NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Health and social care directorate

Quality standards and indicators

Briefing paper

Quality standard topic: Asthma (update)
Output: Prioritised quality improvement areas for development.
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Contents

1 Introduction

This briefing paper presents a structured overview of potential quality improvement areas for asthma. It provides the committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

1.1 Structure

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

If relevant, recommendations selected from the key development sources below are included to help the committee in considering potential statements and measures.

1.2 Development source

The key development sources referenced in this briefing paper are:

Asthma: diagnosis, monitoring and chronic asthma management NICE guideline 80 (2017). Next review: November 2019

British guideline on the management of asthma British Thoracic Society/SIGN guideline 153. Next review: 2018

2 Overview

2.1 Focus of quality standard

This quality standard will cover diagnosing, monitoring and managing asthma in children, young people and adults. It will update and replace the existing NICE quality standard for asthma (QS25) – see appendix 10 for statements.

2.2 Definition

Asthma is a chronic inflammatory respiratory disease. It can affect people of any age, but often starts in childhood. Asthma is a variable disease which can change throughout a person's life, throughout the year, and from day to day. It is characterised by attacks (also known as exacerbations) of breathlessness and wheezing, with the severity and frequency of attacks varying from person to person. The attacks are associated with variable airflow obstruction and inflammation within the lungs, which if left untreated can be life-threatening, however with the appropriate treatment can be reversible.

The causes of asthma are not well understood. A number of risk factors are associated with the condition, often in combination. These influences can be genetic (the condition clusters in families) and/or environmental (such as inhalation of allergens or chemical irritants). Occupational causes of asthma in adults are often under-recognised.

2.3 Incidence and prevalence

Asthma is the most common chronic condition to affect children, and in the UK approximately 5.4 million people (1.1 million children and 4.3 million adults) currently get treatment for asthma[1]. There were 1237 deaths as a result of asthma in England and Wales in 2016, 28% in people under 75[2]. Asthma is responsible for large numbers of accident and emergency admissions, many of which may have been preventable. Asthma UK estimates that around 185 people are admitted to hospital every day in the UK because of asthma attacks.

2.4 Management

There is currently no single test available to diagnose asthma; diagnosis is principally based on a thorough history taken by an experienced clinician. Studies of adults diagnosed with asthma suggest that up to 30% do not have clear evidence of asthma. Some may have had asthma in the past, but it is likely that many have been given an incorrect diagnosis. Conversely, other studies suggest that asthma is underdiagnosed.

It is recognised that asthma control is suboptimal in many people. This has an impact on their quality of life, their use of healthcare services and the associated costs. Asthma control can be monitored by measuring airway obstruction or inflammation and by using validated questionnaires, but the most effective monitoring strategy is unclear.

The severity of asthma varies; some people have severe asthma that limits normal activities, whereas others are able to lead a relatively normal life. The illness fluctuates during the year and over time, so the level of treatment needs to be tailored to the person's current level of asthma severity. Many people with asthma, particularly children, seem to have fewer symptoms over time, and an important part of management is decreasing treatment if asthma is well controlled.

There is no cure for asthma, so management 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

[1] Asthma facts and statistics Asthma UK
[2] Death registrations summary tables – England and Wales 2016 Office for National Statistics

people with asthma and their healthcare professional to devise a personalised treatment plan that is effective and relatively easy to implement.

See appendices 1–3 for the associated diagnosis algorithms from NICE guideline 80.

2.5 National outcome frameworks

Tables 1 and 2 show the outcomes, overarching indicators and improvement areas from the frameworks that the quality standard could contribute to achieving.

Table 1 NHS outcomes framework 2016–17

Domain	Overarching indicators and improvement areas
1 Preventing people from dying prematurely	***Overarching indicators*** 1a Potential Years of Life Lost (PYLL) from causes considered amenable to healthcare i Adults ii Children and young people ***Improvement areas*** **Reducing premature mortality from the major causes of death** 1.2 Under 75 mortality rate from respiratory disease*
2 Enhancing quality of life for people with long-term conditions	***Overarching indicator*** 2 Health-related quality of life for people with long-term conditions** ***Improvement areas*** **Ensuring people feel supported to manage their condition** 2.1 Proportion of people feeling supported to manage their condition **Improving functional ability in people with long-term conditions** 2.2 Employment of people with long-term conditions*, ** **Reducing time spent in hospital by people with long-term conditions** 2.3 i Unplanned hospitalisation for chronic ambulatory care sensitive conditions ii Unplanned hospitalisation for asthma, diabetes and epilepsy in under 19s

4 Ensuring that people have a positive experience of care	***Overarching indicators*** 4a Patient experience of primary care i GP services 4b Patient experience of hospital care 4c *Friends and family test* *4d Patient experience characterised as poor or worse* *I Primary care* *ii Hospital care* ***Improvement areas*** **Improving people's experience of outpatient care** 4.1 Patient experience of outpatient services **Improving people's experience of accident and emergency services** 4.3 Patient experience of A&E services **Improving children and young people's experience of healthcare** *4.8 Children and young people's experience of inpatient services*
Alignment with Adult Social Care Outcomes Framework and/or Public Health Outcomes Framework * Indicator is shared ** Indicator is complementary Indicators in italics in development	

Table 2 Public health outcomes framework for England, 2016–2019

Domain	Objectives and indicators
4 Healthcare public health and preventing premature mortality	***Objective*** Reduced numbers of people living with preventable ill health and people dying prematurely, whilst reducing the gap between communities ***Indicators*** 4.07 Under 75 mortality rate from respiratory diseases* 4.15 Excess winter deaths
Alignment with Adult Social Care Outcomes Framework and/or NHS Outcomes Framework * Indicator is shared	

3 Summary of suggestions

3.1 Responses

In total 19 stakeholders responded to the engagement exercise 15/12/17 - 15/1/18.

Stakeholders were asked to suggest up to 5 areas for quality improvement. Specialist committee members were also invited to provide suggestions. The responses have been merged and summarised in table 3 for further consideration by the Committee.

Full details of all the suggestions provided are given in appendix 11 for information.

Table 3 Summary of suggested quality improvement areas

Suggested area for improvement	Stakeholders
Diagnosis	
• Accurate diagnosis	AUK, BTS, NPRANG, NOV, PFZ, PCRS, RCPCH, RLBU, SCMs
• Occupational asthma	SCMs
Self-management	
• Inhaler technique	ARNS, AZ, BTS, EH, NPL, NPRANG, PCRS, RCN, SCMs
• Personal asthma action plan	ARNS, AUK, BTS, EH, NPL, NPRANG, NCNT, RCN, RLBU, SCMs
Asthma management in primary care	
• Identifying people for review	ARNS, AUK, AZ, NOV, PCRS, RCGP, RCN, RLBU
• Content of review	AUK, CP, EH, NPL, NPRANG, NCNT, NPL, SCMs
• Adjusting medication	RCGP, NPL, RLBU
Acute asthma	
• Severity assessment	EH, SCM
• Treatment of exacerbation	BTS, SCMs
• Follow-up after severe exacerbation	AUK, AZ, EH, NPRANG, SCM
Difficult/severe asthma	
• Referral to a specialist	AUK, AZ, NPL, RLBU, SCMs
• Non-pharmacological treatment	APCP, BS, PCRS
Additional areas	
• Smoking cessation	PZ, PCRS, RCGP
• Training	ARNS, NPL, PCRS, RCN
• Measuring outcomes	RCGP
• Transition	SCM

APCP, Association of Paediatric Chartered Physiotherapists
ARNS, Association of Respiratory Nurse Specialists
AUK, Asthma UK
AZ, AstraZeneca
BS, Boston Scientific
BTS, British Thoracic Society
CP, Circassia Pharmaceuticals plc
EH, Education for Health
NCNT, NIHR CLAHRC North Thames
NPL, Napp Pharmaceuticals Limited
NPRANG, National Paediatric Respiratory and Allergy Nurses Group
NOV, Novartis Pharmaceuticals UK Limited
PFZ, Pfizer
PCRS, Primary Care Respiratory Society UK
RCGP, Royal College of General Practitioners
RCN, Royal College of Nursing
RCPCH, Royal College of Paediatrics and Child Health
RLBU, Royal Liverpool and Broadgreen University NHS Trust
SCM, specialist Committee Member

3.2 Identification of current practice evidence

Bibliographic databases were searched to identify examples of current practice in UK health and social care settings; 2550 papers were identified for asthma. In addition,

72 papers were suggested by stakeholders at topic engagement and 3 papers internally at project scoping.

Of these papers, 12 have been included in this report and are included in the current practice sections where relevant. Appendix 10 outlines the search process.

4 Suggested improvement areas

4.1 Diagnosis

4.1.1 Summary of suggestions

Accurate diagnosis

Stakeholders suggested that asthma is often misdiagnosed which can mean that people who are not diagnosed are at risk of an asthma attack or people who do not have asthma receive drugs that they do not need. Stakeholders highlighted that using objective tests can help healthcare professionals to make a correct diagnosis and should be documented for all new diagnoses. It was acknowledged, however, that this may be difficult to implement due to a current lack of equipment and training, although proposed diagnostic hubs may help. There was a concern that differences in the approach to diagnosis in UK guidelines may lead to inconsistent application in primary care. A stakeholder also highlighted the importance of considering differential diagnoses such as chronic obstructive pulmonary disease.

Occupational asthma

Stakeholders suggested that it is important that people with suspected asthma are assessed for possible occupational asthma so that they can be referred to an occupational asthma specialist if needed.

4.1.2 Selected recommendations from development source

Table 4 below highlights recommendations that have been provisionally selected from the development sources that may support potential statement development. These are presented in full after table 4 to help inform the committee's discussion.

Table 4 Specific areas for quality improvement

Suggested quality improvement area	Suggested source guidance recommendations
Accurate diagnosis	**Initial clinical assessment** NICE NG80 Recommendation 1.1.2 **Objective tests for diagnosing asthma in adults, young people and children aged 5 and over** NICE NG80 Recommendations 1.3.2, 1.3.5, 1.3.6, 1.3.8, 1.3.10, 1.3.11 and 1.3.22
Occupational asthma	**Initial clinical assessment** NICE NG80 Recommendation 1.1.10 and 1.1.11

Initial clinical assessment

NICE NG80 – Recommendation 1.1.2

Do not use symptoms alone without an objective test to diagnose asthma.

NICE NG80 – Recommendation 1.1.10

Check for possible occupational asthma by asking employed people with suspected new-onset asthma, or established asthma that is poorly controlled:

- Are symptoms better on days away from work?
- Are symptoms better when on holiday?

Make sure all answers are recorded for later review.

NICE NG80 – Recommendation 1.1.11

Refer people with suspected occupational asthma to an occupational asthma specialist.

Objective tests for diagnosing asthma in adults, young people and children aged 5 and over

NICE NG80 – 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.

NICE NG80 – 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).

NICE NG80 – Recommendation 1.3.6

Offer a 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.

NICE NG80 – Recommendation 1.3.8

Monitor peak flow variability for 2 to 4 weeks in adults (aged 17 and over) if there is diagnostic uncertainty after initial assessment and a FeNO test and they have either:

- normal spirometry **or**
- obstructive spirometry, reversible airways obstruction (positive BDR) but a FeNO level of 39 ppb or less.

Regard a value of more than 20% variability as a positive test.

NICE NG80 – Recommendation 1.3.10

Monitor peak flow variability for 2 to 4 weeks in children and young people (aged 5 to 16) if there is diagnostic uncertainty after initial assessment and a FeNO test and they have either:

- normal spirometry **or**
- obstructive spirometry, irreversible airways obstruction (negative BDR) and a FeNO level of 35 ppb or more.

Regard a value of more than 20% variability as a positive test.

NICE NG80 – 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.

NICE NG80 – Recommendation 1.3.22

Record the basis for a diagnosis of asthma in a single entry in the person's medical records, alongside the coded diagnostic entry.

4.1.3 Current UK practice

Accurate diagnosis

The BTS audit of adults with asthma admitted to hospital in 2016[3] (171 hospitals, 4258 admissions (excluding those seen only in the emergency department)) found

[3] Adult Asthma Audit Report 2016 (2017) British Thoracic Society

that although there was evidence of a previous diagnosis of asthma in 89% of people admitted, only 42% had evidence of objective testing to support the diagnosis.

The 2014 National Review of Asthma Deaths[4] found that 100 (51%) of the 195 patients who died were diagnosed on the basis of recurrent symptoms, 34 (17%) on physiological measurement of lung function, and 66 (34%) on the response to asthma medication. The basis for diagnosing asthma was not detailed in 64 (33%).

A study of GP data from 72 UK general practices[5] (2 CCG's in England and 1 Health Board in Scotland) found that 25% of patients who received at least one respiratory medication in 12 months had no clinical diagnosis recorded for asthma or COPD.

Occupational asthma

A 2013 Asthma UK survey[6] of 4967 people living in England found that among adults diagnosed in the previous 5 years, 27% recalled being asked questions to find out if their asthma could be caused by their job.

An audit of the recording of occupational asthma in 4 primary care practices in Birmingham in 2012[7] (396 working-age patients) found that occupation was recorded in only 14% of cases and very few (2) were documented within the asthma review template. Occupation was only recorded in 13/55 adults who developed asthma and were in high-risk occupations. Of the 396, 9 (2%) had any work-effect enquiry.

4.1.4 Resource impact

This area of care does have resource implications. The diagnostic pathway has potential to be cost saving, although this depends on the implementation model selected locally by commissioners. The resource impact template for asthma: diagnosis and monitoring, demonstrated that despite up-front costs of £12,209 per 100,000 population, a diagnostic hub model of 5 FeNO machines per 100,000 population would deliver cumulative savings of £16,834 per 100,000 population over 5 years.

Year	2018/19	2019/20	2020/21	2021/22	2022/23
Resource impact (£)	12,209	-7,261	-7,261	-7,261	-7,261
Cumulative impact	12,209	4,949	-2,312	-9,573	-16,834

[4] Why asthma still kills – The National Review of Asthma Deaths Confidential Enquiry Report (2014) Royal College of Physicians
[5] Prescribing respiratory medicines without making a diagnosis of Asthma in UK Primary Care (2015) Clayton et al BMJ Journals Thorax Vol 70, Issue Suppl 3
[6] Compare your care: How asthma care in England matches up to standards (2013) Asthma UK
[7] Audit of the recording of occupational asthma in primary care (2012) Occupational Medicine Vol 62, Issue 7 p570-573

4.2 Self-management

4.2.1 Summary of suggestions

Inhaler technique

The importance of people with asthma knowing how to use their inhalers was emphasised by stakeholders. It was suggested that they should be shown how to use their inhaler at the point of prescribing and at every review/interaction with a healthcare professional, though it was highlighted that not all healthcare professionals are competent in assessing inhaler technique. If inhaler technique is not correct, the person is at increased risk of poor asthma control, and medication may be increased unnecessarily. There was a suggestion that people with asthma should also be directed to online self-help advice and tutorials about inhaler technique (e.g. Asthma UK).

Stakeholders wanted to ensure that the choice of inhaler is appropriate for the person as some may not be able to create sufficient force to activate the device and others may have co-ordination difficulties. It was suggested that the benefits of spacers should be publicised more widely and that people should always be prescribed the same brand of medication to ensure that they do not receive an unfamiliar device.

Personal asthma action plan

Stakeholders suggested that all people with asthma should be involved in developing a written personal asthma action plan (PAAP). Following the plan will help them to respond to changes in their symptoms, enabling them to self-manage and reduce the risk of hospital admission. Stakeholders highlighted that education for people with asthma helps them to understand their condition, and improve adherence to medication and engagement with reviews.

4.2.2 Selected recommendations from development source

Table 5 below highlights recommendations that have been provisionally selected from the development sources that may support potential statement development. These are presented in full after table 5 to help inform the committee's discussion.

Table 5 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Inhaler technique	**Principles of pharmacological management** NICE NG80 Recommendations 1.5.5 **Monitoring asthma control** NICE NG80 Recommendations 1.14.1 and 1.14.7 **Inhaler devices** BTS/SIGN 153 Sections 8.1, 8.2 and 8.4
Personal asthma action plan	**Self-management** NICE NG80 Recommendations 1.10.1

Principles of pharmacological management

NICE NG80 – Recommendation 1.5.5

Ensure that a person with asthma can use their inhaler device:

- at any asthma review, either routine or unscheduled
- whenever a new type of device is supplied.

Monitoring asthma control

NICE NG80 – Recommendation 1.14.1

Monitor asthma control at every review. If control is suboptimal:

- confirm the person's adherence to prescribed treatment in line with the recommendations on assessing adherence in the NICE guideline on medicines adherence
- review the person's inhaler technique
- review if treatment needs to be changed
- ask about occupational asthma (see recommendation 1.1.10) and/or other triggers, if relevant.

NICE NG80 – Recommendation 1.14.7

Observe and give advice on the person's inhaler technique:

- at every consultation relating to an asthma attack, in all care settings
- when there is deterioration in asthma control
- when the inhaler device is changed
- at every annual review
- if the person asks for it to be checked.

Inhaler devices

BTS/SIGN 153 Section 8.2

Choice of reliever inhaler for stable asthma should be based on patient preference and assessment of correct use.

BTS/SIGN 153 Section 8.4

Generic prescribing of inhalers should be avoided as this might lead to people with asthma being given an unfamiliar inhaler device which they are not able to use properly.

Self-management

NICE NG80 – Recommendation 1.10.1

Offer an asthma self-management programme, comprising a written personalised action plan and education, to adults, young people and children aged 5 and over with a diagnosis of asthma (and their families or carers if appropriate).

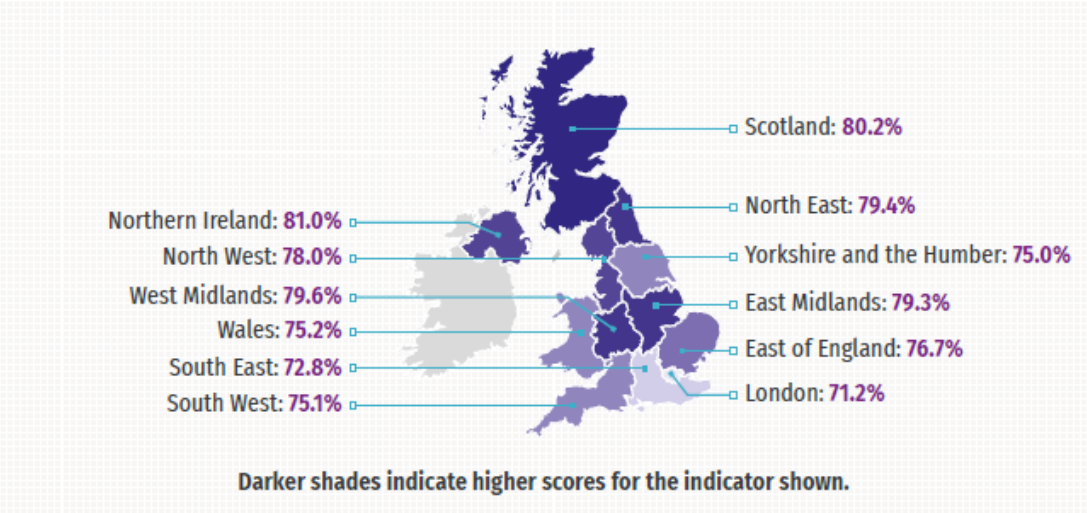
4.2.3 Current UK practice

Inhaler technique

The Asthma UK annual asthma survey 2017[8] (7611 respondents) found that 76.3% of respondents agreed that their doctor or nurse helped to make sure they could correctly use **all** their current types of inhaler before they started using them. This has declined slightly from a high of 79.3% in 2015. The report highlighted regional variations as shown in figure 1.

[8] Falling through the gaps: why more people need basic asthma care Annual Asthma Survey 2017 report Asthma UK

Figure 1: Percentage of respondents who had an inhaler technique check



The BTS paediatric asthma audit 2015[9] (5543 children over 12 months old admitted for 4 hours or more to 153 paediatric units) found that 42% of children had their device technique assessed during admission (compared with 44% in 2013).

A 2016/17 audit of asthma attendances (201 emergency departments, 14043 people including adults and children)[10] found that only 10% of people had a record that their inhaler technique was assessed. In addition, recording of correct inhaler type was poor with only 14% of patients with a record showing that it was satisfactory, and 2% that it was not assessed.

The National Review of Asthma Deaths[11] found that 71% of the 135 cases where the last review was recorded in primary care had an assessment of inhaler technique and inhaler technique was recorded as "good" in 68% of those reviewed. Among the 83 cases where there was a record of receiving specialist secondary care, 8% were known to have been checked for inhaler technique.

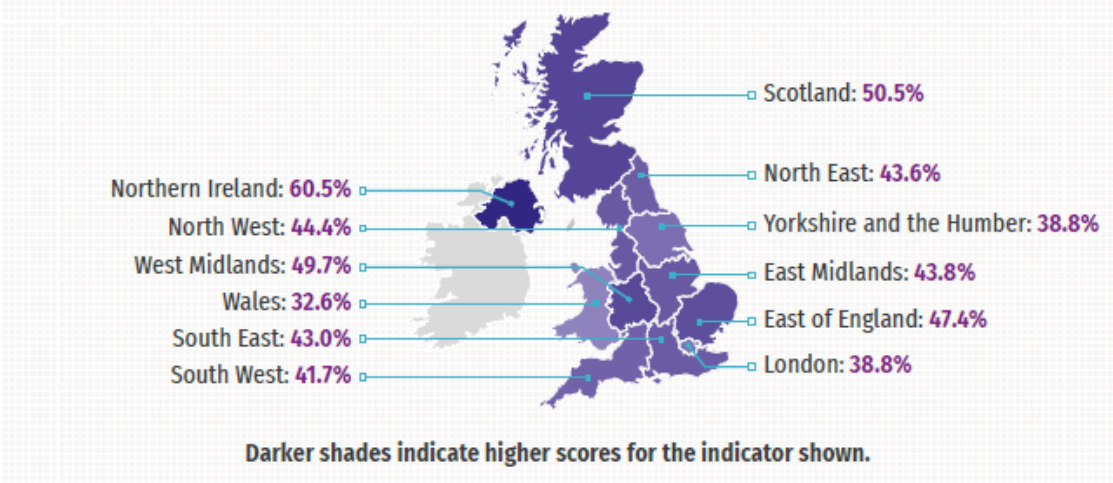
A 2010 study[12] of the ability of healthcare professionals' (HCPs) ability to use the commonly prescribed metered dose inhaler found that of the 113 HCPs who were involved in the teaching of inhaler technique, 11% could demonstrate all the recognised steps in administration including assessment of inspiratory flow using the in-check device.

[9] BTS National Paediatric Asthma Audit Summary Report 2015 British Thoracic Society
[10] Moderate & Acute Severe Asthma Clinical Audit 2016/7 Royal College of Emergency Medicine
[11] Why asthma still kills – The National Review of Asthma Deaths Confidential Enquiry Report (2014) Royal College of Physicians
[12] Do healthcare professionals have sufficient knowledge of inhaler techniques in order to educate their patients effectively in their use? (2010) Baverstock et al BMJ Journals Thorax Vol 65, Issue Suppl 4

Personal asthma action plan

The Asthma UK 2017 survey[13] indicated that 43.9% of respondents had a written action plan for managing their asthma to help them understand when symptoms are getting worse and what to do about it. This increased from 24% in 2013. The report noted regional variations as shown in figure 2.

