

Thanks for inviting me to this meeting



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17 July 2024

Asthma in Children

Asthma is a common and treatable disease

It **CANNOT** be **CURED**

But it can be managed and doesn't have to slow children with asthma down or to threaten their lives

Asthma Poses a Considerable Health Care Burden in UK

In the UK, asthma-related rates of hospitalisation, mortality and SABA prescriptions are some of the highest in Europe¹⁻⁴



>10 million attacks per year (estimated)^{1*}



38% of patients are prescribed ≥ 3 SABAs per year⁴
(n=218,365)



Deaths increased by **>20%** between 2011–2015, at rates **almost 50%** higher than the EU average³



60,000 hospital admissions and **200,000** bed days annually²



SABAs represent **70%** of the total carbon footprint of inhaler devices⁵

£3 billion is spent on asthma annually by the NHS in England

Fundamental change is needed to optimise the way asthma is treated in the UK

Asthma in Children

Prevalence of asthma : 10-15%.

The UK has among the highest prevalence rates of asthma symptoms in children worldwide



- **Approximately 1.1 million children in the UK are currently receiving treatment for asthma.**

The National Review of Asthma Deaths, published in 2014, found that:

The overall standard of care for young children and young people was inadequate, and was well below expected standards in almost one-half of asthma deaths in children.²

Asthma in General Practice

In 2022, using the available Quality and Outcomes Framework (QOF) data from UK general practice registers:

- **6.5%** or **3,745,077** people **over the age of six** were diagnosed with asthma.

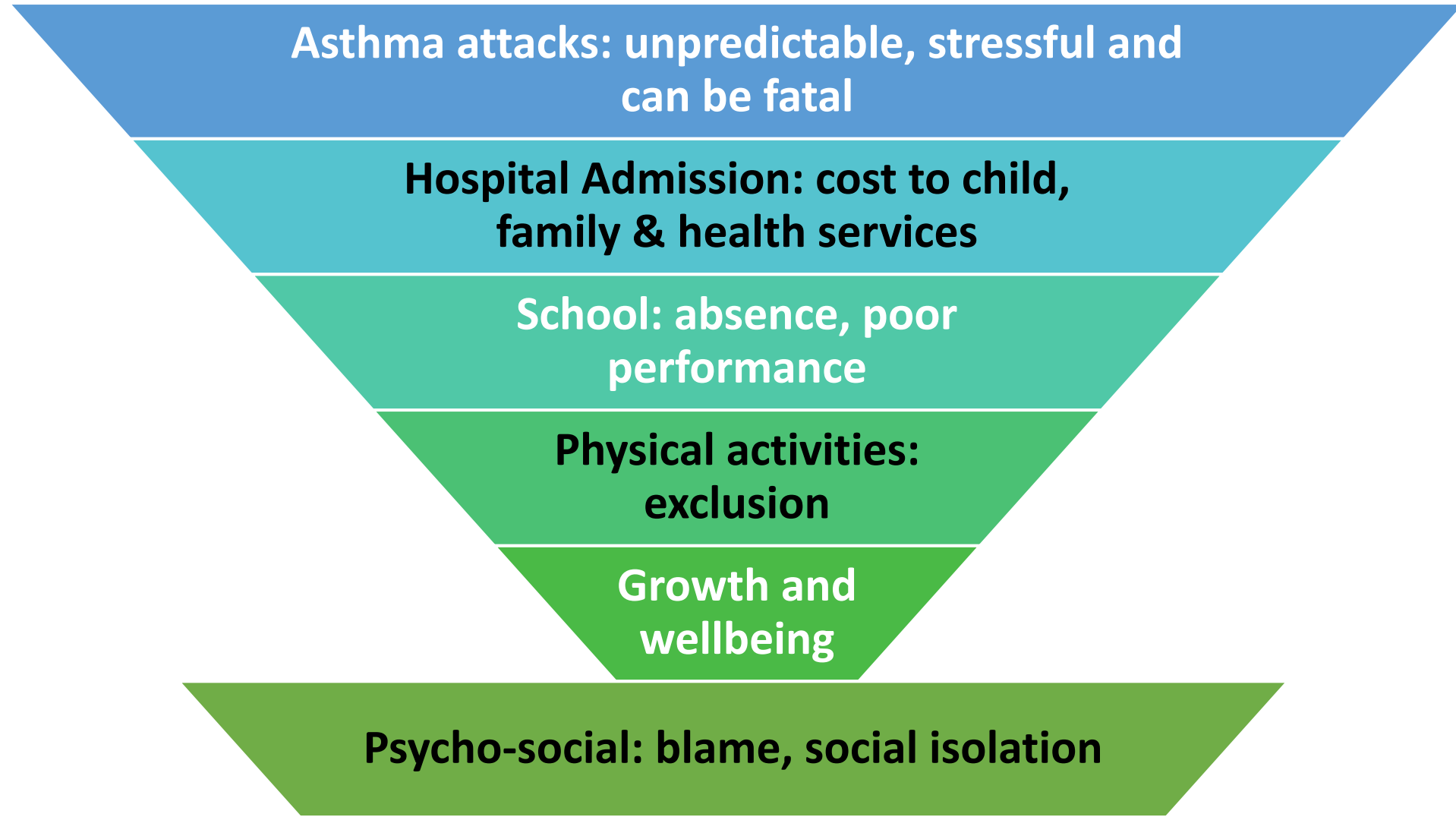
The vast majority of asthma care occurs in general practice. To impact quality of asthma care and outcome we should focus on the primary care



