A primary care perspective on the new British asthma guideline

Bronwen Thompson discusses the revisions to the BTS/SIGN guideline with Dr Hilary Pinnock

This guideline update¹ is significant. It builds on previous asthma guidelines so is an evolution rather than a revolution but, importantly, it focuses on being relevant and practical to implement in primary care. This is highly appropriate because the key chapters which have been updated are those on diagnosis and pharmacological treatment.

Diagnosing asthma

Diagnosing asthma is not straightforward. Asthma is a condition that fluctuates over time, so it may take time to make an accurate diagnosis.

Key messages about diagnosis

- Diagnosis of asthma is based on a structured clinical assessment informed by objective tests for variable airway obstruction or airway inflammation and supported or refuted by monitored initiation of treatment.
- There is no single conclusive test to confirm asthma: all tests have false positive and false negatives.
- Use time to help you make the diagnosis comparing signs and tests when the patient is symptomatic with results when they are asymptomatic – and use the READ code for ‘suspected asthma’ until a diagnosis is confirmed.
- Keep good records while exploring the possibility of asthma – you may need to review the basis on which a diagnosis was made in the future.

Figure 1: Diagnostic algorithm

Reproduced with permission from the British Guideline on the Management of Asthma 2016.

(See page 54 for more information on the diagnostic tests for asthma)
There is no single test that can conclusively determine whether a cluster of symptoms is asthma (or not), so the guideline recommends an initial assessment of the probability of asthma based on a ‘structured clinical assessment’. This is a comprehensive review of the full patient history and previous consultations, alongside the symptoms described by the patient. Depending on whether the patient is considered to have a high, medium or low probability of asthma, a set of further investigations will be appropriate. Because it may take several weeks or months to confirm a diagnosis, the READ code ‘suspected asthma’ should be used in the interim. High quality record keeping is critical in order that the basis for a diagnosis can be checked in the future.

The guideline emphasises that diagnostic tests form only one part of an asthma diagnosis and some tests may give false negatives (e.g. spirometry, peak flows), especially when the patient is asymptomatic. However, quality assured spirometry is regarded as the pivotal test for demonstrating airway obstruction in adults and children old enough to perform the test. The definition of obstruction is based on the FEV1/FVC ratio. This ratio varies with age; using the lower limit of normal (as opposed to a fixed ratio of 70%) will avoid under-diagnosis in children and over-diagnosis in the elderly. A range of other investigations may be used to demonstrate variability and/or inflammatory/atopic status in order that the basis for a diagnosis can be checked in the future.

The draft NICE guideline on asthma diagnosis and monitoring in 2015 raised the profile of fractional exhaled nitric oxide (FeNO) as a potentially mainstream test for asthma. The British Asthma Guideline positions FeNO as a useful approach to detecting eosinophilic inflammation which provides supportive (but not conclusive) evidence of a diagnosis of asthma. Raised FeNO levels indicate steroid responsiveness, and levels fall after treatment with steroids. Blood eosinophilia, raised allergen-specific IgE and a positive skin prick test indicate atopic status and are also associated with asthma. Importantly, normal spirometry does not exclude asthma, indeed, only a minority of people with asthma in primary care will have obstructive spirometry and reversibility at the time when it is tested. There are a number of confounders which may influence FeNO results but, unlike lung function, may still be positive in an asymptomatic patient. A comprehensive table detailing the sensitivities and specificities of all diagnostic tests is included (Table 1 see page 54).

The concept of a ‘trial of therapy’ has been developed into a ‘monitored initiation of therapy’ for people in whom there is a high probability of asthma.

Pharmacological treatment

Pharmacological treatment remains the mainstay of asthma treatment and there have been some important changes to treatment options since the last guideline update in 2014. There are some significant changes to the familiar ‘steps’ of asthma management.

The numbering of steps has been replaced by descriptions. One of the reasons for this is that, due to important changes to the recommendations on early steps, it could cause confusion if we continue to refer to them as Steps 1–3.