Figure 2: Percentage of respondents who had received a written asthma action plan

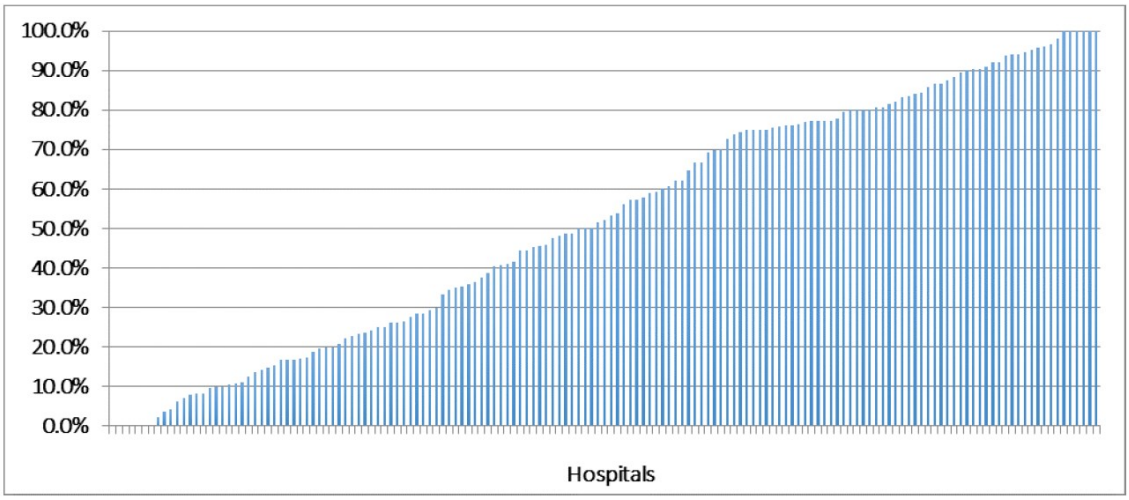


The 2016 BTS adult asthma audit[14] found that 86% of hospitals provided written personal asthma action plans. 28% of people admitted received a care bundle. 31% of those who received an asthma care bundle were provided with a PAAP, and 10% already had one.

The BTS paediatric asthma audit 2015[15] found that 56% of children admitted to a paediatric unit were recorded as having been given an asthma plan (compared with 53% in 2013) and there was significant local variation as shown in figure 3.

[13] Falling through the gaps: why more people need basic asthma care Annual Asthma Survey 2017 report Asthma UK
[14] Adult Asthma Audit Report 2016 (2017) British Thoracic Society
[15] BTS National Paediatric Asthma Audit Summary Report 2015 British Thoracic Society

Figure 3: Proportion of children recorded as having been given an asthma action plan at each hospital



The National review of Asthma Deaths[16] found that of the 195 patients who died in 2012/13 only 23% had a record of having been provided with a PAAP in either primary or secondary care.

4.2.4 Resource impact

This was not considered to be an area of the NICE guidance that would impact on resource use.

[16] Why asthma still kills – The National Review of Asthma Deaths Confidential Enquiry Report (2014) Royal College of Physicians

4.3 Asthma management in primary care

4.3.1 Summary of suggestions

Identifying people for review

Stakeholders suggested that it is important to identify people with asthma who may be at risk of uncontrolled asthma so that treatment can be reviewed. It was felt that it would be possible to identify at risk groups through routine monitoring of data. At risk groups were identified as:

- those overusing short acting beta agonists (SABA)
- people prescribed long-acting reliever medicines without inhaled steroids
- people who have had oral corticosteroids (OCS) but are not prescribed inhaled corticosteroid (ICS) maintenance therapy
- people who have had more than 2 courses of oral or injected corticosteroids
- people who have had an exacerbation, hospital A&E visit or hospital admission in the last 12 months.

Some stakeholders highlighted the importance of a structured annual review for all people with asthma. Others suggested that it is more important to focus reviews on people with asthma who are at risk of uncontrolled asthma and that those who are at risk may need more frequent reviews. A review 4 to 8 weeks after diagnosis was also suggested as a priority.

Content of review

There was agreement that all reviews should include assessment of asthma control and adherence, and support to improve adherence e.g. setting alarms/reminders. It was also suggested that reviews should include an assessment of risk. This will improve quality of life and reduce hospital attendances, admissions and referrals. A stakeholder also suggested that reviews should include periodic assessment of airway inflammation using FENO in order to optimise therapeutic management and assess adherence.

Adjusting medication

Stakeholders highlighted the importance of ensuring a good level of adherence to treatment before medication is stepped up/escalated. It was also suggested that medication should be reviewed regularly to ensure that people receive the lowest effective dose. This will help to avoid the potential side effects of high dose prescribing. It was felt that medication is often escalated during periods of exacerbation but is not reduced during periods of control.

4.3.2 Selected recommendations from development source

Table 6 below highlights recommendations that have been provisionally selected from the development sources that may support potential statement development. These are presented in full after table 6 to help inform the committee's discussion.

Table 6 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Identifying people for review	**Principles of pharmacological treatment** NICE NG80 Recommendation 1.5.2 **Pharmacological treatment pathway for adults (aged 17 and over)** NICE NG80 Recommendation 1.6.3 and 1.6.5 **Pharmacological treatment pathway for children and young people aged 5 to 16** NICE NG80 Recommendation 1.7.3 **Intermittent reliever therapy** BTS/SIGN 153 Section 7.1.1 **Initial add-on therapy** BTS/SIGN 153 Section 7.3.3 **Asthma clinics** BTS/SIGN 153 Section 14.3.1
Content of review	**Monitoring asthma control** NICE NG80 Recommendations 1.14.1, 1.14.3, and 1.14.4
Adjusting medication	**Principles of pharmacological treatment** NICE NG80 Recommendations 1.5.1 and 1.5.4

Identifying people for review

Principles of pharmacological treatment

NICE NG80 Recommendation 1.5.2

After starting or adjusting medicines for asthma, review the response to treatment in 4 to 8 weeks (see section 1.14 on monitoring asthma control).

Pharmacological treatment pathway for adults (aged 17 and over)

NICE NG80 Recommendation 1.6.3

Offer a low dose of an ICS as the first-line maintenance therapy to adults (aged 17 and over) with:

- symptoms at presentation that clearly indicate the need for maintenance therapy (for example, asthma-related symptoms 3 times a week or more, or causing waking at night) **or**
- asthma that is uncontrolled with a SABA alone.

NICE NG80 Recommendation 1.6.5

If asthma is uncontrolled in adults (aged 17 and over) on a low dose of ICS and an LTRA as maintenance therapy, offer a long-acting beta2 agonist (LABA) in combination with the ICS, and review LTRA treatment as follows:

- discuss with the person whether or not to continue LTRA treatment
- take into account the degree of response to LTRA treatment.

Pharmacological treatment pathway for children and young people aged 5 to 16

NICE NG80 Recommendation 1.7.3

Offer a paediatric low dose of an ICS as the first-line maintenance therapy to children and young people (aged 5 to 16) with:

- symptoms at presentation that clearly indicate the need for maintenance therapy (for example, asthma-related symptoms 3 times a week or more, or causing waking at night) **or**
- asthma that is uncontrolled with a SABA alone.

Intermittent reliever therapy

BTS/SIGN 153 Section 7.1.1

Anyone prescribed more than one short-acting bronchodilator inhaler device a month should be identified and have their asthma assessed urgently and measures taken to improve asthma control if this is poor.

Initial add-on therapy

BTS/SIGN 153 Section 7.3.3

Long-acting inhaled β2 agonists should only be started in patients who are already on inhaled corticosteroids, and the inhaled corticosteroid should be continued.

Asthma clinics

BTS/SIGN 153 Section 14.3.1

In primary care, people with asthma should be reviewed regularly by a nurse or doctor with appropriate training in asthma management. Review should incorporate a written action plan.

It is good practice to audit the percentage of patients reviewed annually. Consider focusing on particular groups such as those overusing bronchodilators, patients on higher dose therapies, those with asthma attacks or from groups with more complex needs.

Content of review

Monitoring asthma control

NICE NG80 Recommendation 1.14.1

Monitor asthma control at every review. If control is suboptimal:

- confirm the person's adherence to prescribed treatment in line with the recommendations on assessing adherence in the NICE guideline on medicines adherence

NICE NG80 Recommendation 1.14.3

Monitor asthma control at each review in adults, young people and children aged 5 and over using either spirometry or peak flow variability testing.

NICE NG80 Recommendation 1.14.4

Do not routinely use FeNO to monitor asthma control.

Adjusting medication

Principles of pharmacological treatment

NICE NG80 Recommendation 1.5.1

Take into account the possible reasons for uncontrolled asthma, before starting or adjusting medicines for asthma in adults, young people and children. These may include:

- lack of adherence

NICE NG80 Recommendation 1.5.4

Adjust the dose of ICS maintenance therapy over time, aiming for the lowest dose required for effective asthma control.

Decreasing maintenance therapy

NICE NG80 Recommendation 1.12.1

Consider decreasing maintenance therapy when a person's asthma has been controlled with their current maintenance therapy for at least 3 months.

4.3.3 Current UK practice

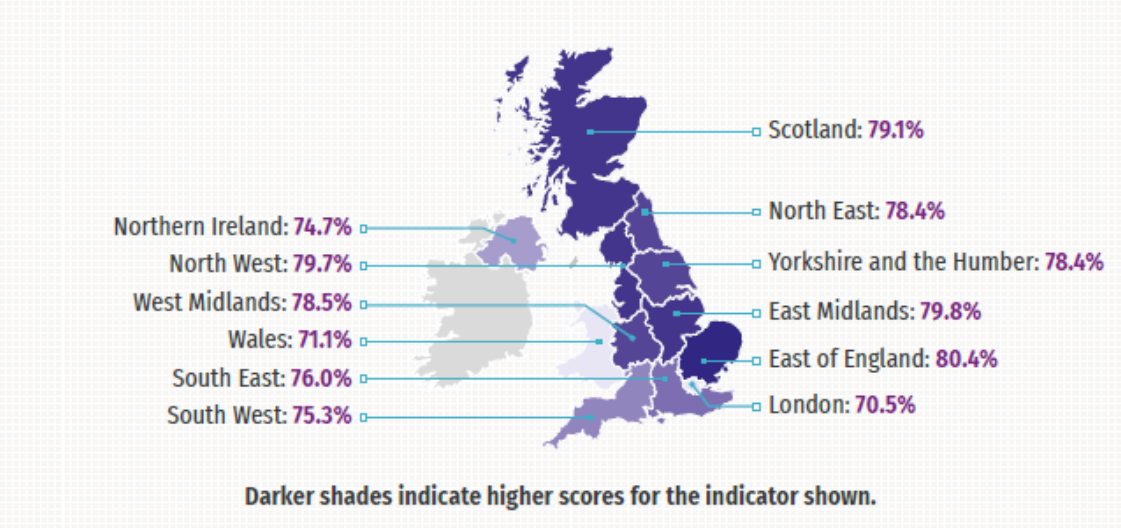
Identifying people for review

The Quality and Outcomes Framework (QOF) data for 2016-17[17] indicated that 70.55% of 3,179,471 people on the GP asthma register (excludes people who have been prescribed no asthma-related drugs in the preceding 12 months) had an asthma review in the preceding 12 months that included an assessment of asthma control using the 3 RCP questions.

The Asthma UK annual survey 2017[18] indicated that 77% of respondents had a planned review or check-up of their asthma with their doctor or nurse in the last year. This was a slight decline from a high of 78.7% in 2015. The report noted regional variations as shown in figure 4.

[17] Quality and Outcomes Framework (QOF) 2016-17 NHS Digital
[18] Falling through the gaps: why more people need basic asthma care Annual Asthma Survey 2017 report Asthma UK

Figure 4: Percentage of respondents receiving an annual asthma review



The National Review of Asthma Deaths[19] 2014 found that 31% of the 195 patients who died had no record of an asthma review in primary care in the previous 12 months. Of the 83 patients who died and were under specialist supervision, 65% had no record of an asthma review in secondary care in the previous 12 months. The review also found evidence of overuse or over-reliance on SABA (reliever) inhalers. From prescribing data for 165 patients, 56% were prescribed more than six and 39% more than 12 SABA inhalers in the year before they died. Six patients (4%) had been prescribed more than 50 SABA inhalers in the previous year. In addition, at least five (3%) patients who died were on LABA monotherapy without inhaled corticosteroid preventer treatment.

An Asthma UK report[20] based on analysis of routinely collected 2010-13 GP practice data to investigate the prescribing issues identified in the National Review of Asthma Deaths found that:

- 402 out of 94,955 people with asthma were prescribed long-acting reliever medicines without inhaled steroids. Applied across the population Asthma UK suggests this could equate to around 22,840 people with asthma, including 1,903 children.
- 5,032 out of 94,955 people had been prescribed more than 12 reliever inhalers over a 12 month period, and almost 40% did not have a review. Applied across the population Asthma UK suggests this could equate to around 106,742 people, including over 10,000 children under 15 who may have been prescribed excessive amounts of reliever medication without being reviewed.

[19] Why asthma still kills – The National Review of Asthma Deaths Confidential Enquiry Report (2014) Royal College of Physicians
[20] Patient safety failures in asthma care: the scale of unsafe prescribing in the UK (2015) Asthma UK

The BTS audit of adults with asthma admitted to hospital in 2016[21] found that 68% were already taking regular ICS. Although the large majority of those discharged were sent home on oral steroids, 25% of those admitted on beta agonist only were not commenced on ICS at discharge. Overall 8% of people were discharged without ICS. The audit concluded that it was a concern that people who have presented with acute asthma are not being discharged on the appropriate treatment.

Content of review

The National Review of Asthma Deaths[22] found that 27% of the 135 cases, where the last review was recorded in primary care, had an assessment of asthma control and 42% had an assessment of medication use.

Adjusting medication

An audit of the management of asthma patients on ICS in primary care in Croydon in 2014-15[23] (9470 patients) found that of the adults who were documented as being suitable for a trial of stepping down treatment, only 50% had their ICS dose reduced. The report concluded that this may suggest reluctance by GPs to step down patients off higher doses of ICS. The audit also suggested that clinicians often do not review the frequency of medication issues to assess adherence and as a result, patients who report continued wheezing often have another drug added to their medication regime, or their ICS dose will be increased, without an inhaler technique check or questions asked about frequency of use first.

4.3.4 Resource impact

The NG80 recommendations on prescribing are considered to be cost saving. The BTS/SIGN 153 Section 7.1.1, 7.3.3 & 14.3.1 should be deliverable within existing resources.

[21] Adult Asthma Audit Report 2016 (2017) British Thoracic Society
[22] Why asthma still kills – The National Review of Asthma Deaths Confidential Enquiry Report (2014) Royal College of Physicians
[23] Audit of the Management of Asthma Patients on Inhaled Corticosteroids in Primary Care (2014-15) Medicines Optimisation team, Croydon CCG

4.4 Acute asthma

4.4.1 Summary of suggestions

Severity assessment

It was suggested that the severity of exacerbations are not routinely assessed in people presenting with acute asthma. This can lead to poor management of the exacerbation. It was highlighted that lung function testing, which can add important information on asthma severity, is underused in acute asthma management.

Treatment of exacerbation

Stakeholders suggested that there is a need to improve treatment of exacerbations, including a nationally agreed acute care pathway. Specific suggestions were:

- Prompt treatment with corticosteroids, and in particular, people with a severe exacerbation should be given oral or intravenous steroids within 1 hour of presentation. This will reduce deaths and may avoid the need for a hospital admission if the person can be discharged from the emergency department.
- Reduce delays in prescription of nebuliser treatment as this leads to suboptimal nebulisation and increased risk of deterioration.

Follow-up after severe exacerbation

Stakeholders indicated that people with asthma who have a severe exacerbation requiring hospital treatment should be followed up in primary care within 2 days in order to review treatment and prevent further exacerbations. Follow-up should be undertaken by an asthma trained healthcare professional. In addition the following were highlighted to facilitate follow up:

- implementation of the BTS Care Bundle on discharge
- improved data sharing between secondary and primary care
- further follow-up after 3 months to review asthma control and adherence.

4.4.2 Selected recommendations from development source

Table 7 below highlights recommendations that have been provisionally selected from the development sources that may support potential statement development. These are presented in full after table 7 to help inform the committee's discussion.

Table 7 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations[24]
Severity assessment	**Acute asthma in adults** BTS/SIGN 153 Tables 12 and 13 **Acute asthma in children** BTS/SIGN 153 Table 14 **Further investigation and monitoring** BTS/SIGN 153 Section 9.4
Treatment of exacerbation	**Treatment of acute asthma in adults** BTS/SIGN 153 Sections 9.3.2 and 9.3.3 **Initial treatment of acute asthma in children** BTS/SIGN 153 Section 9.8.2 and 9.8.4
Follow-up after severe exacerbation	**Lessons from asthma deaths and near fatal asthma** BTS/SIGN 153 Section 9.1.5 **Hospital discharge and follow-up** BTS/SIGN 153 Section 9.6.3 **Second-line treatment of acute asthma in children** BTS/SIGN 153 Section 9.9.7

[24] BTS/SIGN Management pathways for acute asthma are included in Appendices 4 to 9

Severity assessment

Acute asthma in adults

BTS/SIGN 153 Table 12

Table 12: Levels of severity of acute asthma attacks in adults[559-564]

Moderate acute asthma	Increasing symptoms PEF >50–75% best or predicted No features of acute severe asthma	
Acute severe asthma	Any one of: - PEF 33–50% best or predicted - respiratory rate ≥25/min - heart rate ≥110/min - inability to complete sentences in one breath	
Life-threatening asthma	Any one of the following in a patient with severe asthma:	
	Clinical signs	Measurements
	Altered conscious level	PEF <33% best or predicted
	Exhaustion	SpO_2 <92%
	Arrhythmia	PaO_2 <8 kPa
	Hypotension	'normal' $PaCO_2$ (4.6–6.0 kPa)
	Cyanosis	
	Silent chest	
	Poor respiratory effort	
Near-fatal asthma	Raised $PaCO_2$ and/or requiring mechanical ventilation with raised inflation pressures[548-551]	

SpO_2: oxygen saturation measured by a pulse oximeter

PaO_2: partial arterial pressure of oxygen

kPa: kilopascals

$PaCO_2$: partial arterial pressure of carbon dioxide

BTS/SIGN 153 Table 13

Table 13: Initial assessment of symptoms, signs and measurements

Clinical features	Clinical features can identify some patients with severe asthma, eg severe breathlessness (including too breathless to complete sentences in one breath), tachypnoea, tachycardia, silent chest, cyanosis, accessory muscle use, altered consciousness or collapse.[559-564,568] None of these singly or together is specific. Their absence does not exclude a severe attack.	2+
PEF or FEV_1	Measurements of airway calibre improve recognition of the degree of severity, the appropriateness or intensity of therapy, and decisions about management in hospital or at home.[569,570] PEF or FEV_1 are useful and valid measures of airway calibre. PEF is more convenient in the acute situation. PEF expressed as a percentage of the patient's previous best value is most useful clinically. PEF as a percentage of predicted gives a rough guide in the absence of a known previous best value. Different peak flow meters give different readings. Where possible the same or similar type of peak flow meter should be used.	2+
Pulse oximetry	Measure oxygen saturation (SpO_2) with a pulse oximeter to determine the adequacy of oxygen therapy and the need for arterial blood gas (ABG) measurement. The aim of oxygen therapy is to maintain SpO_2 94–98%.[571]	
Blood gases (ABG)	Patients with SpO_2 <92% (irrespective of whether the patient is on air or oxygen) or other features of life-threatening asthma require ABG measurement.[559-562,564,572] SpO_2 <92% is associated with a risk of hypercapnia. Hypercapnia is not detected by pulse oximetry.[572] In contrast, the risk of hypercapnia with SpO_2 >92% is much less.[571]	2+ 4
Chest X-ray	Chest X-ray is not routinely recommended in patients in the absence of: - suspected pneumomediastinum or pneumothorax - suspected consolidation - life-threatening asthma - failure to respond to treatment satisfactorily - requirement for ventilation.	4
Systolic paradox	Systolic paradox (*pulsus paradoxus*) is an inadequate indicator of the severity of an attack and should not be used.[559-564,573]	2+

Acute asthma in children

BTS/SIGN 153 Table 14

Table 14: Levels of severity of acute asthma attacks in children[633]

Moderate asthma	Able to talk in sentences SpO_2 ≥92% PEF ≥50% best or predicted Heart rate ≤140/min in children aged 1–5 years ≤125/min in children >5 years Respiratory rate ≤40/min in children aged 1–5 years ≤30/min in children >5 years	
Acute severe asthma	Can't complete sentences in one breath or too breathless to talk or feed SpO_2 <92% PEF 33–50% best or predicted Heart rate >140/min in children aged 1–5 years >125/min in children >5 years Respiratory rate >40/min in children aged 1–5 years >30/min in children >5 years	
Life-threatening asthma	Any one of the following in a child with severe asthma:	
	Clinical signs	Measurements
	Silent chest	SpO_2 <92%
	Cyanosis	PEF <33% best or predicted
	Poor respiratory effort	
	Hypotension	
	Exhaustion	
	Confusion	

Further investigation and monitoring

BTS/SIGN 153 Section 9.4

Measure and record PEF 15–30 minutes after starting treatment, and thereafter according to the response. Measure and record PEF before and after nebulised or inhaled β2 agonist.

Treatment of exacerbation

Treatment of acute asthma in adults

BTS/SIGN 153 Section 9.3.2

Use high-dose inhaled β2 agonists as first-line agents in patients with acute asthma and administer as early as possible. Reserve intravenous β2 agonists for those patients in whom inhaled therapy cannot be used reliably.

In hospital, ambulance and primary care, nebulisers for giving nebulised β2 agonist bronchodilators should preferably be driven by oxygen.

In patients with acute asthma with life-threatening features the nebulised route (oxygen-driven) is recommended.

BTS/SIGN 153 Section 9.3.3

Give steroids in adequate doses to all patients with an acute asthma attack.

Initial treatment of acute asthma in children

BTS/SIGN 153 Section 9.8.2

Inhaled β2 agonists are the first-line treatment for acute asthma in children.

A pMDI + spacer is the preferred option for children with mild to moderate asthma.

If symptoms are severe additional doses of bronchodilator should be given as needed whilst awaiting medical attention.

Paramedics attending to children with an acute asthma attack should administer nebulised salbutamol, using a nebuliser driven by oxygen if symptoms are severe, whilst transferring the child to the emergency department.

If symptoms are refractory to initial β2 agonist treatment, add ipratropium bromide (250 micrograms/dose mixed with the nebulised β2 agonist solution).

Repeated doses of ipratropium bromide should be given early to treat children who are poorly responsive to β2 agonists.

BTS/SIGN 153 Section 9.8.4

Give oral steroids early in the treatment of acute asthma attacks in children.

Follow-up after severe exacerbation

Lessons from asthma deaths and near fatal asthma

BTS/SIGN 153 Section 9.1.5

A respiratory specialist should follow up patients admitted with a severe asthma attack for at least one year after the admission.

Hospital discharge and follow-up

BTS/SIGN 153 Section 9.6.3

It is essential that the patient's primary care practice is informed within 24 hours of discharge from the emergency department or hospital following an asthma attack. Ideally this communication should be directly with a named individual responsible for asthma care within the practice, by means of fax or email.

Second-line treatment of acute asthma in children

BTS/SIGN 153 Section 9.9.7

Discharge plans should address the following:

- arrange follow up by primary care services within two working days
- arrange follow up in a paediatric asthma clinic within one to two months

4.4.3 Current UK practice

Severity assessment

The Royal College of Emergency Medicine Asthma Audit 2016-17[25] found that 4.1% of people attending an emergency department with asthma did not have their severity level recorded.

The BTS 2016 adult asthma audit[26] found that 80% of patients had a peak expiratory flow (PEF) reading taken on admission (81% in 2012) and 76% prior to discharge. The audit highlighted that PEF measurement informs the decision to admit and is a core variable in assessing a patient for severity and subsequent treatment. The report concluded that it was disappointing this had not improved and highlighted the need for further work such as standardised asthma assessment tools to prompt clinicians to take these readings.

[25] Moderate & Acute Severe Asthma Clinical Audit 2016/7 Royal College of Emergency Medicine
[26] Adult Asthma Audit Report 2016 (2017) British Thoracic Society

The BTS National Paediatric Asthma Audit 2015[27] found that only 10% of children 5 years and older had PEF measured at initial assessment, despite this being a useful marker of severity.