GP Planned and Routine asthma care can allow the vast majority to live well with asthma and avoid emergency care.

At individual level

What are the problems caused by Undiagnosed [or Poorly controlled paediatric asthma?]



Asthma in Children-Age Groups

**Take into account
the age of the
child when
managing asthma
in children**

Under 16 years

5-16 years

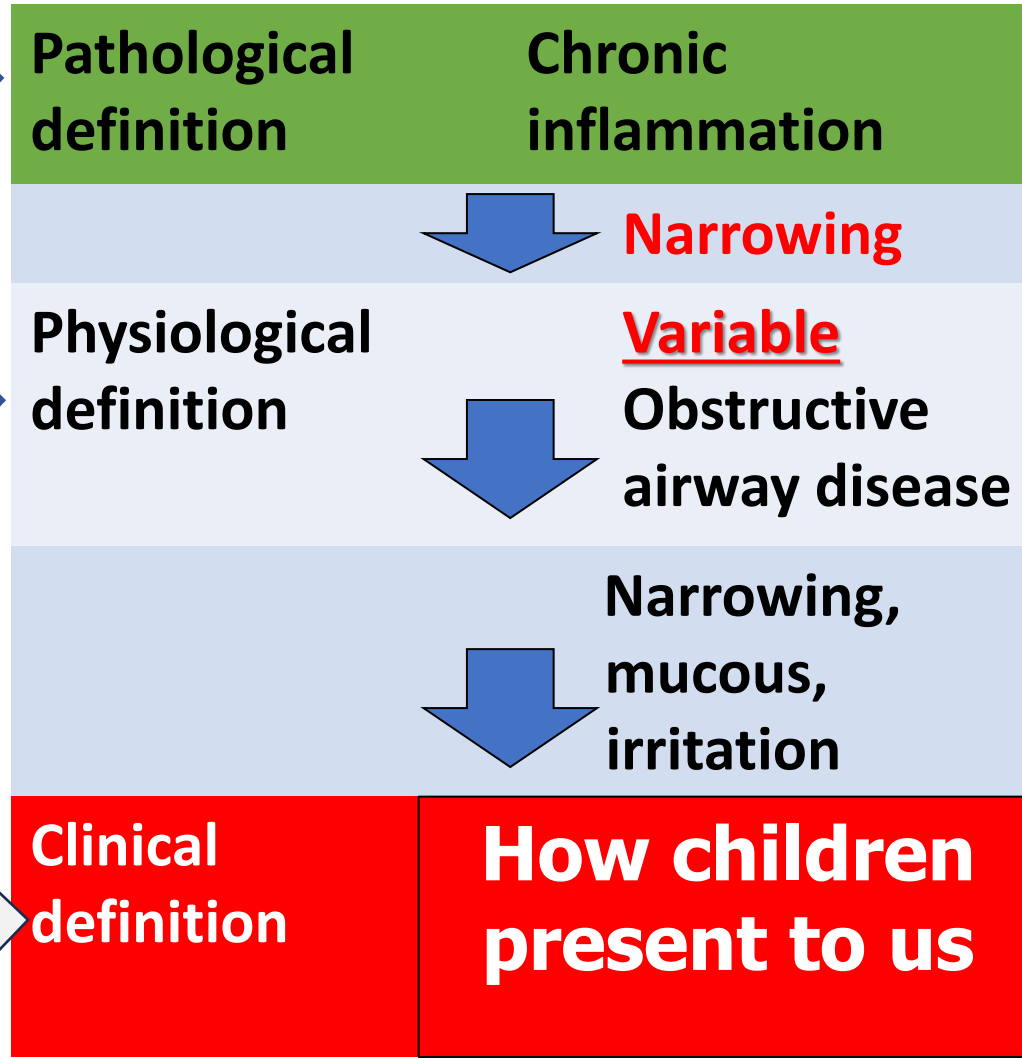
Above 12 years

5-11 years

Under 5 years

What is Asthma?

[Understanding Patho-physiology]