• In all but a few patients, preventive therapy with low-dose inhaled corticosteroids (ICS) should be initiated from diagnosis. Important lessons from the National Review of Asthma Deaths about the overuse of short-acting bronchodilators have been taken on board. So most patients will now start on the step to be known as ‘regular inhaled preventer’. If control is not achieved at any step, patients move through ‘initial add-on therapy’, ‘additional add-on therapies’, ‘high dose therapies’, and ‘continuous or frequent use of oral steroids’ until they are controlled.

• Short-acting beta-agonist (SABAs) should be prescribed for anyone with symptomatic asthma for symptom relief. However, monotherapy with SABAs is now recommended only for those with infrequent short-lived wheeze (typically occasional exercise-induced symptoms lasting no more than an hour or two). Using more than three doses of SABA a week should prompt a review and consideration of moving up to the next step of therapy. Anyone prescribed more than one SABA inhaler device a month should be identified and have their asthma assessed urgently.

• The former Step 3 has been divided into ‘initial add-on therapy’ and ‘additional add-on therapies’. ‘Initial add-on therapy’ is the ad-

Key messages about asthma prescribing

• Preventive treatment should be the basis for asthma management in almost all people with asthma.

• The guidance on preventer medication has been clarified and the old ‘step 3’ divided into two options to emphasise that the evidence for adding a LABA takes precedence over either options (especially in adults).

• The numbered steps have been replaced with descriptions.

• Inhaled steroids have been categorised into bands by strength – very low (children), low, medium, high.

• Inhalers should be prescribed by brand name to ensure patients receive the right inhaler.

• Referral for specialist opinion is recommended if the patient is on ‘high dose therapies’ or ‘continuous or frequent use of oral steroids’.
Figure 2: Summary of management in adults

<table>
<thead>
<tr>
<th>Asthma - suspected</th>
<th>Asthma - diagnosed</th>
</tr>
</thead>
</table>
| **Diagnosis and assessment** | **Evaluation:** assess symptoms, measure lung function, check inhaler technique and adherence  
+ adjust dose + update self-management plan + move up and down as appropriate |
| Regular preventer | Low-dose ICS |
| Infrequent, short-lived wheeze | Add inhaled LABA to low-dose ICS normally as a combination inhaler |
| Initial add-on therapy | Add inhaled LABA to low-dose ICS normally as a combination inhaler |
| **Additional add-on therapies** | **High-dose therapies** |
| No response to LABA – stop LABA and consider increased dose of ICS  
If benefit from LABA but cannot still instigate = continue LABA and increase ICS to medium dose  
If benefit from LABA but cannot still instigate = continue LABA and increase ICS to medium dose |
| Consider trials of increasing ICS up to high dose  
Addition of a fourth drug = Salmeterol, ICS and LABA |
| **Continuous or frequent use of oral steroids** |
| Use daily ICS tablet in the lowest dose providing adequate control  
Maintain high-dose ICS  
Consider other treatments to minimize use of steroid tablets |

Short acting β₂ agonists as required – consider moving up if using three doses a week or more

Reproduced with permission from the British Guideline on the Management of Asthma 2016.

Figure 3: Summary of management in children

<table>
<thead>
<tr>
<th>Asthma - suspected</th>
<th>Asthma - diagnosed</th>
</tr>
</thead>
</table>
| **Diagnosis and assessment** | **Evaluation:** assess symptoms, measure lung function, check inhaler technique and adherence  
+ adjust dose + update self-management plan + move up and down as appropriate |
| Regular preventer | Very low dose (pediatric) ICS (or LTRA <5 years) |
| Infrequent, short-lived wheeze | Very low dose (pediatric) ICS |
| **Initial add-on prevention** | Very low dose (pediatric) ICS  
Pills  
Children <5 years - add inhaled LABA  
Children <5 years - add LTRA |
| **Additional add-on therapies** | **High-dose therapies** |
| No response to LABA – start LABA and increase dose of ICS to low dose  
If benefit from LABA but cannot still instigate = continue LABA and increase ICS to low dose  
If benefit from LABA but cannot still instigate = continue LABA and increase ICS to low dose |
| Consider trials at:  
Increasing ICS up to medium dose  
Addition of a fourth drug = Salmeterol, ICS and LABA |
| **Continuous or frequent use of oral steroids** |
| Use daily ICS tablet in the lowest dose providing adequate control  
Maintain medium-dose ICS  
Consider other treatments to minimize use of steroid tablets |