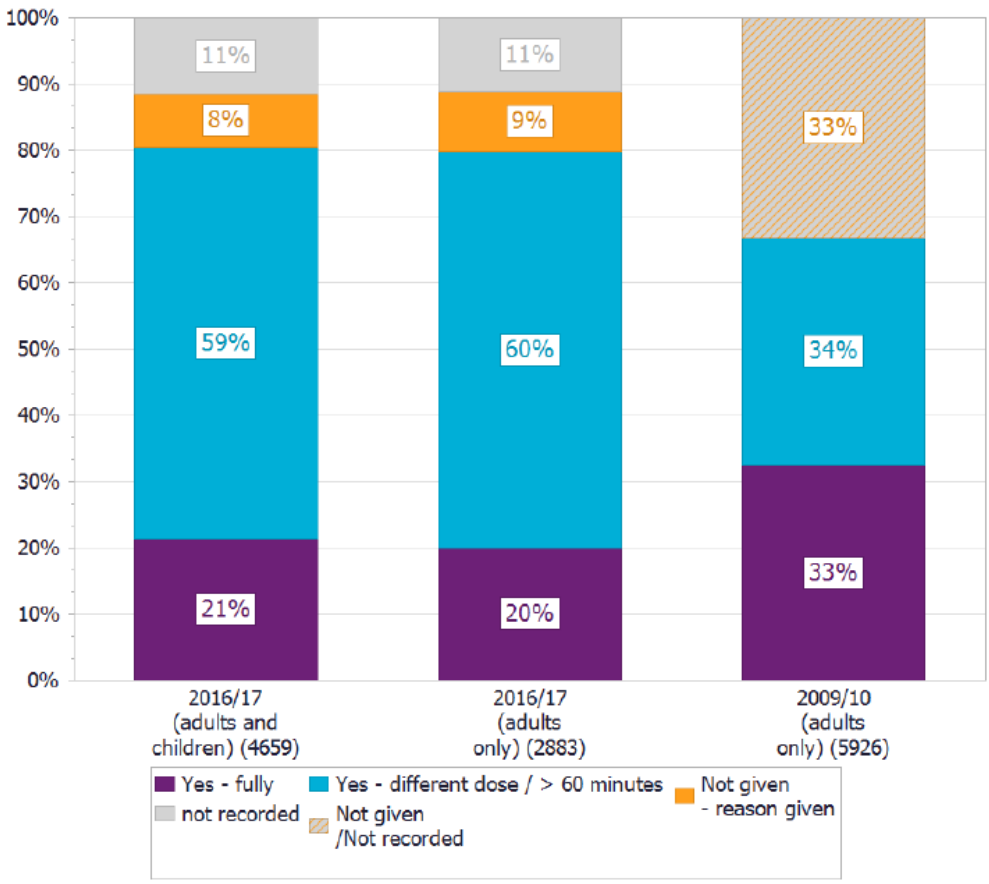
Treatment of exacerbation

The RCEM 2016/17 audit of emergency attendances for asthma[28] found that on average only a quarter of patients got bronchodilator within 10 minutes of arrival. This has improved marginally from previous years. The standard specifies that a pMDI + spacer is the preferred option for children with moderate asthma. However, the audit does not take into account that many patients will have received bronchodilator in an ambulance or at their GP prior to arrival at hospital and so may not require it within 10 minutes.

The RCEM asthma audit also concluded that 88.6% of patients with severe asthma received steroids within 1 hour of arrival, although figure 5 indicates that many were not fully compliant and were either given a different dose to that identified in the standard or timing was more than 60 minutes. The audit also found that steroids were considered or given within 4 hours in 79% of patients with moderate asthma.

[27] BTS National Paediatric Asthma Audit Summary Report 2015 British Thoracic Society
[28] Moderate & Acute Severe Asthma Clinical Audit 2016/7 Royal College of Emergency Medicine

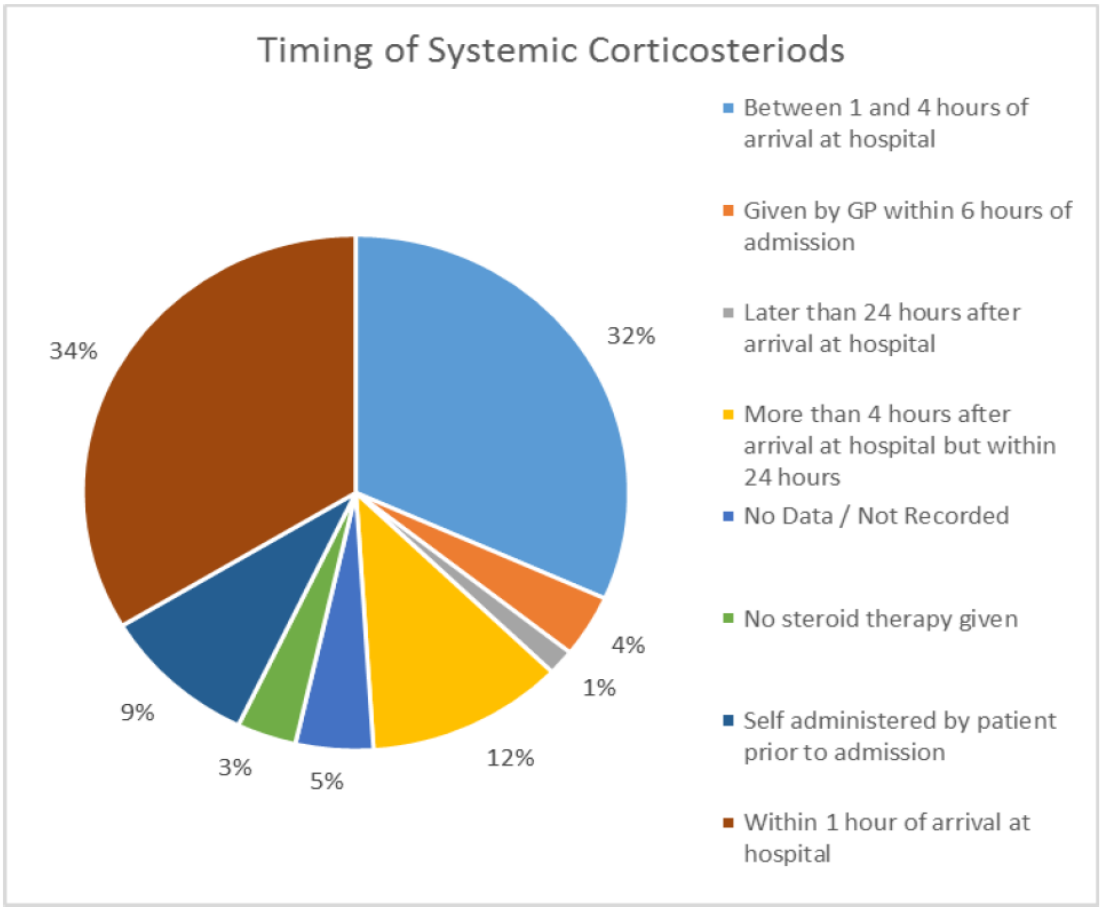
Figure 5: Standard 5a - If not already given before, patients with severe asthma should be given steroids within 60 minutes of arrival



The BTS audit of adults with asthma admitted to hospital in 2016[29] found that 34% were given systemic steroids within 1 hour of arrival at hospital and 13% more than 4 hours after arrival at hospital as shown in figure 6.

[29] Adult Asthma Audit Report 2016 (2017) British Thoracic Society

Figure 6: Timing of systemic steroids



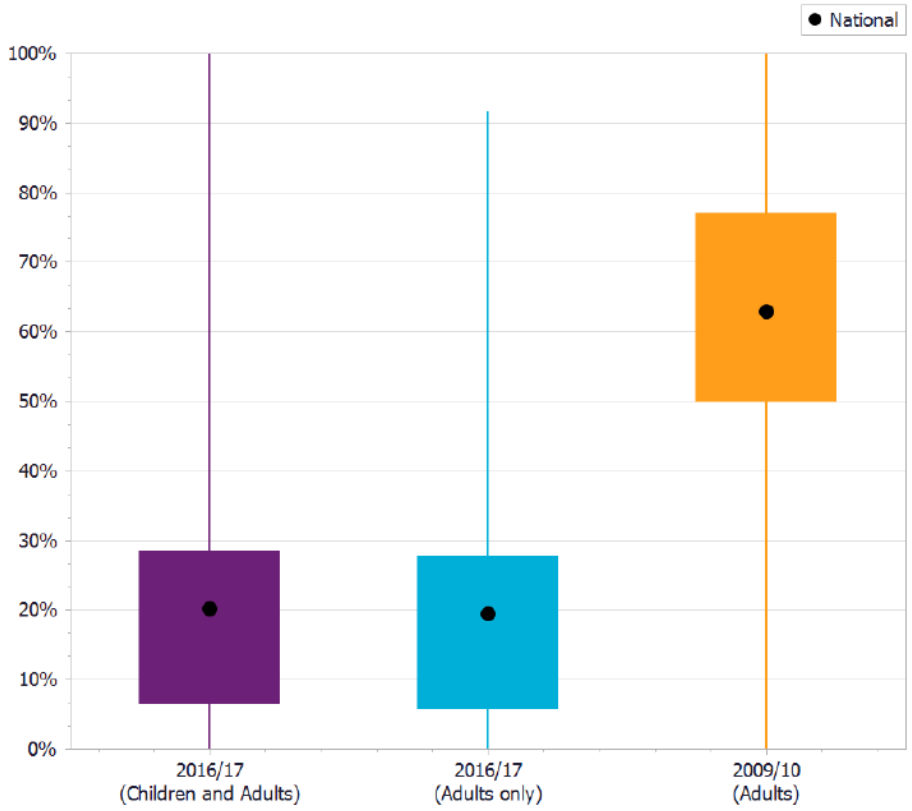
The BTS Paediatric asthma audit 2015[30] found that 75% of children were given steroids, rising to 90% of children aged 6 years or over. In 17% of children, steroids were started before the child came to hospital and 63% were started at admission.

Follow-up after severe exacerbation

The RCEM audit of emergency asthma attendances[31] found that 50% of departments arranged GP follow-up for 16% of their patients within 2 working days, according to local policy. Figure 7 shows that this has declined significantly since 2009.

[30] BTS National Paediatric Asthma Audit Summary Report 2015 British Thoracic Society
[31] Moderate & Acute Severe Asthma Clinical Audit 2016/7 Royal College of Emergency Medicine

Figure 7: Standard 11 – GP or clinic follow-up arranged according to local policy for discharged patients within 2 working days (Median)



Nearly a third of respondents to the Asthma UK annual survey 2017[32] (2229 of 7611) had received emergency or unplanned care at a hospital or out-of-hours centre in the previous year. Of those, 29.7% had a follow-up appointment at their doctor's surgery for their asthma within 2 working days, an increase from 26.9% in 2016.

The BTS adult asthma audit[33] found that 16% of adults with asthma admitted to hospital received a discharge care bundle. A clinic review appointment was scheduled in 64% of admissions and of those 64% were arranged to occur within 4 weeks of discharge.

The BTS paediatric audit[34] found that 24% of children were recorded as being advised to visit their GP within 2 working days. There was no record of this advice being given in 32% of cases. A third of cases had hospital follow-up arranged and follow-up with a respiratory specialist health professional was arranged in 16% of cases.

[32] Falling through the gaps: why more people need basic asthma care Annual Asthma Survey 2017 report Asthma UK
[33] Adult Asthma Audit Report 2016 (2017) British Thoracic Society
[34] BTS National Paediatric Asthma Audit Summary Report 2015 British Thoracic Society

4.4.4 Resource impact

Severe exacerbations are not covered in the NICE guideline and these recommendations have therefore not been costed.

4.5 Difficult/severe asthma

4.5.1 Summary of suggestions

Referral to a specialist

Stakeholders suggested that people with difficult/severe asthma (i.e. they remain uncontrolled on conventional therapy) should be referred to a specialist. This will ensure diagnosis and the approach to management is reviewed. Specialist care can help to reduce exacerbations and dependence on oral steroids. It was noted that there is currently limited access to multidisciplinary difficult asthma services for children.

Some people may need ongoing specialist care in order to improve health outcomes. It was suggested that people who are regularly taking oral steroids should have had a specialist review within the last 2 years. Specialist care can provide access to novel treatments such as biologic therapies as an alternative to long term oral steroids.

Non-pharmacological treatment

Stakeholders highlighted that non-pharmacological treatments such as breathing retraining and therapies delivered via medical devices should be available to people with difficult/severe asthma. It was noted that there is currently local variation in access to breathing re-training for children as paediatric asthma physiotherapy services are not always in place. It was suggested that non-pharmacological treatments can improve quality of life and avoid the need for higher dose medication.

4.5.2 Selected recommendations from development source

Table 8 below highlights recommendations that have been provisionally selected from the development sources that may support potential statement development. These are presented in full after table 8 to help inform the committee's discussion.

Table 8 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Referral to a specialist	**Pharmacological treatment pathway for adults (aged 17 and over)** NICE NG80 Recommendation 1.6.8 **Pharmacological treatment pathway for children and young people aged 5 to 16** NICE NG80 Recommendation 1.7.8 **Pharmacological treatment pathway for children under 5** NICE NG80 Recommendation 1.8.5 **Difficult asthma** BTS/SIGN 153 Section 10.1
Non-pharmacological treatment	**Secondary non-pharmacological prevention** BTS/SIGN 153 Section 6.2.13 **Factors contributing to difficult asthma** BTS/SIGN 153 Section 10.2.3

Referral to a specialist

Pharmacological treatment pathway for adults (aged 17 and over)

NICE NG80 Recommendation 1.6.8

If asthma is uncontrolled in adults (aged 17 and over) on a moderate maintenance ICS dose with a LABA (either as MART or a fixed-dose regimen), with or without an LTRA, consider:

- increasing the ICS to a high maintenance dose (this should only be offered as part of a fixed-dose regimen, with a SABA used as a reliever therapy) or
- a trial of an additional drug (for example, a long-acting muscarinic receptor antagonist or theophylline) or
- seeking advice from a healthcare professional with expertise in asthma.

Pharmacological treatment pathway for children and young people aged 5 to 16

NICE NG80 Recommendation 1.7.8

If asthma is uncontrolled in children and young people (aged 5 to 16) on a paediatric moderate maintenance ICS dose with LABA (either as MART or a fixed-dose regimen), consider seeking advice from a healthcare professional with expertise in asthma and consider either:

- increasing the ICS dose to paediatric high maintenance dose (only as part of a fixed-dose regimen, with a SABA used as a reliever therapy) or
- a trial of an additional drug (for example, theophylline).

Pharmacological treatment pathway for children under 5

NICE NG80 Recommendation 1.8.5

If suspected asthma is uncontrolled in children under 5 on a paediatric low dose of ICS and an LTRA as maintenance therapy, stop the LTRA and refer the child to a healthcare professional with expertise in asthma for further investigation and management.

Difficult asthma

BTS/SIGN 153 Section 10.1

Patients with difficult asthma should be systematically evaluated, including:

- confirmation of the diagnosis of asthma, and
- identification of the mechanism of persisting symptoms and assessment of adherence to therapy.

This assessment should be facilitated through a dedicated multidisciplinary difficult asthma service, by a team experienced in the assessment and management of difficult asthma.

Non-pharmacological treatment

Secondary non-pharmacological prevention

BTS/SIGN 153 Section 6.2.13

Breathing exercise programmes (including physiotherapist-taught methods) can be offered to people with asthma as an adjuvant to pharmacological treatment to improve quality of life and reduce symptoms.

Factors contributing to difficult asthma

BTS/SIGN 153 Section 10.2.3

Dysfunctional breathing should be considered as part of a difficult asthma assessment.

4.5.3 Current UK practice

Referral to a specialist

The BTS audit of adult hospital admissions[35] found that 98 out of 165 hospitals (59%) had a specialist asthma service.

Non-pharmacological treatment

Research presented at the British Thoracic Society's 2017 winter meeting[36] involving 18 paediatric hospitals in the UK identified that:

- 89% of the hospitals did not have funded 'difficult asthma' physiotherapy
- 66% had no dedicated 'difficult asthma' physiotherapy time
- 94% of centres relied on referrals from 'difficult asthma' consultants and nurses rather than having the opportunity to routinely assess 'difficult asthma' patients.

4.5.4 Resource impact

Referral to a specialist was not considered to be an area of the NICE guidance that would impact on resource use. Breathing exercise programmes are not covered in the NICE guideline and these recommendations have therefore not been costed.

[35] Adult Asthma Audit Report 2016 (2017) British Thoracic Society
[36] Physiotherapy overlooked in helping children with difficult asthma (2017) Wells

4.6 Additional areas

Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or require further discussion by the committee to establish potential for statement development.

There will be an opportunity for the committee to discuss these areas at the end of the session on 21st February 2018.

Smoking cessation

Stakeholders suggested people with asthma should be asked if they smoke and if they do they should be offered support to stop smoking. Smoking in people with asthma is associated with poorer outcomes including hospital attendance. These issues are included in the quality standard on smoking: supporting people to stop (QS43). There are specific recommendations on advice and support to parents with asthma on the dangers of smoking in the BTS/SIGN guideline. In general, however, the advice and support on smoking cessation for people with asthma is the same as for all people who smoke and therefore this suggestion has not been progressed.

Training

Ensuring that healthcare professionals have up to date asthma training was suggested as an area of quality improvement. It was also suggested that hospitals and general practices should have a clinical lead for asthma who is responsible for the training of staff. This suggestion has not been progressed. Quality statements focus on actions that demonstrate high quality care or support, not the training that enables the actions to take place. The committee is therefore asked to consider which components of care and support would be improved by increased training. However, training may be referred to in the audience descriptors.

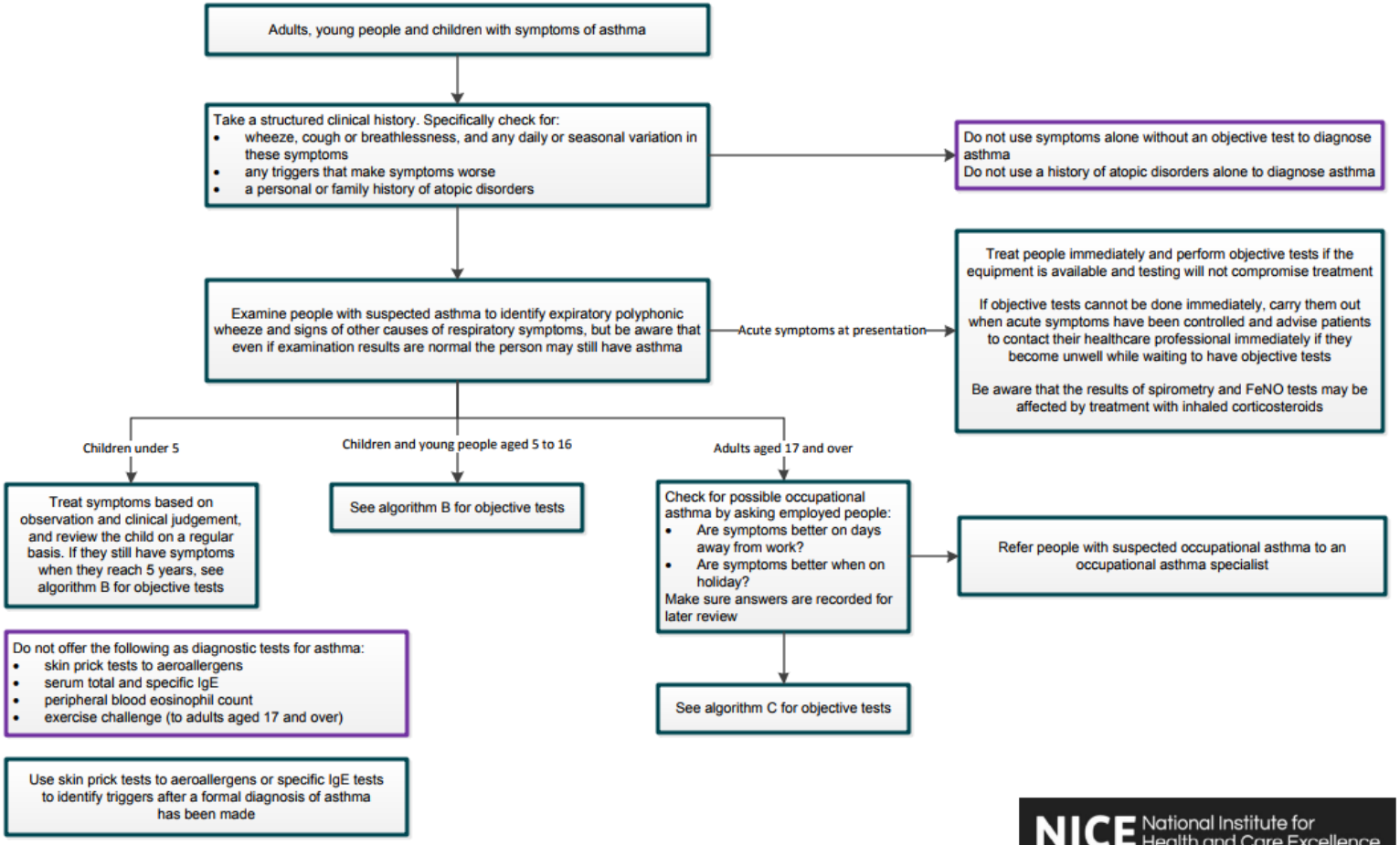
Measuring outcomes

A stakeholder suggested that primary care should be assessed against the outcome of hospital attendances for people with asthma as these should be preventable. Quality statements focus on actions that demonstrate high quality care or support, not the methods by which evidence is collated. However, relevant outcome measures will be included in the quality statements.

Transition

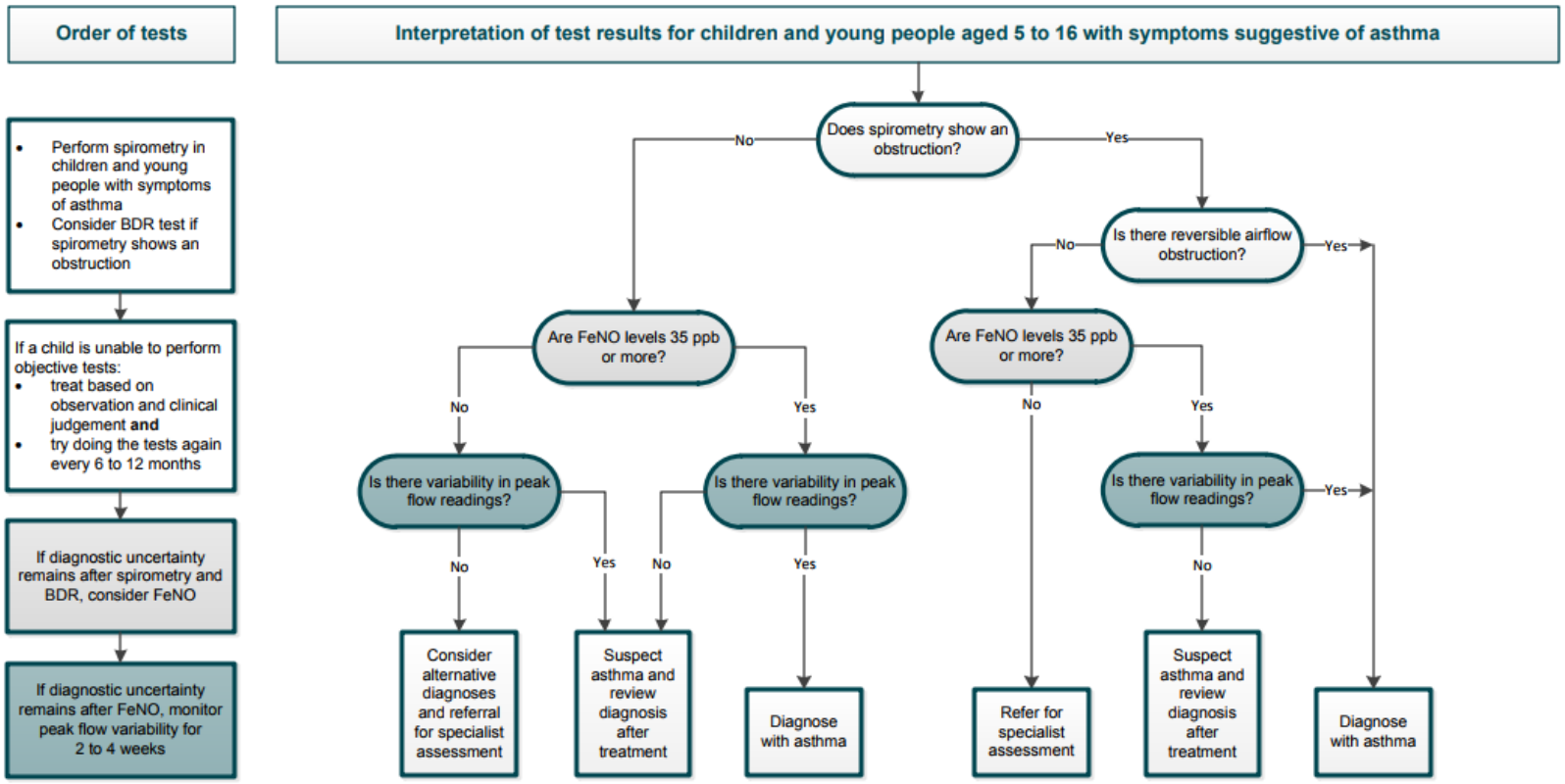
Transition between paediatric and adult services and between tertiary, secondary and primary care was highlighted as a priority for quality improvement. There was concern that responsibilities are not always clear and that this can cause confusion for people with asthma and their families. There is a separate quality standard on transition from children's to adult's services (QS140). Quality statements focus on actions that demonstrate high quality care or support, rather than on organisational responsibilities. However, where it is important to clarify responsibilities this can be addressed in the supporting audience descriptors for prioritised statements.