Wheeze is the Commonest Asthma Symptom



Cough

**Wheeze is
caused by
narrowing of
the airway
[Documented
by HCP]**

Wheeze may
be associated
with other
symptoms e.g.
cough and
breathlessness

Breathlessness/Chest tightness

What is a Wheeze?

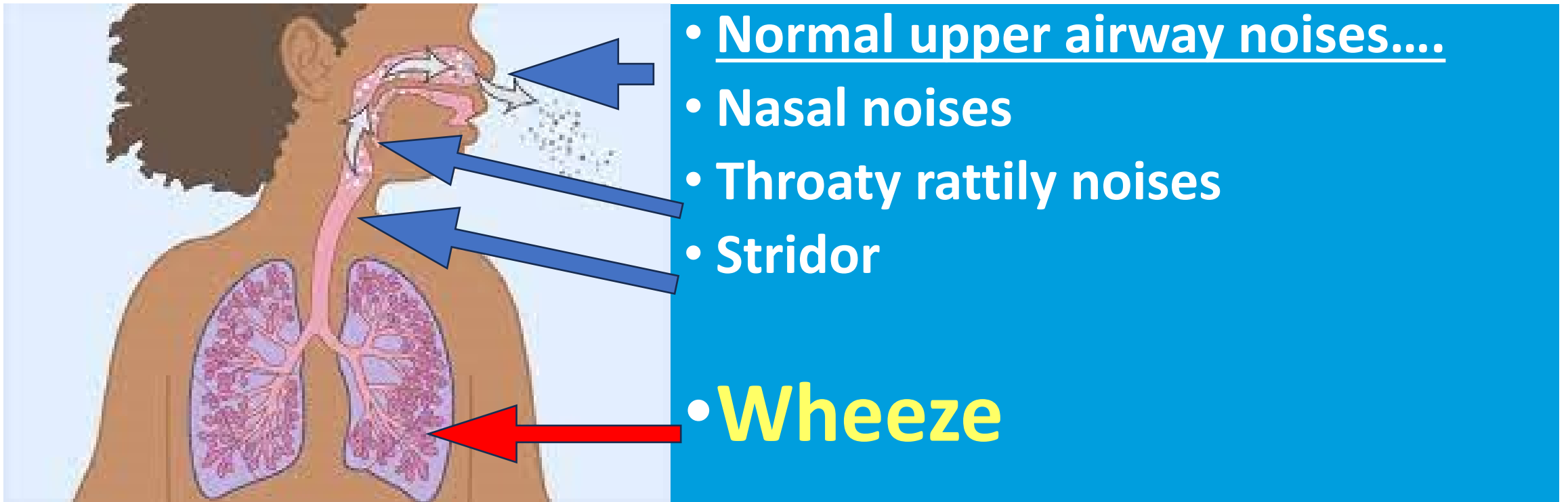
Diagnosis of Wheeze

Does the child actually have wheeze?

- **Noise with breathing**
- **What is relevant, is documented wheeze: heard by a doctor.**
- A child with intermittent symptoms has normal examination at the time of assessment.