Short acting β₂ agonists as required – consider moving up if using three doses a week or more

Reproduced with permission from the British Guideline on the Management of Asthma 2016.
What’s new/different in pharmacological management

- Numbered steps have been removed in favour of descriptions.
- Former Step 1 – SABAs only – has more or less gone in favour of immediate preventer treatment.
- More than one SABA inhaler a month should trigger urgent review and action.
- Former Step 3 has now been divided into two – ‘initial add-on therapy’ and ‘additional add-on therapies’.
- ICS are no longer compared with BDP as reference product for strength. Instead, all ICS are categorised into bands (very low, low, medium and high) to enable comparison.
- Recommendation that all patients on high dose therapies and continuous or frequent use of oral steroids are referred to specialist care (adults and children).
- Inhaler prescriptions should be written by brand name to avoid patients being given an inhaler which they have not been trained to use.

Previous versions of the guideline have used beclometasone (BDP) as a reference ICS against which other steroids are compared. However, the development of an increasing range of ICS and inhaler devices means that this comparison is no longer helpful. All ICS are now banded into very low, low, medium or high dose categories to enable comparison and to determine equivalence. The new banding of ICS by strength should be more accurate and more straightforward in practice. Two tables indicate the licensed doses of all ICS for adults and children (Tables 9 and 10).

The guideline update recommends that both children and adults on high dose therapies and continuous or frequent use of oral steroids are referred to specialist care. This is clearly indicated in the Figures showing the summaries of stepwise management.

For the first time, under ‘Key recommendations for implementation’, the guideline highlights that inhalers should be written by brand name to avoid a patient being dispensed a device which they have not used before. This is particularly important now that increasingly familiar compounds are being made available in a range of inhaler devices. They also emphasise that patients should receive training in use of a particular device and be able to demonstrate that they can use it correctly before it is prescribed.

Other changes to the guidelines include the sections on adherence and telehealth.

Adherence – assessing adherence is an important component of asthma reviews and non-adherence should always be considered as a (common) cause of poor control before stepping up treatment. In this update, guidance is given on the questions to ask to get an accurate view of adherence, using prescribing records to assess adherence and tailored suggestions for ways of encouraging improved adherence.

Telehealthcare – may be used to support self-management, facilitate monitoring and ‘games’ may influence behaviour change. The guideline also highlights how remote consultations (phone and e-mail) could provide convenient care and computerised decision support has potential. The evidence suggests that these technological options deliver similar outcomes to traditional care and may be considered as an option according to the clinical context and preferences of the patient and professional.

Conclusion

This update has real value for primary care where the majority of diagnosis and prescribing takes place. The diagnosis chapter provides a pragmatic, structured approach to suspecting and confirming a diagnosis of asthma. The chapter on prescribing highlights the important role of preventive treatments and gives greater guidance on the sequence of treatments and when to refer for specialist opinion and support. Accurate diagnosis, appropriate use of effective medication and supported self-management can help to reduce the considerable morbidity and mortality still associated with asthma.

Acknowledgements

PCRS-UK wishes to thank the British Thoracic Society for permission to reproduce Figures 1-3 and the table of diagnostic tests from the British Guideline on the Management of Asthma 2016.