Appendix 1: Algorithm A - Initial clinical assessment for adults, young people and children with suspected asthma



This algorithm is based on recommendations from NICE's guideline on asthma: diagnosis, monitoring and chronic asthma management (2017)

Appendix 2: Algorithm B - Objective tests for asthma in children and young people aged 5 to 16



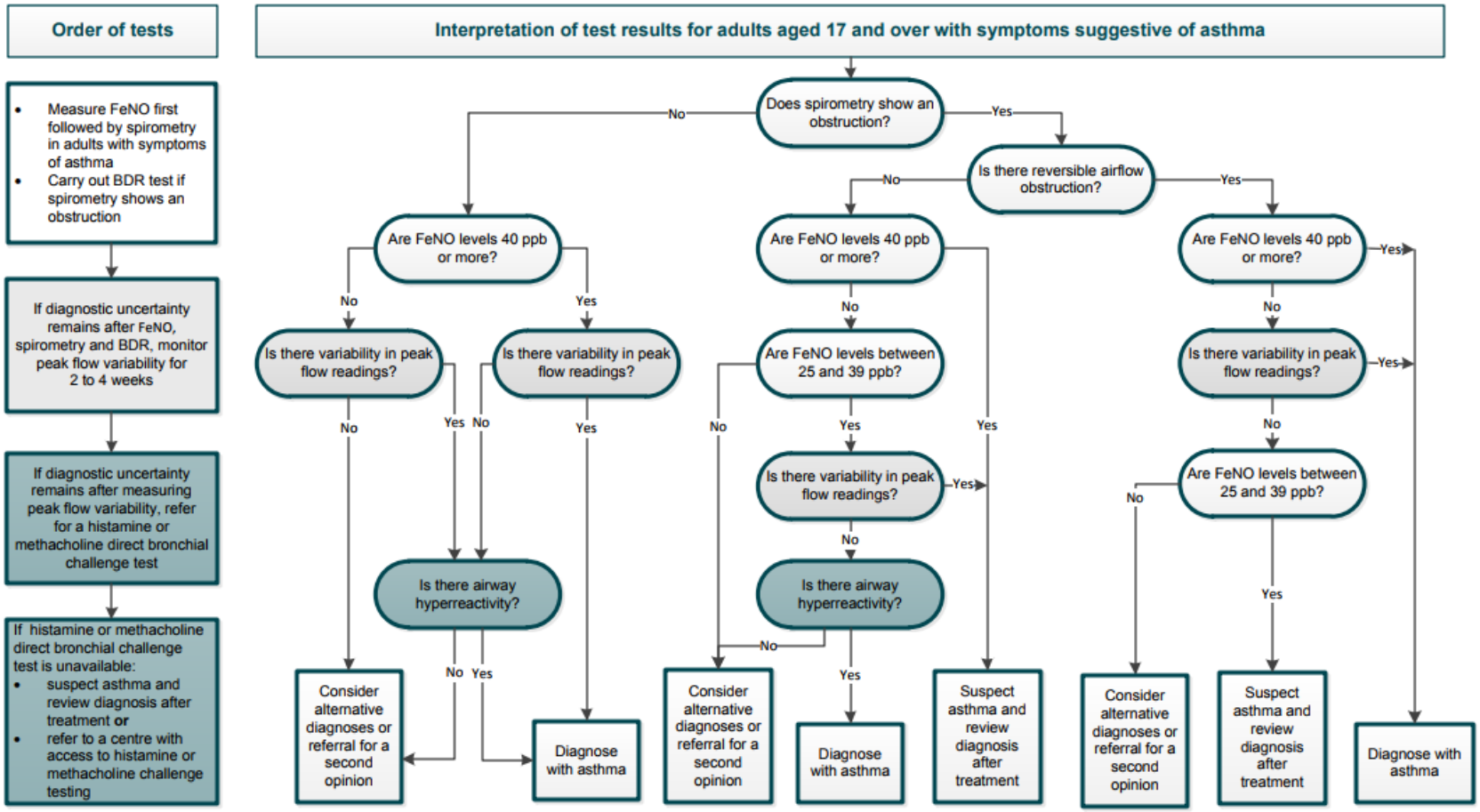
Abbreviations:
FeNO, fractional exhaled nitric oxide
BDR, bronchodilator reversibility

This algorithm is based on recommendations from NICE's guideline on asthma: diagnosis, monitoring and chronic asthma management (2017)

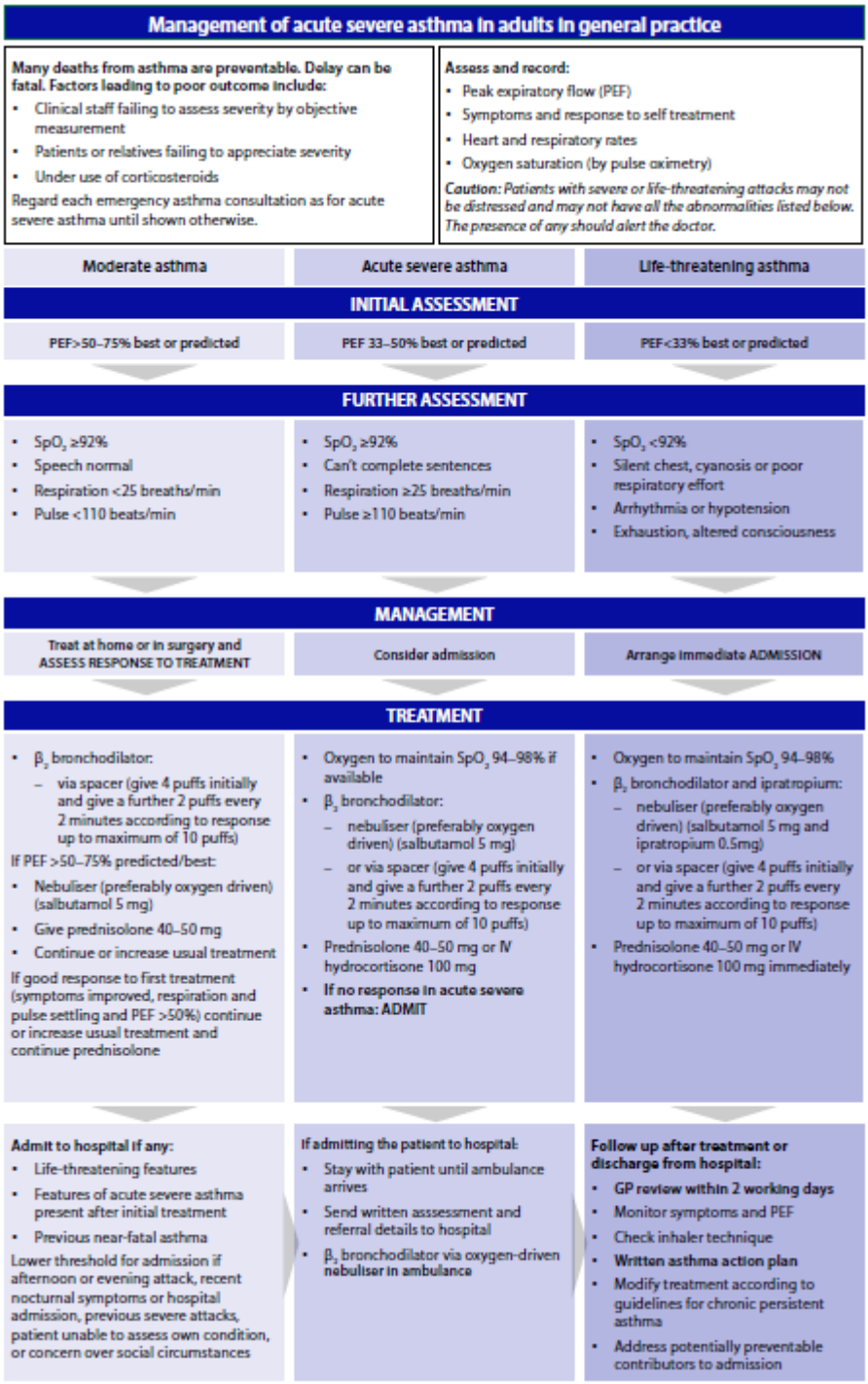
Positive test thresholds
Obstructive spirometry: FEV1/FVC ratio less than 70% (or below the lower limit of normal if available)
FeNO: 35 ppb or more
BDR: improvement in FEV1 of 12% or more
Peak flow variability: variability over 20%

NICE National Institute for Health and Care Excellence

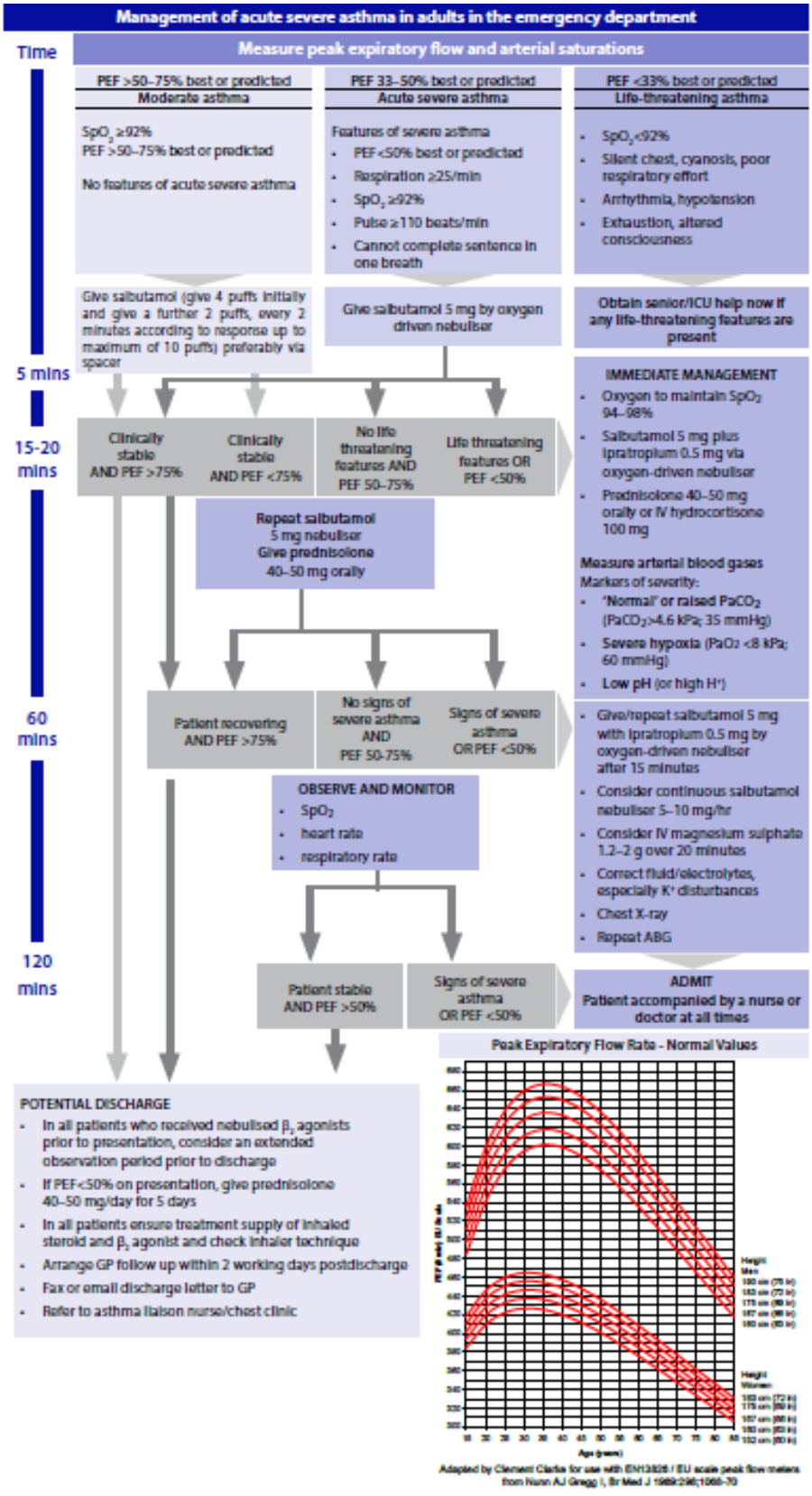
Appendix 3: Algorithm C - Objective tests for asthma in adults aged 17 and over



Appendix 4: Management of acute severe asthma in adults in general practice (BTS/SIGN 153)



Appendix 5: Management of acute severe asthma in adults in the emergency department (BTS/SIGN 153)



Appendix 6: Management of acute severe asthma in adults in hospital (BTS/SIGN 153)

Management of acute severe asthma in adults in hospital

Features of acute severe asthma

- Peak expiratory flow (PEF) 33–50% of best (use % predicted if recent best unknown)
- Can't complete sentences in one breath
- Respiration ≥25 breaths/min
- Pulse ≥110 beats/min

Life-threatening features

- PEF <33% of best or predicted
- SpO_2 <92%
- Silent chest, cyanosis, or feeble respiratory effort
- Arrhythmia or hypotension
- Exhaustion, altered consciousness

If a patient has any life-threatening feature, measure arterial blood gases. No other investigations are needed for immediate management.

Blood gas markers of a life-threatening attack:

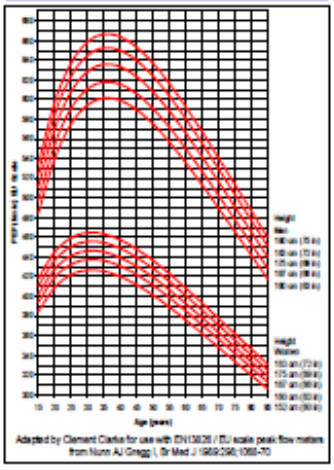
- 'Normal' (4.6–6 kPa, 35–45 mmHg) $PaCO_2$
- Severe hypoxia: PaO_2 <8 kPa (60 mmHg) irrespective of treatment with oxygen
- A low pH (or high H^+)

Caution: Patients with severe or life-threatening attacks may not be distressed and may not have all these abnormalities. The presence of any should alert the doctor.

Near-fatal asthma

- Raised $PaCO_2$
- Requiring mechanical ventilation with raised inflation pressures

Peak Expiratory Flow Rate - Normal Values



Adapted by Clement Clarke for use with EN13826 / EU scale peak flow meters from Nunn AJ Gregg I, Br Med J 1989;298:1068–70

IMMEDIATE TREATMENT

- Oxygen to maintain SpO_2 94–98%
- Salbutamol 5 mg via an oxygen-driven nebuliser
- Ipratropium bromide 0.5 mg via an oxygen-driven nebuliser
- Prednisolone tablets 40–50 mg or IV hydrocortisone 100 mg
- No sedatives of any kind
- Chest X-ray if pneumothorax or consolidation are suspected or patient requires mechanical ventilation

IF LIFE-THREATENING FEATURES ARE PRESENT:

- Discuss with senior clinician and ICU team
- Consider IV magnesium sulphate 1.2–2 g infusion over 20 minutes (unless already given)
- Give nebulised β_2 agonist more frequently eg salbutamol 5 mg up to every 15-30 minutes or 10 mg per hour via continuous nebulisation (requires special nebuliser)

SUBSEQUENT MANAGEMENT

IF PATIENT IS IMPROVING continue:

- Oxygen to maintain SpO_2 94–98%
- Prednisolone 40–50mg daily or IV hydrocortisone 100 mg 6 hourly
- Nebulised β_2 agonist and ipratropium 4–6 hourly

IF PATIENT NOT IMPROVING AFTER 15–30 MINUTES:

- Continue oxygen and steroids
- Use continuous nebulisation of salbutamol at 5–10 mg/hour if an appropriate nebuliser is available. Otherwise give nebulised salbutamol 5 mg every 15–30 minutes
- Continue ipratropium 0.5 mg 4–6 hourly until patient is improving

IF PATIENT IS STILL NOT IMPROVING:

- Discuss patient with senior clinician and ICU team
- Consider IV magnesium sulphate 1.2–2 g over 20 minutes (unless already given)
- Senior clinician may consider use of IV β_2 agonist or IV aminophylline or progression to mechanical ventilation

MONITORING

- Repeat measurement of PEF 15–30 minutes after starting treatment
- Oximetry: maintain SpO_2 >94–98%
- Repeat blood gas measurements within 1 hour of starting treatment if:
  - initial PaO_2 <8 kPa (60 mmHg) unless subsequent SpO_2 >92% or
  - $PaCO_2$ normal or raised or
  - patient deteriorates
- Chart PEF before and after giving β_2 agonists and at least 4 times daily throughout hospital stay

Transfer to ICU accompanied by a doctor prepared to intubate if:

- Deteriorating PEF, worsening or persisting hypoxia, or hypercapnia
- Exhaustion, altered consciousness
- Poor respiratory effort or respiratory arrest

DISCHARGE

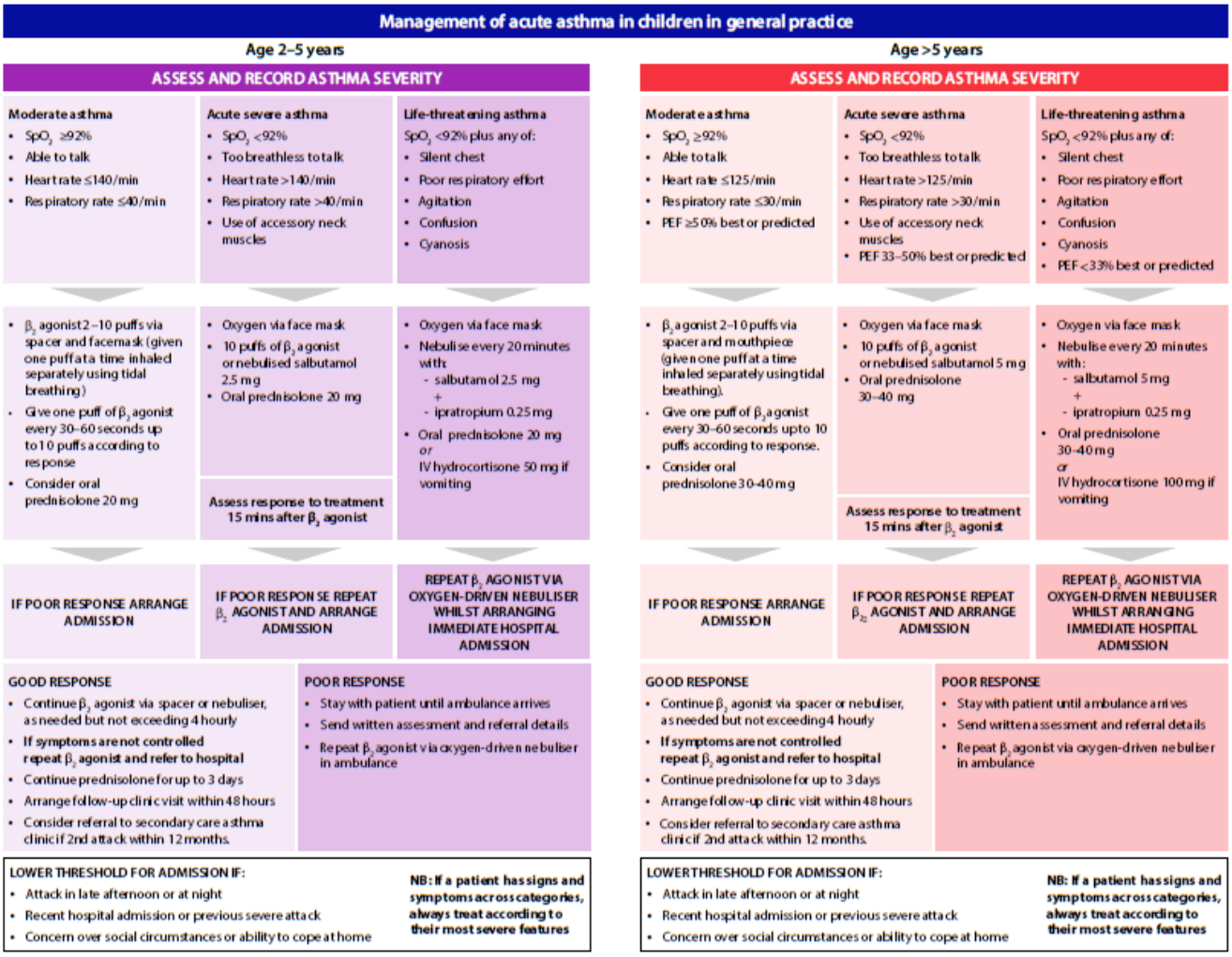
When discharged from hospital, patients should have:

- Been on discharge medication for 12–24 hours and have had inhaler technique checked and recorded
- PEF >75% of best or predicted and PEF diurnal variability <25% unless discharge is agreed with respiratory physician
- Treatment with **oral and inhaled steroids** in addition to bronchodilators
- Own PEF meter and **written asthma action plan**
- GP follow up arranged within **2 working days**
- Follow-up appointment in respiratory clinic **within 4 weeks**