Not every noise with breathing is a wheeze

Noises with Breathing



The “diagnosis of wheeze” is often entirely dependent on accurate parental description.

Parents' interpretation of wheeze

- **Q. Did your child have wheeze? Have you heard him/her wheezing? A. YES**
- Parental recognition of wheeze can differ from medically defined wheeze.
- How accurate is the parents' description?
- How to verify if the child had wheeze?

Parents' interpretation of wheeze

In European populations

Wheeze was only **correctly** identified by parents **83.5%** of the time and in **rural** populations **34%** had never heard of the term.

In a UK population

1/3rd of parents who believed their infant had wheeze **changed their minds** after being shown **video** recordings of wheeze.

Difficulty in describing wheeze...!

- Clinician to attempt to vocally reproduce the sound (Given the difficulty in describing wheeze)

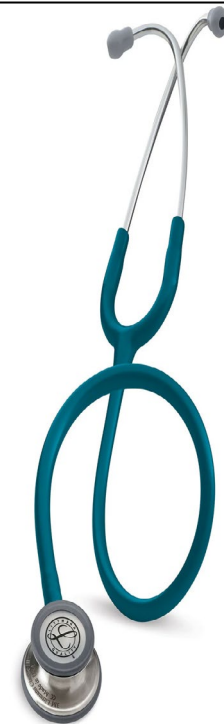
The easiest course of action is to ask the parents to make an audio or video recording.



What is a wheeze clinically?

- Wheeze from the lower airways is a predominantly expiratory sound.
- It is often described as a 'musical sound' or 'polyphonic' in nature

When loud it could be Audible wheeze



**Normal
Examination
does not
exclude
asthma**



When there is wheeze look for other signs.....

- Longer to breathing out (prolonged expiration)
 - Chest in-drawing (Recession)
 - Effort in breathing out: difficulties talking, drinking and feeding
 - Blue discolouration of lips/mucous membranes
 - Use of accessory muscles: neck and abdomen
- Check oxygen saturation
 - **Look carefully, do not expect to see all these signs in every child with wheeze**

Wheeze is common: is it Asthma Wheeze?

About 40% of all young children worldwide have at least one episode of asthmatic symptoms (wheezing, coughing or dyspnoea)