References


Further Information

a. Pinnock H. A structured approach is key to diagnosing asthma. Guidelines in Practice 2016;19(11):13-31. Available at: www.guidelinesinpractice.co.uk/a-structured-approach-is-key-to-diagnosing-asthma

### BTS/SIGN Asthma Guideline – Summary of Diagnostic Tests

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description*</th>
<th>Parameter*</th>
<th>Range of predictive values*</th>
<th>Comments**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical assessment</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Symptoms and signs</td>
<td>The commonest symptoms assessed were cough and wheeze and, in adults, shortness of breath.</td>
<td>Cough in adults</td>
<td>10–66%</td>
<td>28–64% 9–76% 34–87% 41–50% 14–97% 29–84% 18–92% 15–50% 84–92% 76–84% 84–92%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheeze in adults</td>
<td>9–76%</td>
<td>34–87% 10–81% 41–50% 14–97% 29–84% 18–92% 15–50% 84–92% 76–84% 84–92%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dyspnoea in adults</td>
<td>11–73%</td>
<td>38–71% 41–59% 26–70% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cough in schoolchildren&lt;sup&gt;20&lt;/sup&gt;</td>
<td>63%</td>
<td>75% 14% 97% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
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<tr>
<td></td>
<td></td>
<td>Wheeze in children&lt;sup&gt;20&lt;/sup&gt;</td>
<td>59%</td>
<td>93% 34% 97% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cough in pre-school children</td>
<td>88%</td>
<td>7% 76% 15% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheeze in pre-school children</td>
<td>54%</td>
<td>57% 80% 27% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shortness of breath in pre-school children</td>
<td>76%</td>
<td>52% 84% 40% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92% 76–84%</td>
</tr>
<tr>
<td>Symptom variability</td>
<td>Episodic symptoms in adults</td>
<td>9–40%</td>
<td>38–91%</td>
<td>14–86% 18–93% 19–67% 58–84% 6–27% 40–94% 84–92% 76–84% 57–82%</td>
</tr>
<tr>
<td></td>
<td>Diurnal symptoms in adults</td>
<td>30–56%</td>
<td>36–83%</td>
<td>48–76% 10–81% 41–50% 26–70% 76–84% 15–50% 84–92% 6–27% 40–94% 84–92%</td>
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<tr>
<td></td>
<td>Symptoms after exercise in adults</td>
<td>5–40%</td>
<td>32–93%</td>
<td>5–81% 58–84% 6–27% 40–94% 84–92% 76–84% 57–82%</td>
</tr>
<tr>
<td></td>
<td>Episodic symptoms in children&lt;sup&gt;21,22&lt;/sup&gt;</td>
<td>36–93%</td>
<td>35–93%</td>
<td>40–94% 62–90% 58–84% 6–27% 40–94% 84–92% 76–84% 57–82%</td>
</tr>
<tr>
<td></td>
<td>Symptoms after exercise in children&lt;sup&gt;21,22&lt;/sup&gt;</td>
<td>82–94%</td>
<td>59–73%</td>
<td>54–80% 79–91% 58–84% 6–27% 40–94% 84–92% 76–84% 57–82%</td>
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<tr>
<td></td>
<td>Nocturnal symptoms in children&lt;sup&gt;21,22&lt;/sup&gt;</td>
<td>57–84%</td>
<td>58–76%</td>
<td>64–85% 57–82% 40–94% 84–92% 76–84% 57–82%</td>
</tr>
<tr>
<td>Combinations of symptoms</td>
<td>Symptom scores in adults</td>
<td>60%</td>
<td>86%</td>
<td>66–97% 51% 66–97% 51% 66–97% 51%</td>
</tr>
<tr>
<td>(typically cough, wheeze, chest tightness, dyspnoea, exercise symptoms)</td>
<td>Symptom scores in children&lt;sup&gt;20,22&lt;/sup&gt;</td>
<td>45–83%</td>
<td>65–97%</td>
<td>44–94% 51% 44–94% 51% 44–94% 51%</td>
</tr>
<tr>
<td></td>
<td>Symptoms of cough and wheeze in pre-school children</td>
<td>49%</td>
<td>59%</td>
<td>80% 51% 80% 51% 80% 51%</td>
</tr>
<tr>
<td>History of atopy</td>
<td>Personal history of atopy in adults</td>
<td>54–55%</td>
<td>68–74%</td>
<td>46–76% 45–79% 14–30% 24–62%</td>
</tr>
<tr>
<td></td>
<td>Personal history of rhinitis/eczema in pre-school children</td>
<td>47–62%</td>
<td>60–75%</td>
<td>72–86% 45–79% 14–30% 24–62%</td>
</tr>
<tr>
<td></td>
<td>Family history of atopy in adults</td>
<td>26–60%</td>
<td>56–83%</td>
<td>44–74% 39–70% 24–62%</td>
</tr>
<tr>
<td></td>
<td>Family history of atopy in children</td>
<td>43–44%</td>
<td>57–70%</td>
<td>51–77% 24–62%</td>
</tr>
</tbody>
</table>