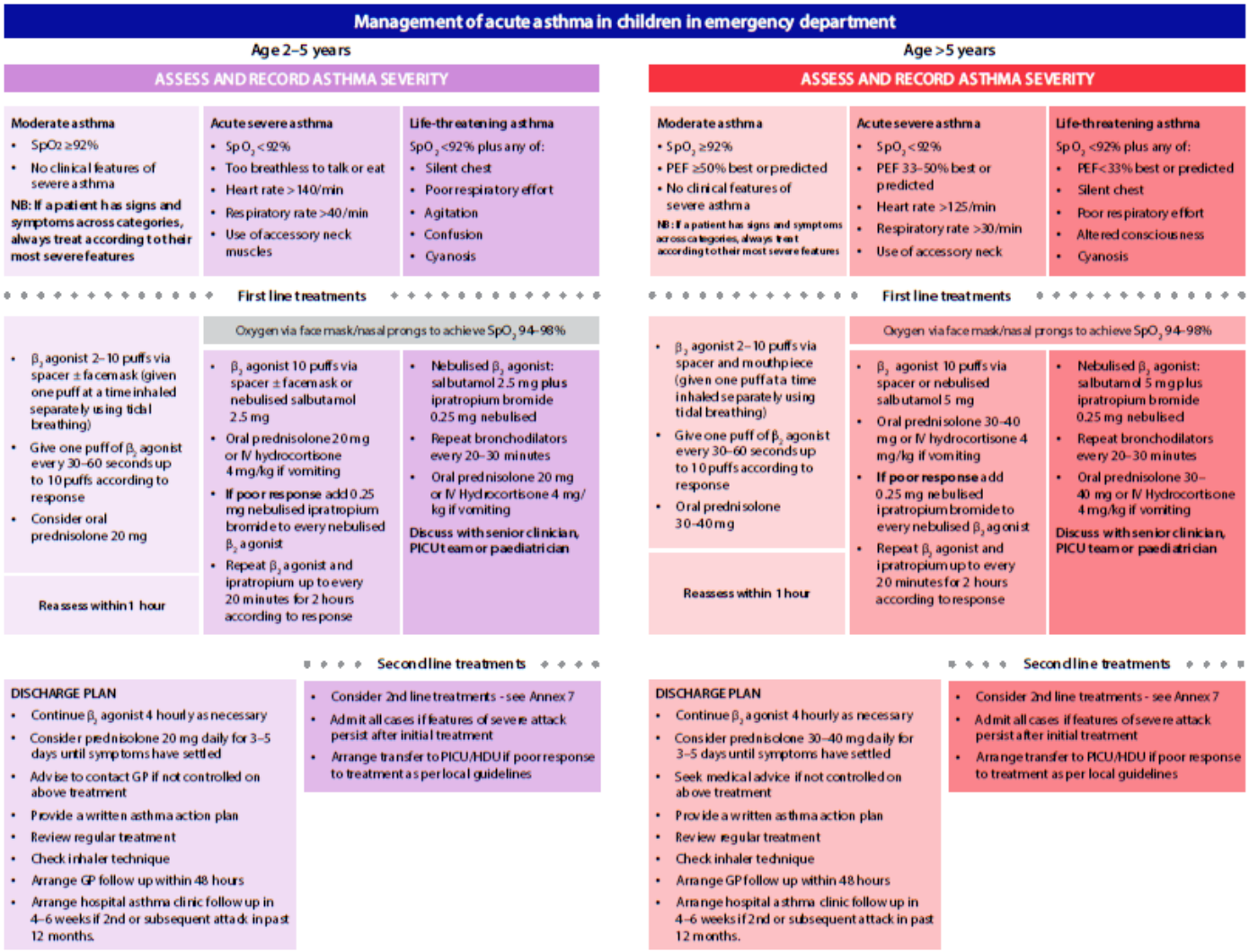
Patients with severe asthma (indicated by need for admission) **and adverse behavioural or psychosocial features are at risk of further severe or fatal attacks.**

- Determine reason(s) for exacerbation and admission
- Send details of admission, discharge and potential best PEF to GP

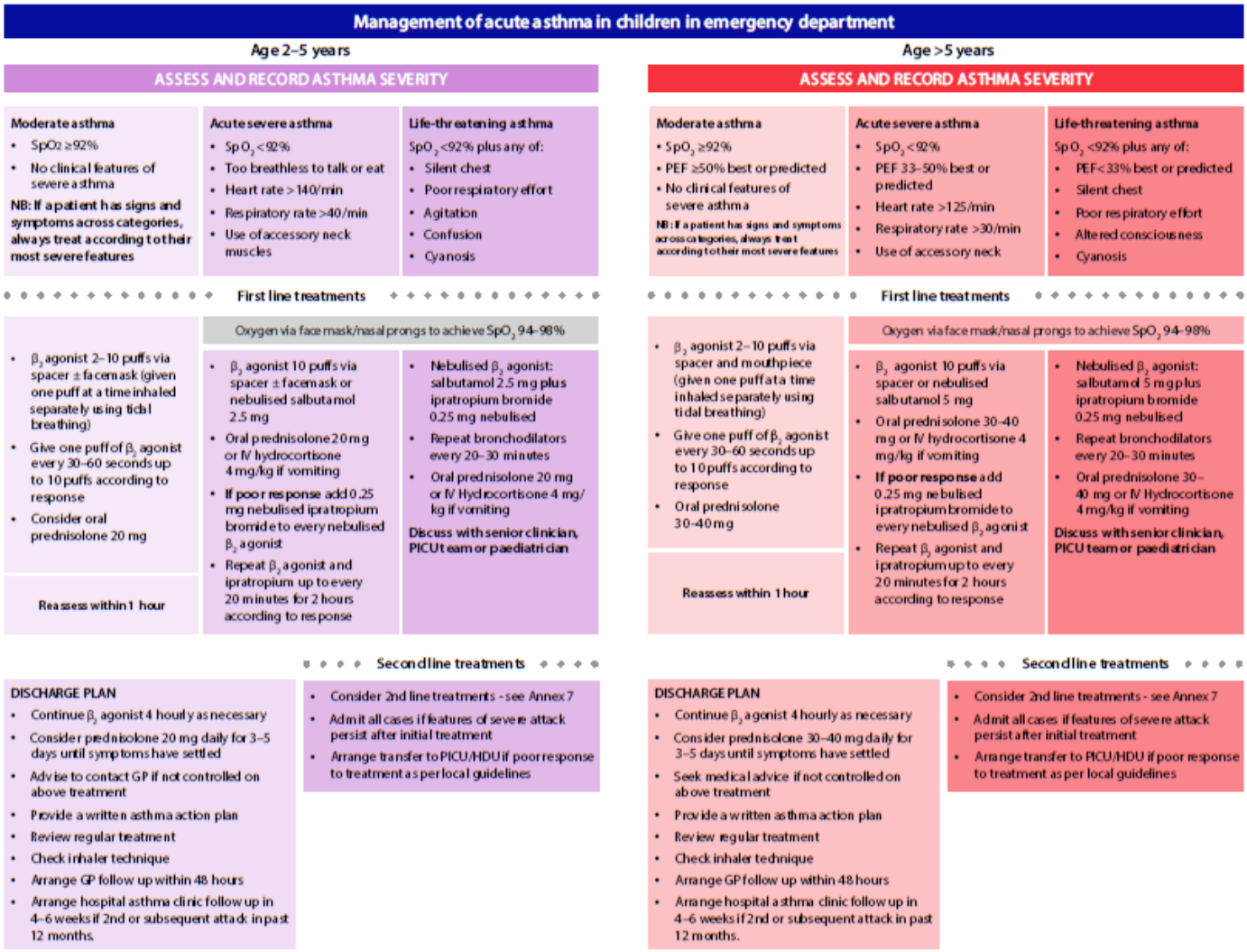
Appendix 7: Management of acute asthma in children in general practice (BTS/SIGN 153)



Appendix 8: Management of acute asthma in children in emergency department (BTS/SIGN 153)



Appendix 9: Management of acute asthma in children in hospital (BTS/SIGN 153)



Appendix 10: Asthma quality standard (2013) - List of quality statements

Statement 1: People with newly diagnosed asthma are diagnosed in accordance with NICE guidance.

Statement 2: Adults with new onset asthma are assessed for occupational causes.

Statement 3: People with asthma receive a written personalised action plan.

Statement 4: People with asthma are given specific training and assessment in inhaler technique before starting any new inhaler treatment.

Statement 5: People with asthma receive a structured review at least annually.

Statement 6: People with asthma who present with respiratory symptoms receive an assessment of their asthma control.

Statement 7: People with asthma who present with an exacerbation of their symptoms receive an objective measurement of severity at the time of presentation.

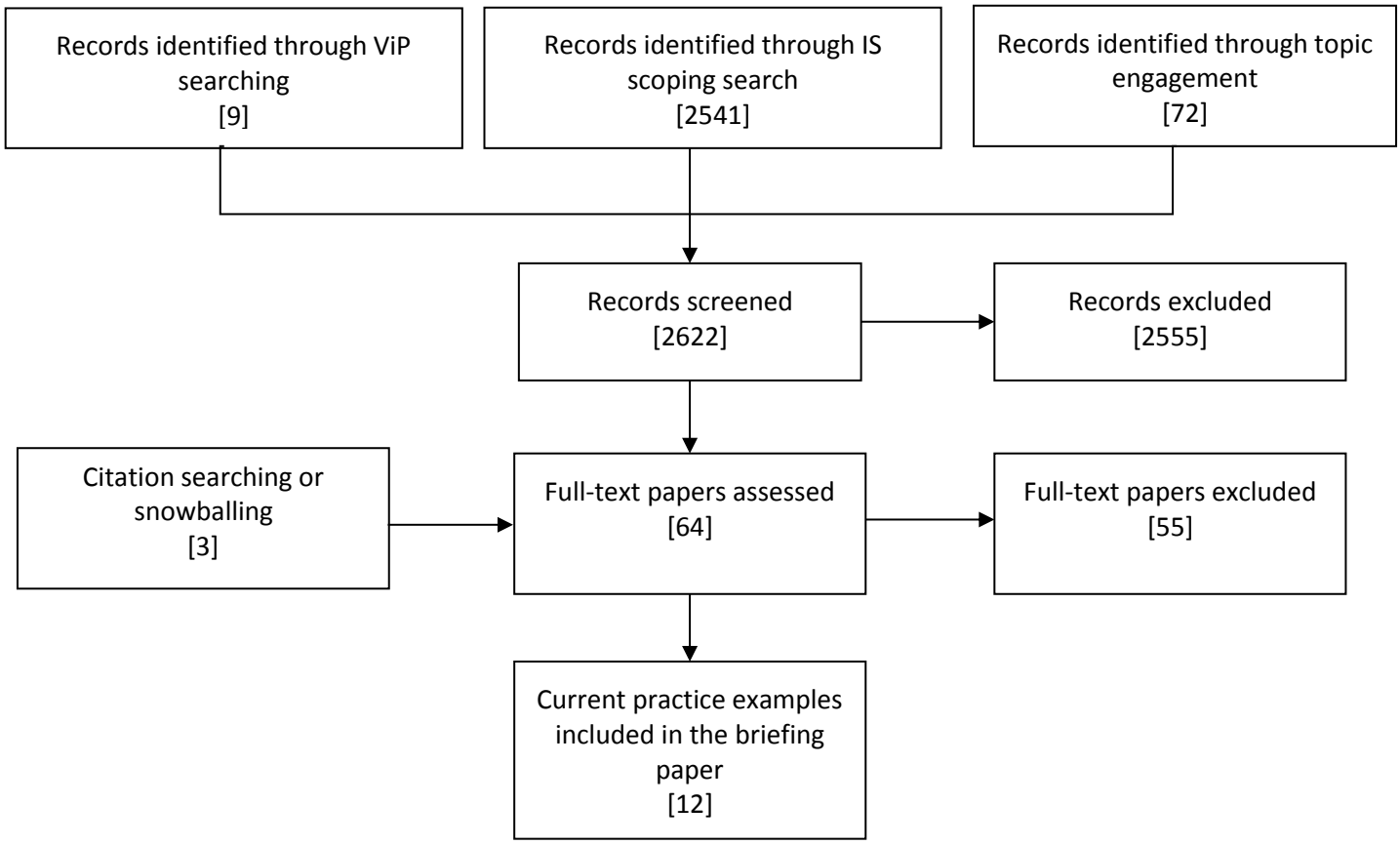
Statement 8: People aged 5 years or older presenting to a healthcare professional with a severe or life-threatening acute exacerbation of asthma receive oral or intravenous steroids within 1 hour of presentation.

Statement 9: People admitted to hospital with an acute exacerbation of asthma have a structured review by a member of a specialist respiratory team before discharge.

Statement 10: People who received treatment in hospital or through out-of-hours services for an acute exacerbation of asthma are followed up by their own GP practice within 2 working days of treatment.

Statement 11: People with difficult asthma are offered an assessment by a multidisciplinary difficult asthma service.

Appendix 10: Review flowchart



Appendix 11: Suggestions from stakeholder engagement exercise – registered stakeholders

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
Diagnosis – Accurate diagnosis					
1	Asthma UK	Key area for quality improvement 1 Diagnosis	Evidence that asthma is often misdiagnosed – both over- and under-diagnosed. This can lead to people not receiving treatments leaving them at risk of life threatening asthma attacks, or being prescribed harmful drugs when they do not have asthma.	Use of a range of objective tests, as highlighted in the NICE guidelines (2017), will help healthcare professionals to make a correct diagnosis. Given the difficulty regarding implementation of some tests due to lack of equipment or training, monitoring the availability and use of tools such as FeNO and spirometry as part of diagnosis would be a useful quality measure. Evidence of skills to use spirometry could be monitored through an analysis of relevant ARTP training among relevant staff.	NICE guideline [NG80] Asthma: diagnosis, monitoring and chronic asthma management, 1.3 (2017)
2	British Thoracic Society	Key area for quality improvement 1	Accurate diagnosis: Relying on FENO as central to diagnosis is as yet unsupported by clinical science in a broad UK population, however we would encourage research to		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			ascertain the value of this approach and it's practical implementation potential.		
3	National Paediatric Respiratory and Allergy Nurses Group (NPRANG)	Key area for quality improvement 2	Diagnosis in adults, young people and children aged >5 yrs	Ensure correct diagnosis of asthma is important to enable appropriate effective treatment given. Avoids patients being misdiagnosed and ensure differential diagnoses are considered	• British Thoracic Society/Scottish Intercollegiate Guidelines Network (2016) British guideline on the management of asthma • Asthma: diagnosis, monitoring and chronic asthma management (2017) NICE guideline NG80 • Asthma UK (2014) Patient safety failures in asthma care: the scale of unsafe prescribing in the UK
4	Novartis Pharmaceuticals UK Limited	Key area for quality improvement 1: Asthma diagnosis	Diagnosis of asthma is clearly described in NICE guidelines. Effective and earlier diagnosis of patients in		NICE. Asthma: diagnosis, monitoring and chronic asthma management. NICE Guideline. November 2017. Available online at:

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			accordance with updated NICE guidelines will ensure patients are treated appropriately. Failure to properly diagnose patients will result in patients unnecessarily experiencing symptoms.		https://www.nice.org.uk/guidance/ng80/resources/asthma-diagnosis-monitoring-and-chronic-asthma-management-pdf-1837687975621
5	Pfizer	Improve differential diagnosis and management of COPD, asthma and asthma-COPD overlap	Challenges remain in the accurate diagnosis of obstructive respiratory conditions in the UK, incorrect diagnosis can lead to inappropriate management and poor symptom/risk control	UK Audits of COPD and Asthma diagnosis/management indicate that differential diagnosis and appropriate management are inconsistently applied. See BTS Adult Asthma Audit1 – of patients admitted to hospital for acute asthma “89% had a previous diagnosis of asthma, and only 42% of those had a diagnosis supported by objective testing.” As highlighted by the PCRS2, differences exist between existing UK guidelines (BTS/SIGN3, NICE) that may lead to inconsistent application in primary care. Provision of a diagnosis guide/desktop helper (such as one developed by the IPCRG4) may help accurate diagnosis of respiratory conditions.	1. British Thoracic Society Adult Asthma Audit Report https://www.brit-thoracic.org.uk/document-library/audit-and-quality-improvement/audit-reports/bts-adult-asthma-report-2016/ 2. PCRS-UK briefing document https://view.officeapps.live.com/op/view.aspx?src=https://pcrs-uk.org/sites/pcrs-uk.org/files/Briefin

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					gAsthmaGuidelines_V3.docx 3. SIGN 153 • British guideline on the management of asthma https://www.brit-thoracic.org.uk/document-library/clinical-information/asthma/btssign-asthma-guideline-2016/ 4. Predicting diagnosis in primary care patients suspected of obstructive respiratory disease http://www.theipcrg.org/display/TreatP/2016/07/14/Predicting+diagnosis+in+primary+care+patients+suspected+of+obstructive+respiratory+disease

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
6	Primary Care Respiratory Society UK	Accurate diagnosis of asthma	No single test for asthma – and the diagnosis needs to take place over time. Need to ensure better training of health professionals in diagnosis and greater use of/access to objective testing including peak flow, quality assured diagnostic spirometry and provision of FeNO – by appropriately trained HCPs.	Lack of consensus between competing guidelines. Overdiagnosis, underdiagnosis and misdiagnosis lead to increased cost – for patients and the NHS, and failure to treat the cause of symptoms. We know that spirometry often fails to meet nationally agreed standards – which leads to misdiagnosis. It is normal in the majority of primary care patients with asthma FeNO is not widely available in Primary Care – where most of the diagnosis takes place – and also has imperfect sensitivity and specificity.	BTS/SIGN supports an approach based on probability algorithms NICE (2013) reported that 30% of people being treated for asthma may not have the condition. This may be an overestimate. And is not based on UK data NICE estimates, using this data, that using FeNO and spirometry to diagnose asthma could save the NHS £10m-£15m over a 5 year period. (Report in BMJ 2017;359 doi: https://doi.org/10.1136/bmj.j5540) . These savings may be overestimated.
7	Royal College of Paediatrics and Child Health	Key area for quality improvement 1	The quality standard suggests spirometry and FeNO measurements to diagnose asthma in children	The guideline needs to account for practitioners' time and resources available. Are the aims set out still achievable?	
8	Royal Liverpool and	QS1: The documentation	There are several papers describing the	Asthma diagnosis by NICE flowcharts is beyond most providers	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
	Broadgreen University NHS Trust	of all new diagnoses of asthma includes supportive objective tests	overdiagnosis of asthma, inappropriately receiving expensive treatment yet not getting the intervention they require	presently, but this proposed QS would be a stepping stone toward it	
9	SCM1	Key area for quality improvement 1	There is good evidence that up to 30% of people with a label of asthma do not have the condition when objective testing is performed. Early objective testing in people with symptoms suggestive of asthma has been demonstrated to be clinically and cost effective in the NICE Guidelines for Asthma.	The availability of timely objective testing with both quality assured spirometry and measurement of exhaled Nitric Oxide levels is not uniform across the UK. One solution proposed by the NICE guideline is the setting up of diagnostic hubs.	NICE Guideline for Asthma: Diagnosis and Monitoring
10	SCM2	Key area for quality improvement 2 People with suspected Asthma are diagnosed in accordance with Current NICE	It is important to use objective testing in order to confirm diagnosis of asthma rather than COPD.	As per our Asthma register the patients are mis-diagnosed as asthma. A standard objective testing with spirometry will confirm Asthma as being diagnosed accurately.	As per NICE Asthma guideline Nov 2017 and BTS guideline2016. We can add a reference from ARTP

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
		Guidance by doing objective test which includes spirometry and check for reversible airflow obstruction			
11	SCM2	Key area for quality improvement 3 People with suspected Asthma with diagnostic uncertainty after doing objective testing with spirometry are offered FeNO testing and levels are used to diagnose Asthma in accordance with Current NICE Guidance.	It is a test to supplement an objective testing in order to confirm a diagnosis of Asthma where there is diagnostic uncertainty after doing spirometry test.	It is new test for implementation in primary care. It will help for accurate diagnosis of asthma as per NICE guidance Nov 2017.	As per NICE Asthma guideline Nov 2017 and BTS guideline2016.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
12	SCM3	Key area for quality improvement 1 Asthma Diagnosis	Objective diagnosis has been shown to be important to ensure people are not miss or under treated through both the NICE Asthma diagnosis and monitoring guideline 2017	This is important because in both adults and children asthma will present differently that many people who present to GPs do not have spirometry or feno testing. Most recent evidence suggests this is the way to best ensure accuracy and a proper diagnosis. It is recognised through the pilot carried out by NICE that it may take some time resources and reorganisation to ensure that GPS and patients are supported in doing this and if it becomes a NICE Quality standard the time needed should be recognised	Please see Asthma diagnosis and monitoring and chronic asthma management 92017) NICE guideline NGO80
13	SCM4	People with newly diagnosed asthma are diagnosed in accordance with NICE guidance.	The NICE guidelines have only just been published and remain controversial. Implementation may prove slow and difficult particularly for children and I think implementation should be reinforced by keeping this in as a quality improvement.	Better diagnosis leads to better treatment of patients and appropriate referral for those where the diagnosis is not asthma	https://www.nice.org.uk/Guidance/NG80
14	SCM5	Key area for quality improvement 2	I still feel that diagnosis of asthma is a relevant quality statement as it imperative that this is	Diagnosis of asthma is very topical in the paediatric world as often “wheezy children” are given the diagnosis of asthma this may lead to	Bush A, Fleming L. Arch Dis Child Month 2016 Vol 0 No 0

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
		Diagnosis of asthma	made correctly to improve the quality of patient's life.	a missed diagnosis of another condition and unnecessary treatment given for many years.	Bush A, Fleming L. Diagnosis and management of asthma in children. BMJ 2015;350:h996. Bush A. Diagnosis of asthma in children under five. Prim Care Respir J 2007;16:7–15.
Diagnosis – Occupational asthma					
15	SCM2	Key area for quality improvement 1 People with suspected Asthma should be checked for possible occupational cause as per current NICE guidance.	This is important to identify any trigger factors which is work related. Hence these patients can be referred to occupational asthma specialist.	There is evidence that as clinicians we need to be more aware of the causes for the symptoms of asthma which are related to occupation.	Health and safety executive (HSE) as organisation supports the need to assess and control risks in the workplace and comply with health and safety law. As per NICE Asthma guideline Nov 2017 and BTS guideline2016.
16	SCM3	Additional developmental areas of emergent practice	This form of asthma can potentially be improved or cured by removing the source of the problem or changing the	Example Whilst this is a key area for improvement it is hoped that a comprehensive diagnosis would include an assessment for occupational asthma	Asthma diagnosis and monitoring and chronic asthma management (2017) NICE guideline NG80 recommendations 1.1.10 and 1.1.11

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
		1 Diagnosing occupational asthma 2. Inhaler technique	environment that the person is operating in Inhaler technique can be the difference between controlled and uncontrolled asthma leading to an acute asthma attack (exacerbation)	Example: both research and anecdotal evidence suggests that wrong inhaler technique may be as big a problem as non adherence. Inhaler technique should always be demonstrated when a new device is give, following an asthma attack and as part of a structured annual review	Asthma diagnosis and monitoring and chronic asthma management (2017)1.14.7
Self-management – Inhaler technique					
17	Association of Respiratory Nurse Specialists	All asthmatics are shown how to use their inhalers at the point of prescribing and checked at every review	If an asthmatic is not shown how to use their device it will be inevitable that they are sub optimally treating their asthma, if treating it at all and are often prescribed more medication when they return to say they are no better.	NRAD report 2014, BTS/SIGN 2016, UKIG inhaler standards and competency document 2016, NICE guidance 2017	
18	Association of Respiratory Nurse Specialists	All asthma medication should be prescribed by brand.	With the multitude of medications/devices on the market, unless prescribing by brand the patient often gets prescribed a device they are not familiar with which can lead to	BTS/SIGN 2016.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			uncontrolled asthma or even death.		
19	AstraZeneca	Inhaler technique training and regular technique and adherence checks with every HCP interaction	According to NRAD, asthma sufferers who are unable to use their inhaler correctly are at increased risk of poor asthma control, potentially resulting in an attack. According to BTS/SIGN guidelines, it is estimated that between a third and a half of all medicines prescribed for long term conditions are not taken as recommended, and evidence in asthma confirms widespread non-adherence to regular preventer medication, that increases over time. Whilst this measure is partly included in the current NICE asthma Quality Standards, there is a need to expand it for	In the NRAD report, only 71% of patients had received an inhaler technique check in the previous year. In addition, only a small number of patients are being asked about their adherence to medical advice: 29% in primary care and 11% in secondary care.	Please see the NRAD report for further information https://www.rcplondon.ac.uk/projects/national-review-asthma-deaths We also understand this may be measured as part of the RCP asthma audit, due April 2018 https://www.rcplondon.ac.uk/projects/asthma-audit-development-project

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			example adherence checks at every HCP interaction. In addition, patients could be advised on where to find more self-help online tutorials on appropriate inhaler technique (e.g. Asthma UK) where formal face-to-face training is not available. Clinical awareness of and referral to such resources is currently varied.		
20	British Thoracic Society	Key area for quality improvement 3	Regular assessment of adherence and inhaler technique,	Correct use of inhalers is associated with improved outcomes for patients including a reduction in risk of exacerbations and hospital admission. Repeated instruction is required to ensure that inhaler technique is optimised. Every opportunity must be taken to promote good inhaler technique in order to ensure adequate delivery of therapy. Review of medication is vital following a hospital attendance or	Jerram P., Medicines use reviews reduce asthma admissions. Pharm Manag 2009;25:15-1