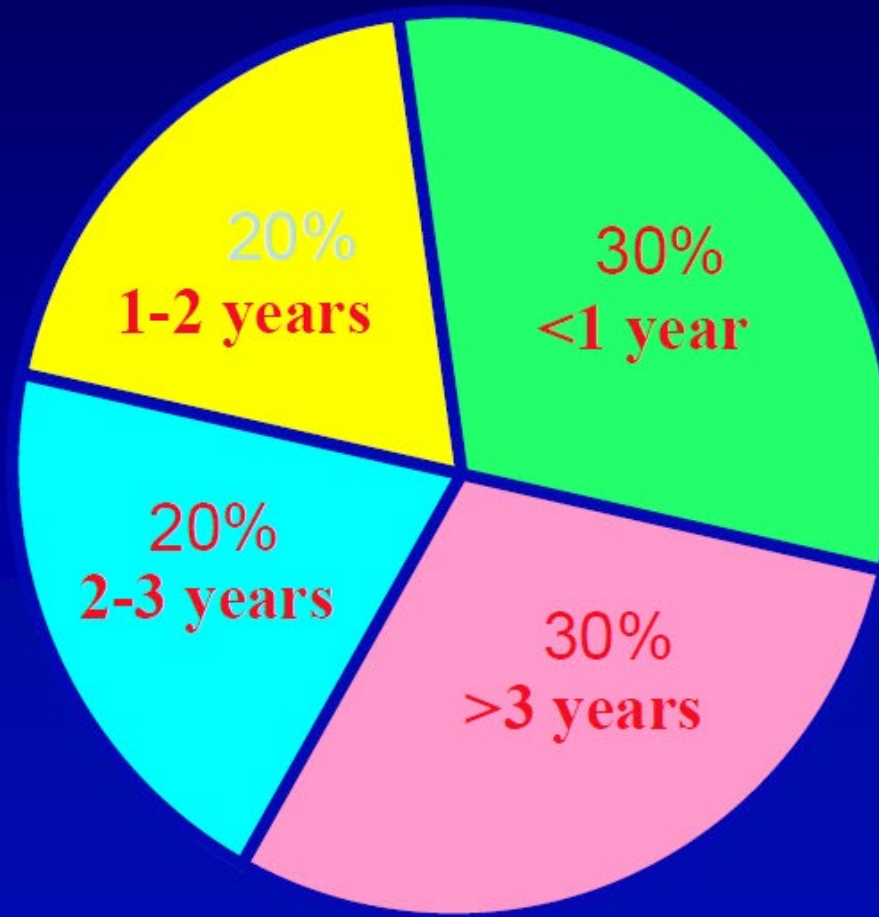


i.e. 70% of children with asthma-like symptoms do not have asthma

**ONLY 30% of pre-schoolers with RECURRENT wheezing
diagnosed with asthma at the age of 6 years**

Onset of Symptoms in Children With Asthma

70% of asthmatic children had wheeze < 3 years of age



McNicol and Williams. *BMJ* 1973;4:7-11; Wainwright et al. *Med J Aust* 1997;167:218-222.

“Not all wheeze is Asthma”

Causes of Wheeze in Children

Recurrent Viral infections (++++++)

Asthma, Asthma , Asthma (++++++)

Infective Endobronchitis (++)

Tracheomalacia/ Bronchomalacia (++)

Aspiration GOR (+)

Foreign body (+)

Others:

Vascular ring

Tracheal stenosis

Mediastinal mass

Endobronchial tumor

Others (+/-)

Abnormal GI - airway anatomy

Persistent airway infection states

➤ **Cystic fibrosis**

➤ **Immunoglobulin deficiency**

➤ **Dysmotile cilia syndromes**

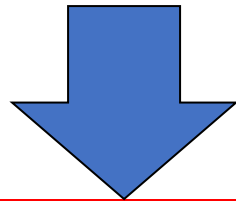
Cardiac failure

Others...

Is it asthma? or is it a viral infection?

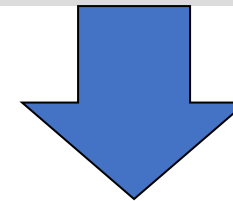
Infection

- Episodic/recurrent
- Inflammation
- Increased secretions
- Muscle spasm
- Caused by infection



Asthma

- Episodic/recurrent
- Inflammation
- Increased secretion
- Muscle spasm
- May be triggered by infection



Wheeze, Cough and breathlessness

Wheezy Child: age of onset and course of the illness



**< 3 years
of age**



**> 3 years
of age**

Wheeze



**≥6 years
of age**



Which children outgrow this wheeze phenomenon?

Age of onset (< or > 6 years of age)

The majority who wheezed at a young age stop wheezing by the age of 6 yr.

From 6 years of age onwards, only 1 in 5 outgrow their symptoms by the age of 19 years i.e. 20%.

Children who did not outgrow their wheeze tended to:

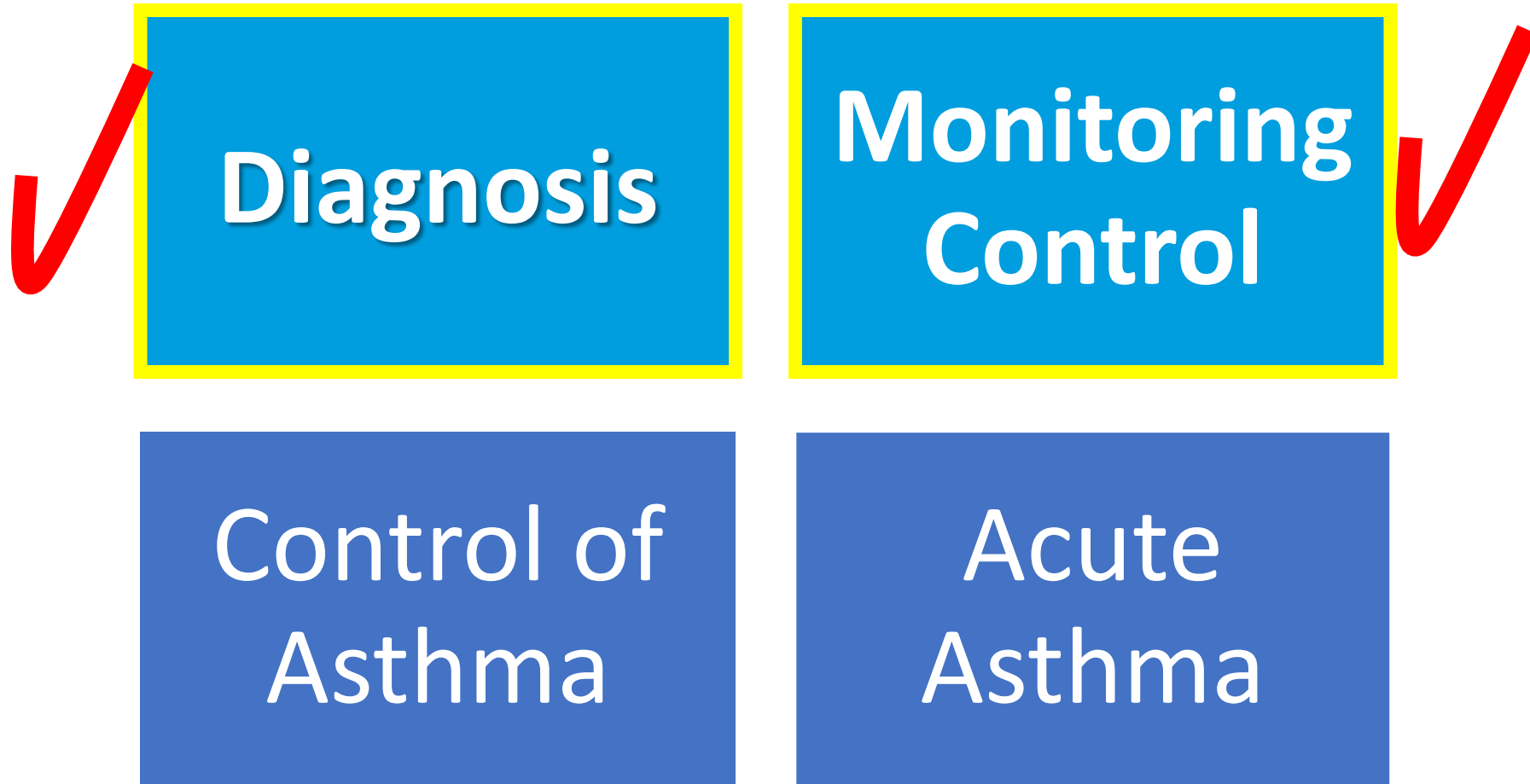
Have allergies to furry animals

Greater severity of symptoms and

More persistent symptoms.

Objectives of this talk

GP Management of Childhood Asthma



Scenario: is it asthma?

- GP referral to Hospital Clinic:

? Diagnosis: is it asthma?

- 7 years old , with recurrent cough and wheeze with or without cold.
- Cough and wheeze with increased activities
- We are not sure and parents are worried

- Could it be asthma?

Making the right diagnosis is important

- Without a clear diagnostic label there is no single correct treatment approach.....!
- **Right diagnosis: right treatment**
- Appropriate advice to parents
- Clearer prediction of outlook
- **Avoid under-diagnosis**
- **Over-diagnosis**
- **Wrong diagnosis**

To Diagnose Asthma



**We need to be proactive and
not just reactive**

In the Clinic: 3 Diagnostic Possibilities

Diagnostic possibilities of asthma

High probability of asthma:
[ASTHMA]

A typical history with documented wheeze, atopic history and no features of other diagnoses.

Consider trial of treatment with response

Intermediate probability of asthma (diagnosis unsure):
[Suspected Asthma]

Pursue investigations as above.

Watchful waiting if asymptomatic or

Consider:

Treatment with assessment of response (particularly if airway obstruction present) or

Low probability of asthma:
[Not Asthma]

Asthma unlikely - pursue other diagnoses and/or refer to secondary care

Referral to secondary care

How is asthma diagnosed?

Good Practice Point

Do not confirm a diagnosis of asthma without a suggestive clinical history

AND

a supporting objective test

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

How is asthma is diagnosed?