*Table 1: Summary of individual diagnostic tests*

**Acknowledgements**

PCRS-UK wishes to thank the British Thoracic Society for permission to reproduce Table 1 - summary of diagnostic tests from the British Guideline on the Management of Asthma 2016. Please see the full guideline available at [https://www.brit-thoracic.org.uk/standards-of-care/guidelines/btssign-british-guideline-on-the-management-of-asthma/](https://www.brit-thoracic.org.uk/standards-of-care/guidelines/btssign-british-guideline-on-the-management-of-asthma/) for more information and reference citations shown in the table.
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<tbody>
<tr>
<td><strong>Strategies for demonstrating airway obstruction</strong></td>
<td></td>
<td></td>
<td>(Note that a single value indicates data from a single study)</td>
<td></td>
</tr>
<tr>
<td>Spirometry</td>
<td>Regard a FEV₁/FVC ratio of less than 70% as a positive test for obstructive airway disease.</td>
<td>Obstructive spirometry in adults (5-18 yrs)</td>
<td>23–47% 52% 31–100% 73% 45–100% 75% 18–73% 49%</td>
<td>In the four larger studies (adults and children), the NPV was between 18% and 54% which means that more than half of patients being investigated who have normal spirometry will have asthma (ie false negatives).</td>
</tr>
<tr>
<td><strong>Strategies for demonstrating variability in airway obstruction</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bronchodilator reversibility</td>
<td>In adults, regard an improvement in FEV₁ of ≥12% and ≥200 ml as a positive test. In children regard an improvement in FEV₁ of ≥12% as a positive test.</td>
<td>Bronchodilator reversibility in adults Bronchodilator reversibility in schoolchildren (using a threshold of 9% change in FEV₁)⁷⁰</td>
<td>17–69% 50% 55–81% 86% 53–82%</td>
<td>In these secondary care populations, about 1 in 3 people with a positive reversibility test will not have asthma (the cohorts all included people with COPD); and at least 1 in 3 people with a negative bronchodilator reversibility test will have asthma.</td>
</tr>
<tr>
<td>Challenge tests</td>
<td>Regard a PC₂₀ value of 8 mg/ml or less as a positive test.</td>
<td>Methacholine challenge in adults. Methacholine challenge in children²⁹,⁴²,⁷¹</td>
<td>51–100% 47–86% 39–100% 36–97% 60–100% 20% 46–100% 94%</td>
<td>Challenge tests are a good indicator for those with a definitive diagnosis of asthma already (based upon clinical judgment, signs and symptoms and response to anti-asthma therapy).</td>
</tr>
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<tr>
<td></td>
<td>Fail in FEV₁ ≥15% at cumulative dose of ≤635 mg is positive</td>
<td>Mannitol in adults Mannitol in children</td>
<td>56% 63% 75% 81% 80% 49%</td>
<td>These data are from a single study in adults and children with symptoms of asthma on questionnaire.</td>
</tr>
<tr>
<td>Exercise challenge</td>
<td>Exercise challenge in adults Exercise challenge in children</td>
<td>26–80% 69–72% 100% 69–72% 100% 90–99% 0% 5–73%</td>
<td>The studies in adults had very small sample sizes. The larger study in children had a false positive rate of 1% (PPV 99%).</td>
<td></td>
</tr>
<tr>
<td>Peak flow charting</td>
<td>Monitor peak flows for 2-4 weeks, calculate mean variability. Regard ≥20% variability as a positive test.</td>
<td>PEF charting in adults in a population study - using mean variability &gt;20% - using mean variability &gt;15% - using diurnal variation &gt;15% on &gt;3 days/week - using variation &gt;12.3% (95th centile)</td>
<td>46% 80% 97% 97% 60–67% 82% 10% 60% 64% 50% 72% 48% 74%</td>
<td>It is not clear whether the patients in these studies were symptomatic at the time of the charting, and results may not reflect clinical use in symptomatic populations. One study concluded that the number of days with diurnal variation was more accurate than calculating the mean variation.</td>
</tr>
</tbody>
</table>