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				admission as intentional and unintentional nonadherence to preventer therapies (principally inhaled corticosteroids) frequently causes deterioration in asthma control.	
21	Education for Health	Key area for quality improvement 1 Assessment of inhaler technique by a competent healthcare professional at every respiratory consultation	Inhaled treatment is the cornerstone of asthma management yet poor inhaler technique is common resulting in sub-optimal disease management.	Not all healthcare professionals are competent in assessing inhaler technique correctly. As inhaled treatment is fundamental to management, ensuring correct use of inhalers remains a top priority	A plethora of evidence demonstrating the widespread problem of poor inhaler technique and its impact on patients. The UK Inhaler Group have produced a set of national inhaler standards congruent with clinical and real world evidence.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
22	Napp Pharmaceuticals Limited	Key area for quality improvement 1 Improve inhaler technique through patient education and inhaler choice	Correct inhaler technique is essential in order to get the drug to the lung and improve patient symptoms. All asthma guidelines recommend to ensure that inhaler technique is optimised before increasing a patient's treatment.	NICE and BTS recommend prescribing an inhaler which a patient can use correctly. Inhaler choice is vital as not all patients can create sufficient force to actuate a DPI and others may have co-ordination difficulties with MDIs [Price 2017]. Optimising inhaler technique can improve patient symptoms on their current dose reducing step up to costlier medications. Reducing high dose ICS prescribing is recommended by NICE and BTS/SIGN and is good clinical practice in order to reduce unnecessarily high doses of steroid.	Baverstock 2010 - Of the 150 HCPs assessed only 11 (7%) could demonstrate all the recognised steps in administration including assessment of inspiratory flow using the in-check device. Sanchis J 2016 – "Incorrect inhaler technique is unacceptably frequent and has not improved over the past 40 years, pointing to an urgent need for new approaches to education and drug delivery".
23	National Paediatric Respiratory and Allergy Nurses Group (NPRANG)	Key area for quality improvement 1	Inhaler technique assessment for patients and professionals with competence measures Health Care Professionals delivering education on inhaler technique should be competently assessed to	NRAD highlighted poor inhaler technique as contributing factor to deaths reviewed BTS/SIGN guidelines reviewed studies that showed correct inhaler technique improved asthma control which prevent further medical intervention Key recommendation that all patients should have their inhaler	• Royal College of Physicians (2014) Why asthma still kills: The National Review of Asthma Deaths (NRAD) Confidential Enquiry Report • British Thoracic Society/Scottish Intercollegiate Guidelines

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			ensure practice is consistent nationwide	technique checked prior to discharge from A&E Asthma UK survey 16% of patient in 2016 had not had their inhaler technique checked and this has been consistent since 2013 from previous Asthma UK survey BTS Paediatric 2015 audit showed less than 50% of children admitted with asthma had their inhaler technique checked on discharge	Network (2016) British guideline on the management of asthma • Royal College of Emergency Medicine (2017) Moderate & Acute Severe Asthma: Clinical Audit 2016/17 National Report • Asthma UK (2016) Annual Asthma Survey 2016 report
24	Primary Care Respiratory Society UK	Making inhaler technique a core component of care for all patient interactions with prescribers and dispensers	Correct inhaler technique is essential in order to get the drug to the lung and improve patient symptoms. Poor inhaler technique is associated with poor outcomes All asthma guidelines recommend to ensure that inhaler technique is optimised before increasing a patient's treatment.	Poor inhaler technique is a frequent factor in poor asthma control. Optimising inhaler technique can improve patient symptoms on their current treatment reducing step up to costlier medications. Reducing high dose ICS prescribing is recommended by NICE and BTS/SIGN and is good clinical practice in order to reduce unnecessarily high doses of steroid. NICE and BTS recommend prescribing an inhaler which a patient can use correctly. Inhaler choice is vital as not all patients can create sufficient force to actuate a	There are many studies which demonstrate poor control associated with poor inhaler technique. Baverstock 2010 - Of the 150 HCPs assessed only 11 (7%) could demonstrate all the recognised steps in administration including assessment of inspiratory flow using the in-check device. Sanchis J 2016 – "Incorrect inhaler technique is

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				DPI and others may have co-ordination difficulties with MDIs [Price 2017]. Spacers are underused to improve the preformance of MDIs and their benefits should be more widely publicised.	unacceptably frequent and has not improved over the past 40 years, pointing to an urgent need for new approaches to education and drug delivery". This includes more widespread use of spacers with MDIs
25	Royal College of Nursing	All asthmatics are shown how to use their inhalers at the point of prescribing and checked at every review	If an asthmatic is not shown how to use their device it will be inevitable that they are sub optimally treating their asthma, if treating it at all and are often prescribed more medication when they return to say they are no better.	NRAD report 2014, BTS/SIGN 2016, UKIG inhaler standards and competency document 2016, NICE guidance 2017	
26	Royal College of Nursing	All asthma medication should be prescribed by brand.	With the multitude of medications/devices on the market, unless prescribing by brand the patient often gets prescribed a device they are not familiar with which can lead to uncontrolled asthma or even death.	BTS/SIGN 2016.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
27	SCM2	Key area for quality improvement 4 People with diagnosed Asthma should have assessment for prescribing appropriate inhaler device. They should be assessed and trained for the usage and technique of prescribed inhaler device.	To assess and prescribe appropriate inhaler device for treating asthma is the key to manage and stabilise the symptoms related to asthma.	We as clinicians including Doctors and nurses working in NHS should have better understanding of inhaler devices types and techniques in order to improve asthma pharmacological management.	As per NICE Asthma guideline Nov 2017 and BTS guideline2016.
28	SCM5	Key area for quality improvement 5 Inhaler technique/ written personalised action plan	Inhaler technique/ written personalised action plan are still the “important” key ways a patient can treat their asthma.	Many patients who attend hospitals are often found to not be using their inhaler correctly nor following an asthma management plan. This will lead to unnecessary symptoms, reduced work force and demand on primary/secondary care.	NRAD (www.rcplondon.ac.uk/projects/national-reveiw-asthma - deaths.)

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
Self-management – Personal asthma action plan					
30	Association of Respiratory Nurse Specialists	All people with asthma are provided with a personal asthma action plan (PAAP).	We know the use of PAAPs saves lives as the patient knows when their asthma is deteriorating and what to do about it.	NRAD report 2014, BTS/SIGN 2016, NICE 2017.	
31	Asthma UK	Key area for quality improvement 3 Management – written asthma action plans	Action plans are fundamental to improving outcomes for people with asthma, enabling them to self-manage their asthma and respond to changes in their symptoms over the course of the year. There is strong evidence that action plans reduce the risk of hospital admissions and that they can form the basis of good self-management.	Our Annual Asthma Survey has shown, over several years, considerable variation in how often people are offered action plans, with 56% of respondents to the Annual Asthma survey 2017 not having received an action plan. There is considerable regional variation with 50% of respondents in West Midlands not receiving an action plan in comparison to 61% in London. Given the impact of action plans on improving health outcomes and reducing pressures on hospitals, the quality standard should demand more than merely receipt of an action plan. The quality measure should be amended to emphasise co-creation of the action plan and education to encourage patient activation. This should occur at the	PRISMS – Practical systematic Review of Self-Management Support for long-term conditions (2014) Adams et al, 2000: people without a written asthma action plan are four times more likely to be admitted to hospital for their asthma Annual Asthma survey (Asthma UK). Please note the latest Asthma UK Annual Asthma Survey will be published on Jan 23, 2018.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				annual asthma review and in other relevant healthcare settings. The Statement should reflect the breadth of the NICE Guidelines recommendation 1.10: 'Offer an asthma self-management programme, comprising a written personalised action plan and education, to adults, young people and children aged 5 and over with a diagnosis of asthma (and their families or carers if appropriate).' (NICE, 2017).	NICE guideline [NG80] Asthma: diagnosis, monitoring and chronic asthma management, 1.10 self-management (2017)
32	British Thoracic Society	Key area for quality improvement 4	Use of asthma action plans	Self-management/action plans for asthma provide information for patients and their families on how to carry out disease specific elements of self-care. There is strong evidence that providing written self-management/action plans, in addition to verbal information, is associated with improved patient/carer understanding of asthma and there-by reduces risk of further attacks and hospitalisation.	Robert J Adams, Brian J Smith, Richard E Ruffin, Factors associated with hospital admissions and repeat emergency department visits for adults with asthma. Thorax 2000, 55:566-573.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
33	Education for Health	Key area for quality improvement 4 Supported self-management	Patients must be supported to understand their condition in a way that it meaningful to them and encouraged to engage with the development of their Personalised Asthma Action Plans	Time pressures and lack of skills in general practice appear to hinder the provision of high quality self-management education and support for patients with asthma. It is not just about having an asthma action plan, it is about the type of plan being right for the patient and the way in which it is developed and provided.	
34	Napp Pharmaceuticals Limited	Key area for quality improvement 4 PAAP/Self Management	PAAPs can reduce exacerbations by helping patients to understand their disease and what to do when symptoms worsen i.e. when to escalate their treatment.	Patient education can aid adherence and improve inhaler technique resulting in improved asthma control and fewer costly exacerbations. Education may also reduce non-attendance at asthma review clinics.	Asthma UK https://www.asthma.org.uk/advice/manage-your-asthma/action-plan/
35	National Paediatric Respiratory and Allergy Nurses Group (NPRANG)	Key area for quality improvement 5	Self- management education and agreement of PAAP	Self-management gives patient the ability to manage their asthma effectively and has shown to improve to improve quality of life and prevent admissions	• Asthma: diagnosis, monitoring and chronic asthma management (2017) NICE guideline NG80 •

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				BTS Paediatric 2015 audit showed less than 50% of children admitted with asthma were given a management plan on discharge Asthma UK survey 2016 showed 57% of asthma patient did not have a self-management asthma plan Key recommendation that all patients should be given as asthma management plan from Clinical Audit for moderate & severe Asthma (Royal College of Emergency Medicine)	• • Asthma UK (2016) Annual Asthma Survey 2016 report • Royal College of Emergency Medicine (2017) Moderate & Acute Severe Asthma: Clinical Audit 2016/17 National Report
36	NIHR CLAHRC North Thames	Key area for quality improvement 2: Attitudes towards asthma in young patient's social environment	Support from peers is thought to influence the motivation to self-manage a chronic condition effectively.	There is evidence for young people with asthma that they perceive a lack of understanding in their peers and some feel bullied	
37	Royal College of Nursing	All people with asthma are provided with a personal asthma action plan (PAAP).	We know the use of PAAPs saves lives as the patient knows when their asthma is deteriorating and what to do about it.	NRAD report 2014, BTS/SIGN 2016, NICE 2017.	

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38	Royal Liverpool and Broadgreen University NHS Trust	QS4: All individuals with a diagnosis of asthma have an educational consultation that results in a written asthma action plan	Asthma education and action plans have a better NNT to prevent one exacerbation than adding LABA or LTRA and are cheaper. They should be prioritised.	This could be a cost-effective intervention that could easily be supported by national level print web or video materials	
39	SCM2	Key area for quality improvement 5 People with diagnosed Asthma should have access to self -care management plan by pharmacologic al and non-pharmacologic al measures. They should have access to exercise for lung and access to psychological therapies to	Patients should have proper education after diagnosis in order to manage their symptoms related to asthma. Patients should be supported to have appropriate level of support as per the severity of their Asthma.	It will help to improve asthma care and better understanding for seeking medical help early.	As per NICE Asthma guideline Nov 2017 and BTS guideline2016.

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		improve their Asthma management.			
40	SCM3	Key area for quality improvement 2 Written personalised asthma plans	People should be given a written personalised action plan along with education on how to use it	Example: Written personalised action plans have been shown to improve outcomes for people with asthma. They can increase self - awareness and confidence in people with asthma. Written personalised asthma plans may reduce readmissions for people who are admitted to hospital with an asthma attack (exacerbation) but the President of the Royal College of Emergency Medicine suggests there is still a way to go in reaching	Please see Asthma diagnosis and monitoring and chronic asthma management NG80 recommendations 1.10.1 and 1.10.2 and BTS / SIGN clinical guidance 153 recommendation in para 5.3.2 Moderate and Acute Severe Asthma Clinical Audit 2016-2017

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				acceptable standards for people who are seen in EDs in asthma attacks	
Asthma management in primary care – Identifying people for review					
41	Association of Respiratory Nurse Specialists	Ensure anyone who uses 12 or more short acting beta agonists in 12 months has an urgent review	We know that overuse of short acting beta agonists lead to uncontrolled asthma and asthma deaths.	NRAD report 2014	
49	Asthma UK	Key area for quality improvement 2 Review	A structured review remains the cornerstone of care for most people with asthma.	The quality of current asthma reviews varies considerably. 23% of the respondents to the 2017 Annual Asthma survey had not had their asthma reviewed in the previous year. With the annual asthma review being one of the key contact points for a person with asthma and primary care, and 15% rating their primary care as poor, this suggests that the asthma review is not always delivering what the asthma patient expects or needs. An assessment of risk could prove more useful than an assessment of control at the time of presentation. People who scored greater than 5 on Asthma UK's risk checker were 11 times more likely to go on to have an	Annual Asthma survey (Asthma UK). **Please note the latest Asthma UK Annual Asthma Survey will be published on Jan 23, 2018.** Blakey et al (2013). Assessing the risk of attack in the management of asthma: a review and proposal for revision of the current control-centred paradigm Asthma attack risk checker

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				asthma attack (Walker, 2014). Identifying modifiable risk factors could drive behaviour change and enable self-driven regular assessment of risk.	Walker et al (2014). Assessing asthma risk in primary care: Can the AAA test predict future asthma attacks? European Respiratory Journal 2014 44: 3405
42	Asthma UK	Key area for quality improvement 4 Specialist review	A specialist review for those at greatest risk can help to prevent further life-threatening asthma attacks.	Identifying poor control and high risk among an asthma population is central to preventing poor health outcomes and asthma deaths. As highlighted in the NICE guidelines, risk stratification of people with asthma should be considered to ensure that those at highest risk are identified and appropriate interventions and referrals are provided. The National Review of Asthma Deaths (NRAD) found evidence of overuse of or over-reliance on SABA (reliever) inhalers with 39% of people reviewed (65) prescribed more than 12 SABA inhalers in the year before they died.	Patient safety failures in asthma care: the scale of unsafe prescribing in the UK (Asthma UK, 2015) NICE guideline [NG80] Asthma: diagnosis, monitoring and chronic asthma management, 1.13 Risk stratification (2017) The National Review of Asthma Deaths (2015) PRIMIS asthma care quality tool

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				NRAD also identified people who had been prescribed long-acting reliever medicines without inhaled steroids, putting them at considerable risk. In line with NRAD recommendations, people with asthma that have been prescribed more than two courses of oral or injected corticosteroids should be referred for specialist review. Joined up data across CCGs is needed to ensure that all prescription data is available to identify those at risk and in need of a specialist review. Through prescription alerts within GP software systems (such as EMIS), those at greatest risk could be identified and given an urgent review. The use of prescribing alerts to trigger a specialist review should be considered as a key element of quality improvement. Emerging asthma audit tools for primary care, such as PRIMIS asthma care quality tool, that	

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				highlight patients with high SABA (reliever) and low inhaled corticosteroid (ICS) could also be considered by commissioners as a tool to support the identification of high risk people with asthma.	
43	AstraZeneca	Prevention of over reliance on short acting beta agonists (SABA) - As part of asthma monitoring, patients should be checked on use of more than 12 SABA inhalers per year	Well-controlled asthma is associated with little or no need for short-acting bronchodilator (SABA or reliever) inhalers, so the need for excess SABA inhalers is a signal that asthma is poorly controlled (NRAD, 2014). The new NICE asthma guidelines define uncontrolled asthma as 3 or more days a week with required use of a SABA for symptomatic relief, and the BTS/SIGN guidelines on asthma recommend that as part of asthma monitoring, it should be checked that patients are not using more than 12 SABA inhalers per year.	The NRAD report found that of the 165 asthma deaths where SABA use was recorded, 56% were prescribed more than 6 inhalers in the previous year, and 39% had been prescribed more than 12 SABA inhalers in the year before they died. In addition, the asthma UK prescribing audit identified that of 94,955 asthma patients audited, 5,032 had been prescribed more than 12 reliever inhalers over a 12 month period, 1,965 of them without being reviewed. Asthma UK suggests that this could equate to over 100,000 patients in the UK over relying on reliever medication without a review.	Please see the NRAD report highlighting the deaths associated with excessive SABA prescribing https://www.rcplondon.ac.uk/projects/national-review-asthma-deaths Please also see the Asthma UK report on patient safety failures in asthma care https://www.asthma.org.uk/get-involved/campaigns/publications/nrad-one-year-on/ We also understand this may be measured as part of the RCP asthma audit, due April 2018 https://www.rcplondon.ac.uk/projects/asthma-

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			There is also evidence to suggest that more frequent use than one reliever inhaler per month drastically increases the risk of asthma death (Asthma UK, 2014).		audit-development-project
44	AstraZeneca	Management post repeated short-burst OCS and monitoring OCS use - Patients on OCS should be monitored with a clear care pathway/referral criteria put in place to provide timely and effective alternative	Frequent, short bursts of OCS in asthma patients are a sign of severe asthma, and a need for the patient to have their maintenance treatment escalated where appropriate. BTS/SIGN calls for OCS use to be monitored and recorded in primary care. Alternative diagnoses (such as ABPA, sarcoidosis or hypersensivity pneumonitis) may also need to be considered for those patients requiring frequent prolonged courses of	Confidential study data provided.	We understand this may be measured as part of the RCP asthma audit, due April 2018 https://www.rcplondon.ac.uk/projects/asthma-audit-development-project

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		options to OCS	oral steroids, particularly those that relapse soon after discontinuation. Frequent or chronic use of OCS in asthma is associated with short-term and long-term detrimental side effects including osteoporosis, peptic ulcers, cataracts, adrenal suppression, weight gain, hypertension, mood problems, high blood pressure, and Type 2 diabetes mellitus.		
58	Novartis Pharmaceuticals UK Limited	Key area for quality improvement 2: Asthma management	In accordance with findings of the National Review of Asthma Deaths (NRAD), Novartis considers a personalised asthma action plan and structured annual review to be essential to optimum asthma management.	NRAD has recommended that people with asthma should have a structured review by a healthcare professional with specialist training in asthma at least annually (NRAD key recommendations, medical and professional care, recommendation 2). The recommendation also states that people at high risk of severe asthma attacks should be monitored	Royal College of Physicians. National Review of Asthma Deaths. May 2014. Available online at: https://www.asthma.org.uk/globalassets/campaigns/nrad-full-report.pdf

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				more closely, and that their personal asthma action plans are reviewed and updated at each review.	
45	Primary Care Respiratory Society UK	Overuse of reliever inhalers - need to limit reliever Rx to 6 or less per year, by identifying those overusing	Good control of asthma requires use of ICS for most people – salbutamol alone is not sufficient. Known association with asthma deaths as highlighted in NRAD 2014	See NRAD report. Many of the deaths had high use of reliever medication as a factor in the mortality Many people with asthma are still only using salbutamol to treat their asthma	National review of asthma deaths highlights the problem. https://www.rcplondon.ac.uk/projects/national-review-asthma-deaths Searching for patients overusing SABAs is easy using GP clinical systems BTS/SIGN Guideline on the management of asthma 2016 – 'step 1' regular preventer. Asthma is not just due to bronchoconstriction but also an inflammatory disease
46	Primary Care Respiratory Society UK	Additional developmental areas of emergent practice Lack of systematic stratification of	NRAD (2014) identified that over 70% of asthma deaths were preventable, some deemed mild/moderate asthma according to medication profile	It is not difficult to identify people with asthma who request 6 or more salbutamol in a year, who have courses of oral steroids and/or have had an exacerbation/ had hospital A&E visit or admission in last 12 months. (if coding is being done well) A standardised national template for asthma review – a key recommendation in the National	National Review of Asthma Deaths. Avoidable factors relating to prescribing were identified by the panels in 47% of the cases managed in primary care. Among patients that were on short-acting relievers at the time of

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		patients by risk.		Review of Asthma Deaths - including the recording of risk, would help to identify those most at risk and standardise the profiling and recording of risk. It would enable proactive approaches to avoid exacerbations and help HCPs to focus their effort on the most vulnerable (and costly) patients.	death, 39% had been prescribed more than 12 salbutamol inhalers in the previous year and six individuals had had more than 50. Overuse of short-acting bronchodilators is a key indicator of poor asthma control and of higher risk of exacerbation and death.
59	Royal College of General Practitioners	Effective review	The general practice QoF measures annual review of asthma. Cost effective practice is required for primary care.	There is no evidence that an annual review is of benefit. The NICE update suggests review 4 to 8 weeks after diagnosis whilst this lacks evidence it is clinically plausible that this is more effective. It should include use of inhaler technique.	NICE asthma update 1.5.2 and 1.14.1
47	Royal College of Nursing	Ensure anyone who uses 12 or more short acting beta agonists in 12 months has an urgent review	We know that overuse of short acting beta agonists lead to uncontrolled asthma and asthma deaths.	NRAD report 2014	
48	Royal Liverpool and Broadgreen University NHS Trust	QS2: Of individuals that have ever received oral corticosteroids	In every large scale asthma study (e.g. CPRD database work) we see tens of thousands of people with	This is an “easy win”. ICS use greatly reduces asthma attacks and thus reduces pressure on primary care and EDs, and keeps people at work	

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		for their asthma, none should be treated with a short-acting reliever drug alone.	asthma that get OCS but not ICS. Allowing harmful events to occur without instituting preventative therapy is unacceptable.		
60	SCM3	Key area for quality improvement 3 Review	A structured review at least annually can help improve outcomes for people with asthma	Both research and anecdotal evidence suggests that some people will asthma do not receive reviews at least annually and that even where a review takes place, it is not always structured according to an objective proforma. Benefits attached to a structured review may include increased attendance at work and school, reduced asthma attacks (exacerbations) improved control of asthma symptoms and reduced emergency admissions	Asthma diagnosis and monitoring and chronic asthma management (2017) NICE guideline NG80 recommendations 1.14.1 and 1.14.7 BTS /SIGN 2016 British guideline on the management of asthma
Asthma management in primary care – Content of review					
50	Circassia Pharmaceuticals plc	Key area for quality improvement 1: Periodic, quantitative measurement of Fractionally Exhaled Nitric Oxide (FeNO)	Patients respond to various asthma treatments differently depending on their underlying disease characteristics. While the majority of patients with asthma demonstrate a Th2	Of the £1.1b cost of treating asthma in the UK, at least £666 million is spent on prescription costs each year. Other costs include £160m on GP consultations, £143m on disability claims and £137m on hospital care (Asthma UK 2018).	Several outcomes based studies favourably comparing FeNO to conventional therapeutic monitoring techniques have been published: Anderson (Annals Allergy Asthma Immunol 2016) Use of FeNO for

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		can optimise the therapeutic management of inflammatory (Th-2) asthma	phenotype and do respond to corticosteroid treatment, a significant portion of patients demonstrate phenotypes not characteristic of Th2 inflammation and thus will respond less. It has been observed that up to 75% of steroid-naïve patients have primarily Th2 driven asthma and respond significantly to ICSs (Bradding 2008). Current national asthma guidelines recommend periodic clinical assessment of patients and adjustment of medications by either stepping-up or -down therapy (AHRQ 2017, BTS-SIGN 2016). FeNO measurement identifies patients with Th2 driven airway inflammation and helps to predict response to ICS therapy Price 2017).	Identification and effective monitoring of patients most likely to respond to inhaled corticosteroids would minimise inappropriate treatment and limit side-effects and unnecessary healthcare costs (UK Primary care study) (Price 2017) Up to 45% of asthmatic patients do not benefit from ICS therapy as they exhibit non-eosinophilic Th1 asthma (Spahn 2016). Administration of medium, high dose ICS in children may be associated with systemic side effects including growth failure and adrenal suppression (Sharek 2000, BTS-SIGN 2016) While studies have demonstrated some clinical benefit of ICS, it has been difficult to demonstrate differences between doses, with most benefit obtained at the lowest doses used (Barnes 2010). The relatively flat dose response curve of ICS (based on changes in symptoms and lung function) combined with a lack of specific measures of airway	dosing of ICS more accurate than FEV1 Cowan (JACI 2015) FeNO useful for ICS dosingAttanasi (Arch Med Sci 2016) Asthma control (ACT) correlates to FeNO Malinovschi (JACI 2016) Monitoring FeNO related to measures of asthma control Current NICE guidance (2017) states: Consider FeNO measurement as an option to support asthma management in patients who are symptomatic despite using inhaled corticosteroids. The clinical benefit of periodic assessment of airway inflammation using FeNO in chronic asthma was demonstrated in a study by Smith et al. (Smith 2005b). They followed

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				inflammation to help clinicians guide dosing has led to many patients receiving higher doses than are necessary. Using higher doses of ICS exposes patients to potential adverse effects from steroids. Higher doses and prolonged use of ICSs can have systemic effects on growth, bone density, cataracts, adrenal insufficiency and an increased risk of diabetes (Skoner 2016, Carr 2016, Choi 2017, Nguyen 2003, Suissa 2010). Lipworth and colleagues evaluated the dose response curve for ICSs by adding markers of airway inflammation to the analysis. In their study they confirmed that improvements in symptoms and lung function were only seen with lower doses of ICS. However, addition of measures of inflammation such as FeNO, eosinophilic cationic protein and blood eosinophils was able to detect a clear dose response curve covering low to high doses of ICS (Anderson 2017).	two groups of patients, one used traditional monitoring (symptoms, spirometry, etc) and the other a FeNO based approach. After 12 months, the ICS dose of fluticasone was 370 µg per day in the FeNO group and 641 µg per day in the control group. More importantly, asthma control was better in the FeNO group with 45.6% less exacerbations compared to the standard care group. Exposure to high doses of ICS was also reduced in this study by using a FeNO based strategy to step patients down; 48% of the standard care group were receiving 1,000ug of fluticasone daily at the end of the study compared to 20% in the FeNO group.