Asthma Diagnosis:

**Test before
treating,
wherever
possible**

**Variable
Respiratory Symptoms**

AND

**Variable
Airflow Limitation**

Document the evidence for the diagnosis of asthma before starting ICS-containing treatment, as it is often more difficult to confirm the diagnosis once asthma control has improved.

Asthma Diagnosis



Asthma diagnosis



Key Symptoms:



Variability:

Timing:

Triggers:

Tests:

Shortness of breath

Cough

Wheeze (Confirmed by HCP)

Chest tightness

Personal and family history of atopy

Duration, intensity of the airflow obstruction, Seasonality

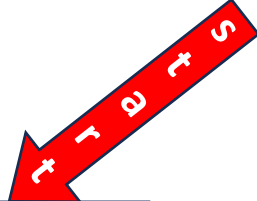
Often worse at night and early morning

Infections, Exercise, Allergen exposure, weather or Irritants (e.g. smoking)

Spirometry including reversibility, Peak flow and FeNO

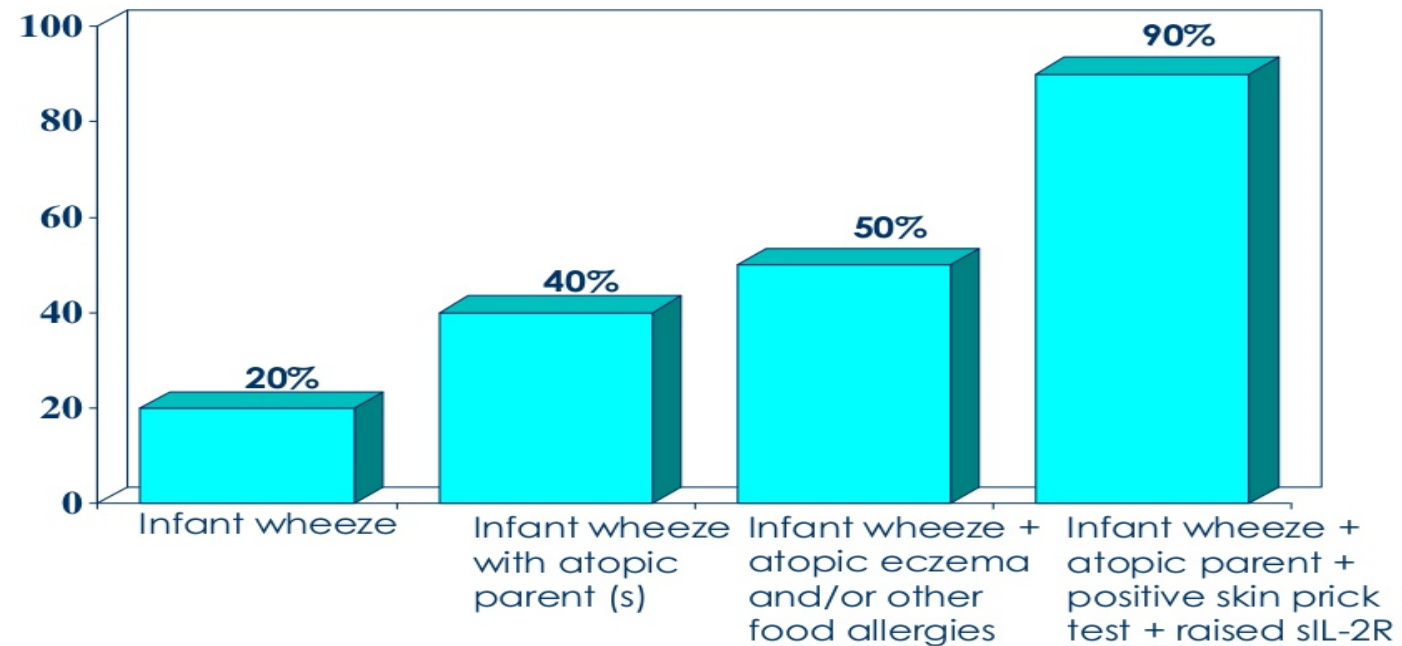
History and Examination

Look for Key features of asthma **AND** key features of other diagnosis



Atopy and risk of developing asthma

% OF INFANTS SUBSEQUENTLY DEVELOPING ASTHMA



Physical Examination

Identify expiratory polyphonic wheeze and signs of other causes of respiratory symptoms

**Clubbing,
Cyanosis,
Respiratory distress and
Chest wall deformities
Other....**

But be aware that even if examination results are normal, the person may still have asthma.