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</tr>
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<tbody>
<tr>
<td><strong>Strategies for detecting eosinophilic inflammation or atopy</strong></td>
<td></td>
<td></td>
<td>(Note that a single value indicates data from a single study)</td>
<td></td>
</tr>
<tr>
<td>FeNO</td>
<td>Adults: Regard a FeNO level of 40 ppb or more as a positive test. Children 5-16yrs: regard a FeNO level of 35 ppb or more as a positive test.</td>
<td>FeNO in adults FeNO in schoolchildren</td>
<td>43–88% 57% 60–92% 87% 54–95% 90% 65–93% 48%</td>
<td>These studies are all in secondary care populations. Approximately 1 in 5 adults with a positive FeNO test will not have asthma (ie false positives) and 1 in 5 adults with a negative FeNO test will have asthma (ie false negatives).</td>
</tr>
<tr>
<td>Blood eosinophils</td>
<td>Suggested thresholds for blood eosinophils: Adults &gt;4.15% Children ≥4%</td>
<td>Blood eosinophils in adults Blood eosinophils in children</td>
<td>15–38% 55–62% 39–100% 67–84% 39–100% 56–69% 27–75% 73%</td>
<td>Elevated blood eosinophil level is poorly predictive. The threshold varies in these studies from 4.0 to 6.3%.</td>
</tr>
<tr>
<td>IgE</td>
<td>Any allergen-specific IgE &gt;0.35 kU/l in adults Total IgE in adults &gt;100 kU/l</td>
<td></td>
<td>54–93% 57% 67–73% 78% 5–14% 5% 95–99% 99%</td>
<td>A normal IgE substantially reduces the probability of asthma in adults with a false negative rate of less than 1 in 10, although a positive result is poorly predictive.</td>
</tr>
<tr>
<td>Skin prick testing</td>
<td>Any positive test (wheat ≥3 mm) in adults Any positive test (wheat ≥3 mm) in children</td>
<td></td>
<td>61–62% 63–69% 66–92% 14–81% 65–92% 39–96% 36–79%</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- * Data derived from NICE evidence tables unless otherwise specified. Only studies reporting sensitivity, specificity, PPV and NPV are included here.
- ** Comments have been added by the guideline development group as an aid to interpretation of the data presented.
  1. Sensitivity (Sens) is the probability of a test being positive when asthma is present.
  2. Specificity (Spec) is the probability of a test being negative when asthma is absent.
  3. Positive predictive value (PPV) is the proportion of patients with a positive test who actually have asthma (100 minus the PPV is the proportion of patients with a false positive test).
  4. Negative predictive value (NPV) is the proportion of patients with a negative test who do not have asthma (100 minus the NPV is the proportion of patients with asthma but in whom test was negative).

**Reference tests**
In most of the studies, the reference test was spirometry plus either bronchodilator reversibility or a challenge test, although some studies also included a ‘typical history of attacks’ or diurnal variation, or used physician diagnosis. Studies evaluating methacholine challenge tests used physician diagnosis or bronchodilator reversibility and/or diurnal peak flow variability. In children, the reference tests used were physician diagnosed asthma plus spirometry, or documented history of wheeze on at least two occasions, and variability in FEV₁ over time or on exercise testing.

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