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					A recent multi-centre study including 214 patients in UK primary care clinics showed a significant interaction between baseline FENO and treatment group for every 10 ppb increase in baseline FENO, with the change in ACQ7 greater in the inhaled corticosteroids group than in the placebo group. The results were consistent with previous findings in both asthma and undiagnosed asthma, with a clear association between high FENO and a greater likelihood to respond to inhaled corticosteroids. These results led to the conclusion that FENO measurement is an easy and non-invasive tool to use in clinical practice in patients with nonspecific respiratory symptoms to predict response to

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					inhaled corticosteroids (Price 2017). In another NHS setting, a cost-effectiveness study of FeNO monitoring to optimise ICS therapy (either by stepping up or down) was carried out in three GP practices in Northern Ireland over a 12 month period (McManus, PCRS 2017). This study showed that regular patient review based on a FeNO modulated response-to-therapy protocol led to optimal prescribing of ICS and a projected drug and service saving in the region of £15,000 per annum. Debly 2012 showed that FENO measured at hospital discharge among children hospitalized with acute asthma may be useful in

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					identifying patients who will respond to ICS therapy. In a study of 40 asthmatic children who had an elevated FENO at enrollment (above25 ppb), patients who did not use ICSs after hospital discharge had lower end-of-study lung function than those who used ICSs. At 2 and 4 weeks after hospital discharge, FENO was higher among patients who reported albuterol use more than twice weekly and among patients who reported no ICS use. Similarly, a prospective observational study in children showed that serial measurements of FeNO may guide step down of ICS and that a rising FeNO predicted relapse after cessation of ICS (Zacharasiewcz 2005, Pijnenburg 2005, BTS-SIGN 2016)

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					ATS Guideline recommendations for the use of FeNO monitoring states that a FeNO > 50 ppb (> 35 ppb in children) be used to indicate eosinophilic inflammation is likely and, in symptomatic patients, responsiveness to corticosteroids are also likely (strong recommendation, moderate quality of evidence) (Dweik 2011)
51	Circassia Pharmaceuticals plc	Periodic, quantitative measurement of Fractionally Exhaled Nitric Oxide (FeNO) may uncover poor adherence to ICS inhaler therapy in patients with inflammatory (Th-2) asthma	• ICS treatment is widely considered to be the cornerstone therapy for the control of asthma symptoms (NICE 2017), however, adherence to asthma medication regimens tends to be very poor, with reported rates of non-adherence ranging from 30 to 70 percent (Lindsay 2013). A number of factors are associated with non-	Adherence with regular maintenance inhaled corticosteroids, on their own or in combination with long-acting beta agonists, is of paramount importance to achieve control of asthma and prevent asthma attacks. Published evidence in patients with severe asthma suggests that at least 30% of patients are partially or non-adherent with their prescribed medications, and the Royal College of Physicians' National Review of Asthma Deaths (NRAD) demonstrated that poor	Inducible nitric oxide synthase enzyme expressed by airway epithelial cells is very sensitive to the effect of corticosteroids (Kharitonov 1996). Therefore, it follows that FeNO would also be a useful tool to determine if patients have been using their inhaled or oral medications that contain a corticosteroid. Indeed

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			adherence to asthma therapy. Medication-related factors include difficulties with inhaler devices, complex regimens, side effects, cost of medication, dislike of medication, and distant pharmacies.	adherence was associated with 38% of asthma deaths (NICE 2017). Non-adherence is a major reason for poor asthma control, asthma-related emergency department visits, inpatient hospitalizations, persistent eosinophilic inflammation, and increased oral steroid use (Murphy 2012, Williams 2004). Up to three-quarters of the total costs associated with asthma may be due to poor asthma control (Apter 2015). Guidelines and consensus statements on the diagnosis and assessment of patients with difficult-to-treat asthma unanimously stress the importance of identifying and addressing non-adherence in this population (Bousquet 2010, Bel 2011).	good adherence to prescribed asthma therapy has been associated with better disease control and lower FeNO concentrations (Klok 2014). The BTS-SIGN 2016 guidelines state that biomarker testing with FeNO may have a role in establishing (non-) adherence (to ICE therapy) in people with severe, difficult asthma. The BTS-SIGN 2016 guidelines cite as evidence a study by McNicholl et al that clearly demonstrates the dynamic effect of ICSs on FeNO may be used as an accurate discriminator of non-adherence to inhaled corticosteroids in adults (McNicholl 2012). Patients in this study received 7 days of direct

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					observed administration of their ICS medication (DOICS). Those patients who had a history of poor adherence as measured by ICS refills of less than 50% experienced a greater reduction in FeNO following 7days of DOICS compared to the group of adherent patients who had > 80% history of ICS refills (47 +/- 21% versus 79 +/- 26%) of baseline measurement (P < 0.003). Delgado-Corcoran et al investigated the relationship of FeNO to asthma control and medication adherence in 30 pediatric and adolescent patients that were followed periodically for 2.5yrs using NHLBI Guidelines. FeNO levels correlated to improved asthma control and were

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					significantly reduced in subjects with good compliance to steroids compared with patients with poor and moderate compliance. FEV1 levels were not substantially different between compliance groups. (Delgado-Corcoran 2004)
52	Circassia Pharmaceuticals plc	Periodic, quantitative measurement of Fractionally Exhaled Nitric Oxide (FeNO) reduces the likelihood of exacerbations in patients at risk for future events,	• Asthma exacerbations significantly impact patient lives and lead to an increase in direct and indirect costs It is estimated that only 20% of asthmatics have had exacerbations requiring treatment in the emergency department or hospitalization, yet these patients account for more than 80% of total direct costs (Rodrigo 2004). For example, in one study of 3,151 patients presenting to 83 US	Exacerbations (attacks) are the primary cause of mortality and morbidity in both adults and children with asthma. The UK has among the highest prevalence rates of asthma symptoms in children worldwide. 5.4 million people in the UK are currently receiving treatment for asthma. Asthma attacks hospitalise someone every 8 minutes; 185 people are admitted to hospital because of asthma attacks every day in the UK (a child is admitted to hospital every 20 minutes because of an asthma attack) (Asthma UK 2018). Asthma exacerbations significantly impact patient lives and lead to an increase in direct and indirect costs.	Elevated FeNO (> 50ppb) has been shown to be a significant independent risk factor for uncontrolled asthma (Malinovischi 2016). Furthermore, in a 3 year longitudinal study examining loss of lung function, a persistently high FeNO level of >40 ppb was independently associated with an accelerated decline in FEV1 (Matsunaga 2016). • The most compelling evidence to support the use of

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			emergency departments with acute asthma, 73% reported at least one visit for asthma in the prior year, with 21% reporting six or more visits (Griswold 2005).	In 2008, at least one half (52.6%) of persons with asthma in the US reported having an asthma attack in the preceding 12 months. Those who had attacks had a higher proportion of emergency department and urgent care visits, and reported fair to poor health (CDC, MMWR 2011).	monitoring FeNO in asthma management has been summarized in two recent Cochrane meta-analyses that concluded exacerbations were reduced 40-50%. The 2016 Cochrane Systematic Review on "Exhaled Nitric Oxide Levels to Guide Treatment for Adults with Asthma" included 7 randomized controlled trials and 1,700 adult participants. (Petsky 2016) By monitoring FeNO, the number of exacerbations were reduced by 40% and the exacerbation rates by at least 41%. The number of people having one or more asthma exacerbations was significantly lower in the FeNO group compared to the control group (odds ratio (OR) 0.60, 95% confidence interval (CI) 0.43- 0.84). Those in

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					the FeNO group were also significantly more likely to have a lower exacerbation rate than the controls (rate ratio 0.59, 95% CI 0.45 – 0.77). The quality of the evidence to support the effect on FeNO on reducing asthma exacerbations was determined to be moderate even though exacerbations were not defined the same across all of the studies included in the analysis. In a second 2016 Cochrane Systematic Review focusing on pediatrics, Petsky and colleagues evaluated the efficacy of tailoring asthma interventions based on monitoring FeNO, in comparison to management based on clinical symptoms (with or without spirometry/peak flow) or

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					asthma guidelines (or both), for asthma-related outcomes. This meta-analysis included 9 randomized controlled trials and 1,426 children. Using traditional monitoring, 40 out of 100 children experienced at least one exacerbation over 48.5 weeks, compared to 28 out of 100 children where treatment was guided by FeNO (OR 0.58, 95% CI 0.45 to 0.75; 1279 participants; 8 studies; p< 0.0002) (Petsky 2016). The benefit of using a FeNO based monitoring strategy was also demonstrated in a study of asthma in pregnancy. (Powell 2011). Women were enrolled in the study at 22 weeks gestation or sooner. Using a FeNO based strategy compared to

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					usual care was associated with a significant reduction in asthma exacerbations and improved quality of life. (Powell 2011). Interestingly, there were benefits seen in the offspring as neonatal hospitalizations were reduced too. The offspring from this study were also followed up later in life. In the year following birth there was a reduced incidence of recurrent bronchiolitis in the infants born from mothers in the FeNO group. (Mattes 2014). When the children were followed up as toddlers (mean age 5 years), the prevalence of wheezing, ED visits and doctor diagnosed asthma were all significantly lower in children from the FeNO group. (Morten 2016).

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					Ledford 2016 showed that an increase in FENO values from baseline to week 12 after omalizumab discontinuation was a positive predictor of exacerbations. Similarly, when this regression analysis was repeated for the subset of subjects receiving an ICS at baseline, an increase in FENO values from baseline to week 12 after omalizumab discontinuation was again seen as a positive predictor of exacerbations For subjects in the placebo group who experienced an exacerbation, there was a sharp increase in FENO value from baseline to week 12 of the study. Subjects in the omalizumab group who experienced an exacerbation also had an increase in FENO values

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					from baseline to week 12, but it was less pronounced. Subjects in either treatment group who did not experience an exacerbation had no increase in FENO values from baseline to week 12.
53	Circassia Pharmaceuticals plc	• Periodic, quantitative measurement of Fractionally Exhaled Nitric Oxide (FeNO) • helps to identify asthmatics who are possible candidates for treatment with a biologic	A small minority of asthma patients cannot achieve control of their disease with traditional therapies (i.e., ICS/LABA combinations with or without LTRAs and OCS) and are considered for additional treatment with a biologic agent according to growing NHS practice	Before a patient is considered to have truly severe refractory asthma, other factors related to achieving disease control should be considered. Difficult to control or treat asthma differs from severe refractory asthma and includes confounding factors such as allergic comorbidities, smoking, medication nonadherence and poor inhaler technique. (Hekking 2015, Kupcyzk 2011). This is an important distinction since methods to improve asthma control in difficult patients relate to addressing the confounding factors compared to the refractory patient where additional anti-inflammatory treatment is needed such as a biologic (e.g.,	• FeNO has been utilized as one of the study entry criteria during phase III clinical trials with the anti IL-5 antibody, mepolizumab in patients with severe asthma with a Th-2 eosinophilic phenotype. The DREAM mepolizumab study evaluated 621 patients with eosinophilic asthma who had a history of severe recurrent exacerbations. Baseline entry criteria included one or more of the following criteria: a sputum eosinophil count

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				omalizumab, mepolizumab or reslizumab). Before treatment with a biologic is considered, patients need to be reevaluated and comorbidities, medication nonadherence and poor inhaler technique ruled out. Using FeNO monitoring in asthma management helps to confirm ICS non-adherence/compliance and identifies patients with more severe disease that have persistent airway inflammation despite treatment with an ICS/LABA with or without additional drugs such as LTRAs (McNicholl 2012)	of ≥ 3%, a FeNO of ≥ 50 ppb, an asthma-related peripheral blood eosinophil count of ≥ $0{\cdot}3\times10^9$ per L, or prompt deterioration of asthma control after a ≤ 25% reduction in regular maintenance inhaled or oral corticosteroids. Patients were randomized to receive one of 4 treatment regimens: placebo, 75mg, 250mg and 750mg of mepolizumab IV every 4 weeks for one year. The mean baseline FeNO ranged from 29.2 to 33.7 ppb. The rate of clinically significant exacerbations was 2.40 per patient per year in the placebo group, 1.24 in the 75 mg mepolizumab group (48% reduction, 95% CI 31–61%; P<0·0001), 1.46 in the 250 mg mepolizumab group (39% reduction, CI 19–

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					54%; P=0·0005), and 1.15 in the 750 mg mepolizumab group (52% reduction, CI 36–64%; P<0·0001). Post treatment FeNO was not significantly different across the groups of mepolizumab doses. (Pavord 2012) Dupilumab, a fully human anti-interleukin-4 receptor α monoclonal antibody, inhibits interleukin-4 and interleukin-13 signalling, key drivers of type-2-mediated asthma. Adults with uncontrolled persistent asthma who are receiving medium-to-high-dose inhaled corticosteroids plus a long-acting β2 agonist require additional treatment options as add-on therapy. In a recent study to assess the effectiveness of dupilumab, Wenzel 2016

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					showed that all dose regimens resulted in significant dose-dependent reductions in FeNO compared to placebo, suggesting that FeNO is an accurate marker for treatment efficacy in anti IL-4 and 13 mediated therapy. Monitoring FeNO has the advantage of being available at the point of care, enabling physicians to make treatment decisions during the patient's visit. The use of FeNO to predict omalizumab responders has been shown to have significant cost savings (Massanari 2017). Without the use of FeNO, evaluating the response to a trial course of omalizumab (typically 16- 28 weeks) can be difficult. The addition of FeNO helps to identify responders to

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					omalizumab and significantly reduces overall costs of both FeNO and omalizumab. A pre-specified analysis of the pivotal trial for omalizumab (EXTRA) was performed to evaluate the reduction in exacerbation rate of omalizumab in relation to baseline biomarkers of airway inflammation (FeNO and blood eosinophils), and serum periostin (done post hoc). (Hanania 2013) Patients were divided into low- and high-biomarker groups. After 48 weeks of omalizumab treatment, reductions in exacerbations were greater in the high biomarker sub-groups than in the low biomarker subgroups. The greatest reduction in asthma exacerbations was seen in the high FeNO-group

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					(>19.5 ppb); mean 53% reduction compared to 16% when baseline FeNO was < 19.5ppb. For high blood eosinophils the mean reduction in asthma exacerbations was 32% (eosinophils > 260ul) vs 9% for low eosinophils (< 260ul). In summary, use of biomarkers of persistent airway inflammation helps to identify patients who may benefit most from treatment with omalizumab.
54	Education for Health	Key area for quality improvement 5 Identification and prioritisation of patients with poor asthma control	Poor asthma control is common and a significant cause of poor quality of life, increased use of healthcare resources and asthma death.	There is a need for routine audit to identify patients with poor asthma control and the implementation of a screening tool to determine underlying causes and need for onward referral. Changes to the organisation of reviews for patients with asthma presents an opportunity to make	

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				clear recommendations for prioritising patients for review.	
55	Napp Pharmaceuticals Limited	Key area for quality improvement 2 Adherence to maintenance treatment	Many patients are not adherent to their maintenance treatment and therefore overuse SABA medication.	Improving adherence to maintenance treatment will improve patient outcomes, reduce exacerbations and medicines wastage. Improving adherence is recommended in all guidelines.	Sumino K 2013
56	National Paediatric Respiratory and Allergy Nurses Group (NPRANG)	Key area for quality improvement 3	Adherence and monitoring of it	Review of their medications a) to avoid over use and reliance of SABA's potentially lead to death as found in NRAD b) 2) ensure compliance or adherence with prescribed asthma medications specifically inhaled corticosteroids to maintain good asthma control and prevent GP attendances, hospital admissions, emergency medications therefore reducing burden on hospital resources as well as improve patients qualiy of life.	• Asthma: diagnosis, monitoring and chronic asthma management (2017) NICE guideline NG80 • • Asthma UK (2014) Patient safety failures in asthma care: the scale of unsafe prescribing in the UK • Royal College of Physicians (2014) Why asthma still kills: The National Review of Asthma Deaths (NRAD) Confidential Enquiry Report

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57	NIHR CLAHRC North Thames	Key area for quality improvement 1: Advice during check-ups on how to address forgetfulness as a barrier to adhere well to corticosteroid inhalers, e.g. setting alarms, locate inhaler next to toothbrush	There is evidence that asthma control and medication adherence is problematic in children and young people with asthma in London secondary schools, Barriers to adherence, including forgetfulness, social concerns, incorrect knowledge, and side-effects of medication, should be considered throughout all stages of asthma care, including during the asthma review.	A recent school-based study assessed asthma control and medication adherence in London secondary school children with asthma, and found that poor control was linked to medication adherence. Children with poorer levels of asthma control also had increased rates of school absences and unscheduled healthcare use, compared to children with optimal asthma control, according to the validated Asthma Control Test. Adherence to corticosteroid inhalers is crucial for the maintenance of good asthma control.	Harris, K, Mosler, G, Williams, SA et al. Asthma control in London secondary school children. J Asthma. 2017; 23: 1–8
61	SCM3	Key area for quality improvement 4 Assessing asthma control	Assessing asthma control both at and between annual reviews, where a person presents to a GP with respiratory symptoms, is important and may prevent an admission to hospital for an acute asthma attack.	Example: Monitoring asthma control is very important because it allows the practitioner to assess adherence in line with NICE guidelines on medicine adherence. There is much evidence to suggest that none adherence of asthma medication can lead to untimely deaths (NRAD 2014) Assessing and monitoring asthma control is also an important opportunity to review inhaler technique	Asthma diagnosis and monitoring and chronic asthma management NG80 recommendations 1.14.2 and 1.14.3 • Royal College of Physicians (2014) Why asthma still kills: The National Review

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					of Asthma Deaths (NRAD) Confidential Enquiry Report
62	SCM4	Better adherence monitoring	This is the most important reason why asthma treatment fails.	By detecting poor adherence proper advice can be given and it stops doctors from simply prescribing additional medication or higher dose corticosteroids.	Several publications with the use of smarthalers.
63	SCM5	Key area for quality improvement 1 Adherence/ concordance to asthma therapy	Adherence to asthma treatment will improve the quality of life for children, young people and adults with asthma. It will also reduce the referrals to secondary and tertiary care.	Many asthma audits (NRAD for one) has found that patient's do not take asthma medication either due to lack of understanding or education. This can result in increased morbidity, reduced attendance at school/work and unnecessary admissions to hospital and death.	NICE medicines adherence (CG76) NRAD (www.rcplondon.ac.uk/projects/national-reveiw-asthma - deaths.) Szefler SJ. Monitoring and adherence in asthma management. Lancet Respir Med. 2015 P.Nagakumar,P.Hall,A.Bush, S.saglani, L.Fleming. Is Prescription Uptake And Medication Adherence Rating Scale (mars) A Useful Tool In Assessing Asthma Control In

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					Children With Problematic Severe Asthma,.Thorax 2014 Anja Jochmann, Prasad Nagakumar, Pippa Hall, Angela Jamalzadeh, Luc a Artusio, Sejal Saglani, Andrew Bush, Louise Fle ming. Improvement in asthma control and airway inflammation during period of electronic monitoring. ERJ.2015 Morton RW, Everard ML, Elphick HE. Adherence in childhood asthma: the elephant in the room. Arch Dis Child. 2014
Asthma management in primary care – Adjusting medication					
64	Royal College of General Practitioners	Over and under prescribing	There are qualitative reports that clinicians are good at stepping up asthma therapy but poor at stepping down. Similarly clinicians are	Over and under-prescribing is not cost effective and puts patients at risk of side-effects of therapy or adverse outcomes including hospital admission. A review of patients who have not ordered short acting beta 2	NICE asthma update 1.12.1

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			poor at detecting over use of therapy.	agonists in the previous 6 months from their repeat prescription (so that they can be stepped down) or over ordered (so that they can be stepped up) is clinically plausible to be more effective than an annual review.	
65	Napp Pharmaceuticals Limited	Key area for quality improvement 3 Appropriate step up and down of treatment	Often asthma maintenance treatment is escalated during periods of exacerbation however it is often not reduced during periods of control. Both NICE and BTS guidelines recommend that patients should be maintained on the lowest effective dose of steroid.	Optimising patients to the lowest effective dose and reviewing frequently will avoid unnecessary high dose prescribing and potential side effects. Often there is a reluctance to step down for fear of exacerbation although studies have shown that stepping down can be safe in suitable patients.	Usmani 2017 Hawkins 2003
66	Royal Liverpool and Broadgreen University NHS Trust	QS3: All individuals that have their asthma treatment escalated beyond a single preventer inhaler should have evidence	Time and again objective measures of concordance are seen to be poor in asthma, yet good concordance is associated with much better outcomes.	Concordance assessments are very simple in systems like EMIS. Acting on them results in lower drug spend and better outcomes.	

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		of >75% concordance with that initial treatment.			
Acute asthma – Severity assessment					
67	Education for Health	Key area for quality improvement 2 Assessment and management of acute asthma	Patients presenting with acute asthma are not routinely assessed in accordance with the British asthma management guidelines resulting in poor identification of severity of the exacerbation and subsequent poor management.	By listening to our students we are aware of the challenges of assessing and managing acute asthma in clinical practice. Our education is directly tailored to developing a full understanding of this issue but not all healthcare professionals managing patients with asthma are students of Education for Health. Recommendations about education and training and national template would easily resolve this situation.	NRAD
68	SCM4	Lung function testing (PEFR or spirometry) pre and post nebuliser during acute asthma and	Will add important information on asthma severity and improvement following SABA nebuliser treatment	Lung function testing is underused in acute asthma management.	National asthma and COPD audit

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		before discharge			
Acute asthma – Treatment of exacerbation					
69	British Thoracic Society	Key area for quality improvement 5	Effective treatment of exacerbation.		
70	SCM3	Key area for quality improvement 5 Treatment for acute asthma	People aged five or over presenting to a health care professional with a severe or life threatening acute asthma attack (exacerbation) should be given oral or intravenous steroids within one hour of presentation.	Example: Asthma UK estimate that three people a day die from asthma in the UK. Once an asthma attack has commenced it is important that the correct treatment is administered as soon as possible to prevent deterioration or death. Administering steroids in a timely manner may not only mean a reduction in deaths also means that a person in an acute attack may be discharged after admission to an emergency department rather than needing an hospital admission	BTS /SIGN British guideline on the management of asthma SIGN clinical guideline 153 recommendations in paras 9 and 12 and guidance in annex 3-7
71	SCM4	Acute asthma care pathway	Adopting a nationally agreed acute care pathway would ensure not only prompt treatment with corticosteroids but also more aggressive use of nebuliser treatment.	In many places every nebuliser has to be prescribed separately and there is frequently delay in patient review and therefore prescription of nebuliser treatment resulting in suboptimal nebulisation and risk of deterioration.	NAEPP asthma guidelines 2007.
Acute asthma – Follow-up after severe exacerbation					

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72	Asthma UK	Key area for quality improvement 5 Follow up in primary care	People with asthma who have had an emergency admission due to an asthma attack are at high risk of further asthma attacks.	NRAD found that nineteen (10%) of those who died did so within 28 days of being treated in hospital for an asthma attack. The BTS National Paediatric Audit notes that there has been no systematic improvement in discharge planning in recent audits. The Audit notes that 'Discharge planning in the form of education about asthma and its treatment, including asthma inhaler device technique, are important not least because they have been shown to decrease the number of future admissions with the asthma attacks.' The BTS Care Bundle for patients discharged from accident and emergency departments following an acute asthma attack, could be used to improve the process of care. In turn, its use could be a quality measure to monitor improvement. Improved data sharing between primary and secondary care and between settings – hospitals, general practice, A&E, Out of Hours – will be the most effective way to	The National Review of Asthma Deaths (2015) BTS National Paediatric Asthma Audit 2015 BTS Care Bundle

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				facilitate this and ensure that acute asthma exacerbations are followed up in primary care.	
73	AstraZeneca	Patient management following a severe exacerbation - Patients should receive appropriate observation by a specialist, and a review of maintenance therapy and adherence after an exacerbation regardless of the care setting or area of country they live in	Following a severe exacerbation for asthma (any exacerbation requiring hospitalisation or emergency medical care), patients should receive the same standard of care and follow up regardless of the care setting they are seen in, and the area of the country they live in. Patients who receive appropriate care and follow up following an exacerbation are more likely to keep well – the NRAD report identified that two-thirds of people hospitalised in the month before they died did not receive the necessary follow-up care. An asthma exacerbation that requires emergency	The NRAD report identified that two-thirds of people hospitalised in the month before they died did not receive the necessary follow-up care. The latest asthma UK audit (2016) suggests that there are still thousands of people with asthma not receiving the correct treatment following a potentially life threatening episode.	Please see the NRAD report highlighting the use of NHS services by asthma patients who died https://www.rcplondon.ac.uk/projects/national-review-asthma-deaths Please also see the Asthma UK Annual Asthma Survey 2016 report https://www.asthma.org.uk/share/?rid=6770 We also understand this may be measured as part of the RCP asthma audit, due April 2018 https://www.rcplondon.ac.uk/projects/asthma-audit-development-project

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			care should be seen as a trigger to review current maintenance therapy and adherence. It should be seen as the responsibility of the treating clinician at that time to ensure that appropriate measures are put in place to prevent further exacerbations and optimise asthma control. The BTS/SIGN guidelines for asthma recommend a range of therapeutic options and follow up following an admission with acute asthma. This includes a discharge bundle which likely requires increased uptake across the country.		
74	Education for Health	Key area for quality improvement 3	Despite good evidence, previous recommendations and	Listening to the experiences of our students in clinical practice informs us that this recommendation is not	

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		Follow up of patients after an exacerbation of asthma	sound guidance patients are still not being reviewed within 2 working days of treatment for acute asthma as a matter of routine. This is presenting risks of further deterioration, repeated exacerbations and asthma death.	met as a matter of routine. Furthermore the recommendation is not fully understood. Great clarity around the timing and specific purpose of this review is needed.	
75	National Paediatric Respiratory and Allergy Nurses Group (NPRANG)	Key area for quality improvement 4	Follow up of asthma attack within 2 working days by asthma trained HCP in primary to ensure ongoing recovery from exacerbation and investigate reason for loss of asthma control	Guidelines suggest review by healthcare professional or GP within 2 working days after discharge. BTS Paediatric audit found only 24% had recorded that patient had been told or given an appointment for review by GP within 2 days of discharge. Only 16% by Healthcare profession l e Respiratory Nurse Specialist	• British Thoracic Society/Scottish Intercollegiate Guidelines Network (2016) British guideline on the management of asthma • Asthma: diagnosis, monitoring and chronic asthma management (2017) NICE guideline NG80 • Asthma UK (2016) Annual Asthma Survey 2016 report

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					• Royal College of Physicians (2014) Why asthma still kills: The National Review of Asthma Deaths (NRAD) Confidential Enquiry Report • British Thoracic Society (2016) 2015 BTS Paediatric Asthma Audit Summary Report
76	SCM4	People who experienced a severe asthma attack should be reviewed after 3 months following the acute attack to review asthma control and adherence.	The greatest risk factor for an exacerbation is a previous exacerbation and more frequent review for patients at a higher risk of an asthma attack should be conducted.	NRAD has shown that many people who died did not have a recent asthma review.	NRAD report
77	SCM4	BTS asthma discharge care bundle	This was developed to achieve safe discharge of patients following an acute severe asthma attack by a multi expert commission.	NRAD found that many people died soon after a hospital admission with asthma.	https://www.brit-thoracic.org.uk/standards-of-care/quality-improvement/care-bundle-for-asthma/

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Difficult/severe asthma – Referral to a specialist					
78	Asthma UK	Key area for quality improvement 6 Difficult asthma	There are approximately 200,000-250,000 people with severe asthma in the UK, of whom around 50,000 are on the highest level of treatment (Walsh et al, 1999). People with difficult asthma face a considerable loss in quality of life. Despite recommendations for people to be referred to specialist care when on high dose treatment or continued oral corticosteroids, many are not under specialist care.	In 2014, the National Review of Asthma Deaths reported on the circumstances surrounding and leading up to 195 asthma deaths between February 2012 and January 2013 (14% of 1374 asthma deaths reported in 2012). Whilst severe asthma accounts for a small proportion of people with asthma, 39% of the people who died and were included in the review had severe asthma. The quality statement should reflect the need to ensure that people with difficult asthma are referred to specialist care – and not merely 'offered an assessment'. This could help improve health outcomes and reduce deaths.	Severe asthma: the unmet need and the global challenge (Asthma UK, 2017) Walsh LJ, Wong CA, Cooper S, et al. Morbidity from asthma in relation to regular treatment: a community based study. Thorax, 1999;54:296-300.
79	AstraZeneca	Patients who remain uncontrolled on conventional therapy should be referred to a specialist.	Specialist care from either the secondary or tertiary setting is essential for severe asthma patients, as additional measures can be taken to diagnose	Confidential study data provided.	There is considerable variability across the UK of referral rates to both secondary and tertiary care.

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			and manage patients in these settings, which can potentially avoid asthma exacerbations, improve control, and reduce OCS dependence. Both NICE and BTS/SIGN guidelines highlight that patients who remain uncontrolled on conventional therapy should be referred to a specialist. This will help with a diagnosis – either severe asthma or a misdiagnosis of asthma. BTS/SIGN suggests that patients with suspected asthma who failed to respond to an initial trial of ICS or have atypical symptoms may require additional testing to confirm the diagnosis. NICE 2017 recommends the establishment of diagnostic hubs to evaluate such symptoms.		There are currently several pilot studies evaluating Diagnostic Hubs and Active Case Finding based on ICS prescribing to improve appropriate referral and review.

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80	Novartis Pharmaceuticals UK Limited	Key area for quality improvement 3: Uncontrolled asthma and specialist care	There is strong evidence to demonstrate that patients with uncontrolled asthma (NICE definition - asthma that has an impact on a person's lifestyle or restricts their normal activities) experience better outcomes when reviewed by an asthma specialist. In alignment with new NICE guidelines, clinicians should seek expert advice about uncontrolled asthmatic patients. We believe that this recommendation should be strengthened in line with similar recommendations from NRAD for the proactive identification and review of uncontrolled asthma patients to be seen by an asthma specialist.	According to NRADs recommendation (NRAD key recommendations, organisation of NHS services, recommendation 2) we would advocate that patients with an asthma diagnosis who have had either an A&E attendance, inpatient admission or greater than 2 courses of systemic corticosteroids (oral or injected) in the last 12 months must be proactively identified and reviewed by an asthma specialist. We believe that systems required to do this are already in place to proactively identify this group of patients with high unmet need in primary care. According to Scottish Intercollegiate Guidelines Network (SIGN) and British Thoracic Society (BTS) recommendations (management of acute asthma, 9.1.5), a respiratory specialist should follow up patients admitted with a severe asthma attack for at least one year. NRAD recommended that every NHS hospital and general practice should have a designated clinical	NICE. Asthma: diagnosis, monitoring and chronic asthma management. NICE Guideline. November 2017. Available online at: https://www.nice.org.uk/guidance/ng80/resources/asthma-diagnosis-monitoring-and-chronic-asthma-management-pdf-1837687975621 Royal College of Physicians. National Review of Asthma Deaths. May 2014. Available online at: https://www.asthma.org.uk/globalassets/campaigns/nrad-full-report.pdf SIGN 153. British guideline on the management of asthma. A national clinical guideline. September 2016. Available online at: http://www.sign.ac.uk/assets/sign153.pdf

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				lead for asthma services. NRAD also recommended that patients who have had more than 12 short acting beta agonist (SABA) inhalers in the previous 12 months should be invited for urgent review by an asthma specialist.	
81	Royal Liverpool and Broadgreen University NHS Trust	QS5: All individuals on regular oral corticosteroids for asthma should have had a review in a specialist asthma centre within the last 2 years.	The treatment of asthma with oral steroids has long been a trigger for referral, but still most people on “step 5” are not under specialist care.	We now have effective options in place of steroids (MAbs), but for most people we don’t use them as the specialist centre finds another issue (e.g. concordance) or a comorbidity (e.g. ILO)	
82	SCM1	Key area for quality improvement 2	Published evidence suggests that people with severe asthma have symptoms for up to 20 years before referral to specialist services. Through NICE HTA there are now multiple targeted biologic therapies available for people with severe asthma.	Prompt referral to specialist centres will allow early access to novel treatments and minimise the side effects of long term oral steroid use. Published evidence demonstrates an improvement in quality of life and decreased healthcare utilisation in the 12 months following review at a specialist centre independent of the impact of starting novel therapies.	NHS England Adult Respiratory CRG service specification for Severe Asthma

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83	SCM4	People with difficult asthma are offered an assessment by a multidisciplinary difficult asthma service.	This is a group of patients with complex problems and increased risk of a severe asthma attack.	Multidisciplinary asthma services are not yet the norm in the management of childhood asthma and this has been implemented in few hospitals.	
84	SCM5	Key area for quality improvement 3 Follow up/ appropriate specialist referral	I think this really could be argued to go hand in hand with improvement 2. If diagnosis is of doubt or that the patient is at the level of treatment the health professional involved should refer to the specialist within their area.	Patients should receive medical review from the most appropriate professional. If they are not referred then this will again cause unnecessary morbidity for the patient and family involved.	As above
Difficult/severe asthma – Non-pharmacological treatment					
85	Association of Paediatric Chartered Physiotherapists	The provision of a dedicated paediatric physiotherapy service for the assessment of dysfunctional breathing and management	A dysfunctional breathing pattern can mimic asthma or exercise induced asthma. The national BTS asthma guidelines 2016 identify that poor asthma control may be	There is currently no mention of the assessment and management of dysfunctional breathing in the current NICE guidelines. We are aware as a profession that especially in the paediatric population there is a national inconsistency in the physiotherapy	

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		through breathing re-training.	also be due to dysfunctional breathing. BTS therefore state that dysfunctional breathing should be considered as part of a difficult asthma assessment. An assessment by a skilled physiotherapist would assess and treat accordingly and may reduce the use of pharmacological agents. Breathing retraining programmes improve quality of life in patients with incompletely controlled asthma despite having little effect on lung function or airway inflammation. Such programmes can be delivered conveniently and cost-effectively as a self-guided digital audiovisual programme,	service to this group of patients. Few centres offer a dedicated service to paediatric asthma patients. Wells (2017) performed a national benchmark of physiotherapy provision for children with difficult asthma (DA) and found that 89% of physiotherapy input to DA is not directly funded by the asthma or DA teams and 66% of physiotherapy services have no set hours dedicated to provide services or designated physiotherapist for the DA team (taken from abstract from winter BTS meet 2017). Barker N et al demonstrated the benefits of a physiotherapy led clinic but then mentioned that this is not the case nationally and was very specific to that hospital (Sheffield) Ref: Getting to grips with 'dysfunctional breathing'. Paediatric Respiratory Reviews. 2015;16(1):53-61.) Bruton et al (2017) state that breathing retraining programmes can improve quality of life in those with asthma. However, clinicians rarely	

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			so might also reduce health-care costs.	advocate breathing retraining and access to this intervention is restricted for most patients due to the limited availability of suitable physiotherapists and poor integration of breathing retraining into standard care. Ref: Physiotherapy breathing retraining for asthma: a randomised controlled trial. Lancet Respiratory Medicine 2018; 6(1): 19-28.	
86	Association of Paediatric Chartered Physiotherapists	Areas of development and research required to potentially enhance the paediatric asthma physiotherapy service.	Keys areas in which physiotherapy could be beneficial are exercise prescription, airway clearance when indicated, and musculoskeletal management (including thoracic posture and mobility, continence.) Due to the emergent nature of the physiotherapy service to this patient group, there	In support of exercise Holloway E, Ram FS showed that physical exercise training has shown no effect on PEF, FEV1, FVC or ventilation at maximal exercise capacity. However, exercise did have significant effects on oxygen consumption, maximal HR and work capacity. Exercise training and breathing pattern retraining with exercise is important for symptom differentiation, to improve fitness and tackle obesity in this population. In reducing obesity and improving functional ability has been shown to reduce the symptoms of asthma. Ref: Breathing exercises for Asthma. Cochrane Database of Systematic Reviews. 2004. Issue 1	

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			also needs to be development and clarification in the following areas: -Referral criteria -Establishing an appropriate referral point e.g. screening tool for other members of the MDT. -Validated outcome measures. -Technological tools e.g virtual appointments	Further studies are recommended to assess efficacy in the other areas stated.	
87	Boston Scientific	Key area for quality improvement 1: Management of severe asthma in adult patients, informed consent	Severe asthma is a life threatening disease with significant negative impact on quality of life. Therefore it is crucial to provide more guidance for the treatment of this group of patients. Patients must be offered all therapies that have proven increased health benefits. By therapy we mean not just pharmacological treatments but also non pharmacological	It is important to ensure all patients receive the most appropriate treatment at the right time. Unfortunately some patients wait too long before having access to certain therapies and for this reason we recommend quality standards for ensuring all treatment options are communicated at the correct time and also to provide specific guidance as to the optimal patient pathway based on the latest evidence available. This might be best informed by the data in the difficult asthma registry.	

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			treatment (for instance therapies delivered through the use of medical devices). The healthcare professionals specialized in asthma have a fundamental role in identifying which treatment would work best at a specific point of the patient pathway, and identifying patient sub-groups proven to respond to non-pharmacological therapies. We believe in the importance of providing treatment options tailored to the individual patient.		
88	Primary Care Respiratory Society UK	Additional developmental areas of emergent practice Breathing retraining		This approach may avoid the need to progress to higher dose medication.	1. http://www.thelancet.com/journals/lanres/article/PIIS2213-2600(17)30474-5/fulltext
Additional areas – Smoking cessation					

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89	Pfizer	Ensure smoking cessation is offered to all asthma patients who currently smoke	Smoking is associated with reduced responsiveness to corticosteroid therapy, poorer symptom control and worse outcomes in asthma patients1	Smoking cessation support and pharmacotherapy offered to all asthma patients. See the report on smoking cessation from the PCRS "Two thirds of people with asthma admitted to hospital in the UK are current or ex-smokers and at least as many people with asthma smoke as in the general population. For these people intensive and evidence based stop smoking support should be part of their essential treatment."2	1. NCSCT Clinical Case for Smoking Cessation for RESPIRATORY PATIENTS http://www.ncsct.co.uk/usr/pub/interventions-in-secondary-care-june-10-respiratory-patients-factsheet.pdf 2. PCRS Tobacco dependency report: https://pcrs-uk.org/tobacco-dependency-0
90	Primary Care Respiratory Society UK	Help to quit smoking	Although smoking rates are declining, smoking cessation clinics are being decommissioned around the country. We know you are 4 times more likely to quit successfully with additional support including NRT	Up to 33% of people with mental health problems and more than two-thirds (70%) of patients in psychiatric units, smoke cigarettes. 42% of all the tobacco smoked in the UK is by people with a mental health problem. (PCRS N Baxter 2014). The annual QOF smoking returns suggests that up to 1:4 people with common long-term conditions continue to smoke. (as above)	Stopping smoking reduces all cause mortality in people with mild and moderate airways obstruction according to a 14.5-year cohort study that followed subjects in receipt of an intensive quit smoking intervention. (PCRS – Noel Baxter. Date of

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					Production: November 2014 Resource Number: 2014SC001.1)
91	Royal College of General Practitioners	Smoking	Smoking worsens asthma	All patients with asthma should be asked regularly about their smoking habits and not just those in the teenage years.	
Additional areas - Training					
92	Association of Respiratory Nurse Specialists	Every NHS hospital and general practice should have a designated, named clinical lead for asthma services, responsible for formal training in the management of acute asthma	If someone has responsibility for taking a lead then education may be improved in both chronic and acute asthma, thus saving lives.	NRAD report 2014.	
93	Napp Pharmaceuticals Limited	Key area for quality improvement 5	Access to asthma trained healthcare professionals and objective tests are essential for the	There is a variation in asthma outcomes throughout the UK. Objective tests such as spirometry and FeNo are not universally available but are recommended by	

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		Access to trained asthma specialist in Primary care (Nurse or GP)	appropriate and effective diagnosis and management of asthma patients. NICE recognises the value/importance of diagnostic hubs and access to objective tests such as spirometry and FeNO. Spirometry is the “gold standard” respiratory test and is essential when diagnosing new patients and for differentiating between asthma and COPD.	NICE and BTS/SIGN for the diagnosis and monitoring of asthma. Training is required in order to conduct and interpret spirometry correctly and is not always available due to resource pressure for HCPs e.g. Nurses are now managing multiple long term conditions including asthma without being specialists in all areas	
94	Napp Pharmaceuticals Limited	Additional developmental areas of emergent practice Ongoing asthma training for Healthcare professionals (HCP’s)	In order to provide effective asthma management, it is vital that GP’s, nurses and practice based pharmacists are kept updated and fully trained on the array of new medication options on the market. Training on how to identify and	If HCP’s are not aware of the choice of medications available or how to use them, it may limit medicines optimisation. NRAD report suggests identifying uncontrolled asthma patients or those on high dose ICS to be reviewed to help avoid avoidable deaths from asthma. HCP’s should be fully trained to ensure they can carry this out effectively.	https://www.rcplondon.ac.uk/file/868/download?token=JQzyNWUs

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			manage uncontrolled asthma patients.		
95	Primary Care Respiratory Society UK	Health care professionals undertaking asthma care should have appropriate qualifications and up to date training	Outcomes in Primary care are very variable and some of this variability can be attributed Access to asthma trained healthcare professionals and objective tests are essential for the appropriate and effective diagnosis and management of asthma patients. to the standard of care received during routine reviews	The drive to reduce costs in Primary Care is leading to many untrained HCPs delegating to untrained individuals Training is required in order to conduct and interpret spirometry correctly and is not always available due to resource pressure for HCPs e.g. Nurses are now managing multiple long term conditions including asthma without being specialists in all areas	This vital area of the performance of the NHS in respect of asthma and other respiratory diseases is under resourced and under researched. It is likely that improvements in health care professionals education and in the conditions of practice in primary care will do more to improve outcomes than modifications in guidelines.
96	Royal College of Nursing	Every NHS hospital and general practice should have a designated, named clinical lead for asthma services, responsible for	If someone has responsibility for taking a lead then education may be improved in both chronic and acute asthma, thus saving lives.	NRAD report 2014.	

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		formal training in the management of acute asthma			
Additional areas – Measuring outcomes					
97	Royal College of General Practitioners	Acute Hospital Attendances for asthma	Asthma attendances are in theory preventable	Measuring asthma hospital attendances is an outcome measure rather than a process and therefore is more significant to the patient and the NHS system.	Asthma admissions are routinely measured as part of ambulatory care sensitive attendances at A+E through the data collated by commissioning support units. Primary care should be assessed against this.
Additional areas - Transition					
98	SCM5	Key area for quality improvement 4 Transition	Transition is important to consider – although I understand if this may be out of scope. However not only talking about transition between paediatric and adult service but between tertiary, secondary and primary care. As a tertiary centre for	Teenagers need appropriate advice so they can take on their own asthma care. Patients and families often get confused to who leads on asthma – sometimes getting conflicting advice,	NICE (QS140)

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			paediatric asthma – our patients are seen by us, primary care and some also in secondary care – there often are “blurring” of responsibilities.		
Other comments					
99	British Thoracic Society	Key area for quality improvement 2	Early initiation of ICS: Commencing patients on SABA only at diagnosis as supported by NICE would be considered a sub-optimal less effective treatment approach when considering effectiveness outcomes such as mortality or serious high risk events.		
100	British Thoracic Society	Additional developmental areas of emergent practice	FENO as a diagnostic tool	NICE have encouraged the use of FENO in every patient as a diagnostic component of the algorithm for ALL patients	• Evidence for this is based on 1 non-UK and probably non-generaliable study and we would encourage the development of a robust research programme to investigate this and believe it is too conceptual an approach

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			ICS at diagnosis	NICE have dismissed ICS at diagnosis for all patients on cost effective grounds.	on which to base a quality standard. • One potential response would be to explore death rates prospectively in practices that adopt NICE compared to BTS/SIGN (perhaps Scotland v's England). Those deaths found in the NRAD study who were off ICS (never treated) are completely avoidable if ICS used at baseline. Further data, will be available later this year from the publication based on the Melbourne thunderstorm event, where even a single dose of ICS in preceding 24 hours, resulted in 100% protection from a fatal outcome, or even an ICU ventilation episode, in the worlds largest single epidemic of thunderstorm asthma deaths. Data is available from the proceedings of the national conference

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					on this even in Australia and is awaited in publication in next few months. • NICE accept LTRA as a second controller although this is a clearly less effective treatment than LABA when tested head to head. Therefore we believe NO quality based standard could be based on this concept. However we would fully support the development of high quality real life research that attempts to answer this question.
101	Royal College of General Practitioners	A single unified guideline within the UK on asthma. The RCGP have feedback to NICE, with the PCRS, about our concerns about		Ensuring there is a generalist (GP) perspective on NICE guidelines development groups, the management of patients in the community using diagnostic tools that are available to primary care including peak flow monitoring and spirometry which provides baseline objective measurement of asthma control at the time of diagnosis and	The British Thoracic Society (BTS) have identified the key differences between the BTS/SIGN and NICE guidelines on the diagnosis and management of asthma. These include diagnosis, pharmacological

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		recommending a diagnostic test (FeNo) in General Practice (GP) that is not freely available or used either in primary care and to an extent in secondary care. (FeNo testing) which is then likely to increase work demand pressures in secondary care.		reassessment, and the importance of reserving patient referral to secondary care for those patients who are identified at high risk (e.g. from the Review of Asthma deaths 4) and not just referring because of the lack of availability to us in practice of a presumed diagnostic tool	management, treatment at diagnosis, the introduction of leukotriene receptor antagonists (LTRA) after low dose inhaled corticosteroids (ICS), maintenance and reliever therapy (MART) and treatment beyond combined inhaler therapy as well as some other issues in managing asthma in children. BTS/SIGN guideline also provides recommendations for important aspects of asthma management that are not addressed within NICE guidelines. These include guidance on inhaler devices, the management of acute asthma attacks in both adults and children, the management of difficult asthma, guidance on asthma in adolescents, in pregnant women and on occupational factors.

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					1. White J, Paton JY , Niven R, et al Guidelines for the diagnosis and management of asthma: a look at the key differences between BTS/SIGN and NICE Thorax Published Online First: 03 January 2018. doi: 10.1136/thoraxjnl-2017-211189
102	Royal College of Physicians	The RCP is grateful for the opportunity to respond to the above consultation. We would like to endorse the response submitted by the British Thoracic Society (BTS).			