Diagnosis-supporting objective Tests

**Obstruction:
Spirometry**

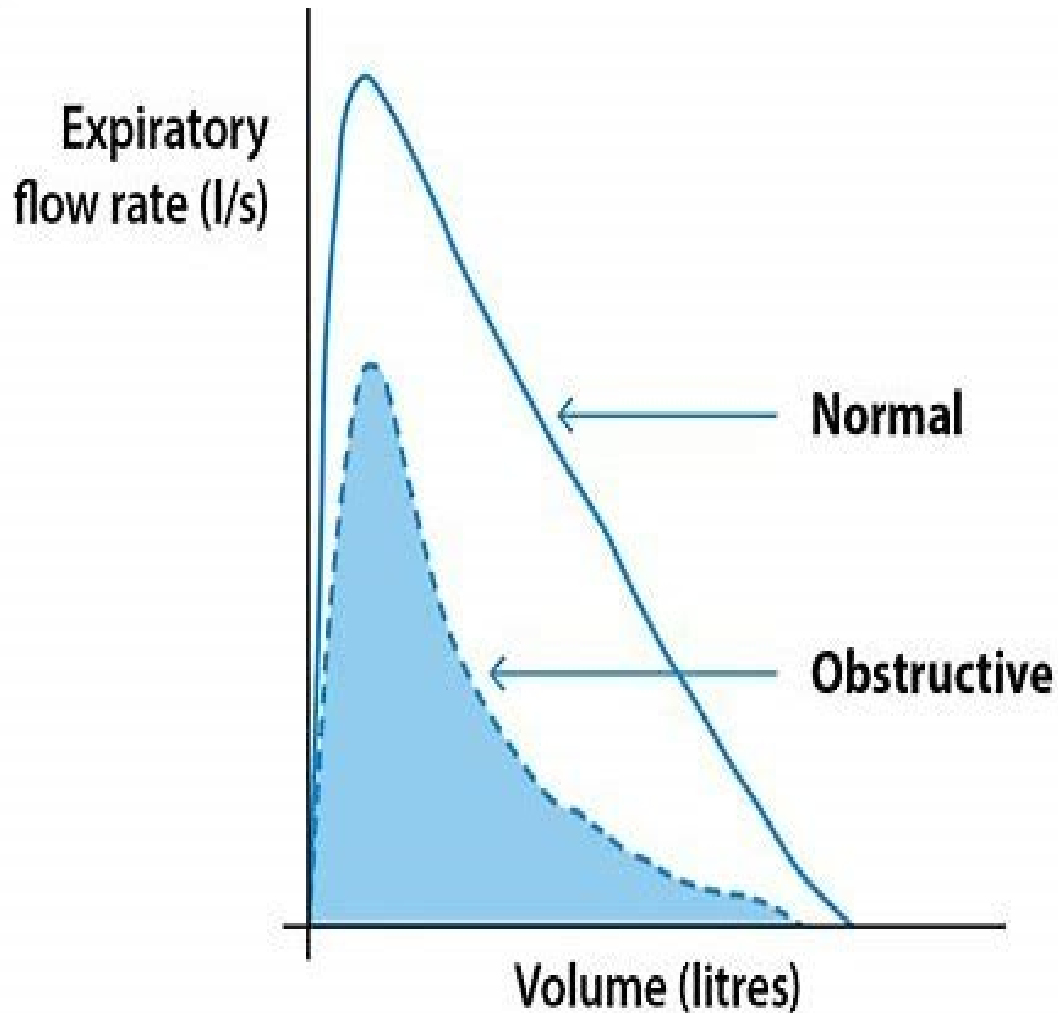
**Reversibility:
Spirometry-BDR**

**Variability:
PEFR**

**Inflammation/Allergy:
FeNO; Skin P. test
Eosinophilia, RAST**



Spirometry: Obstructive Spirometry



Use spirometry to confirm diagnosis or if diagnosis is unsure.

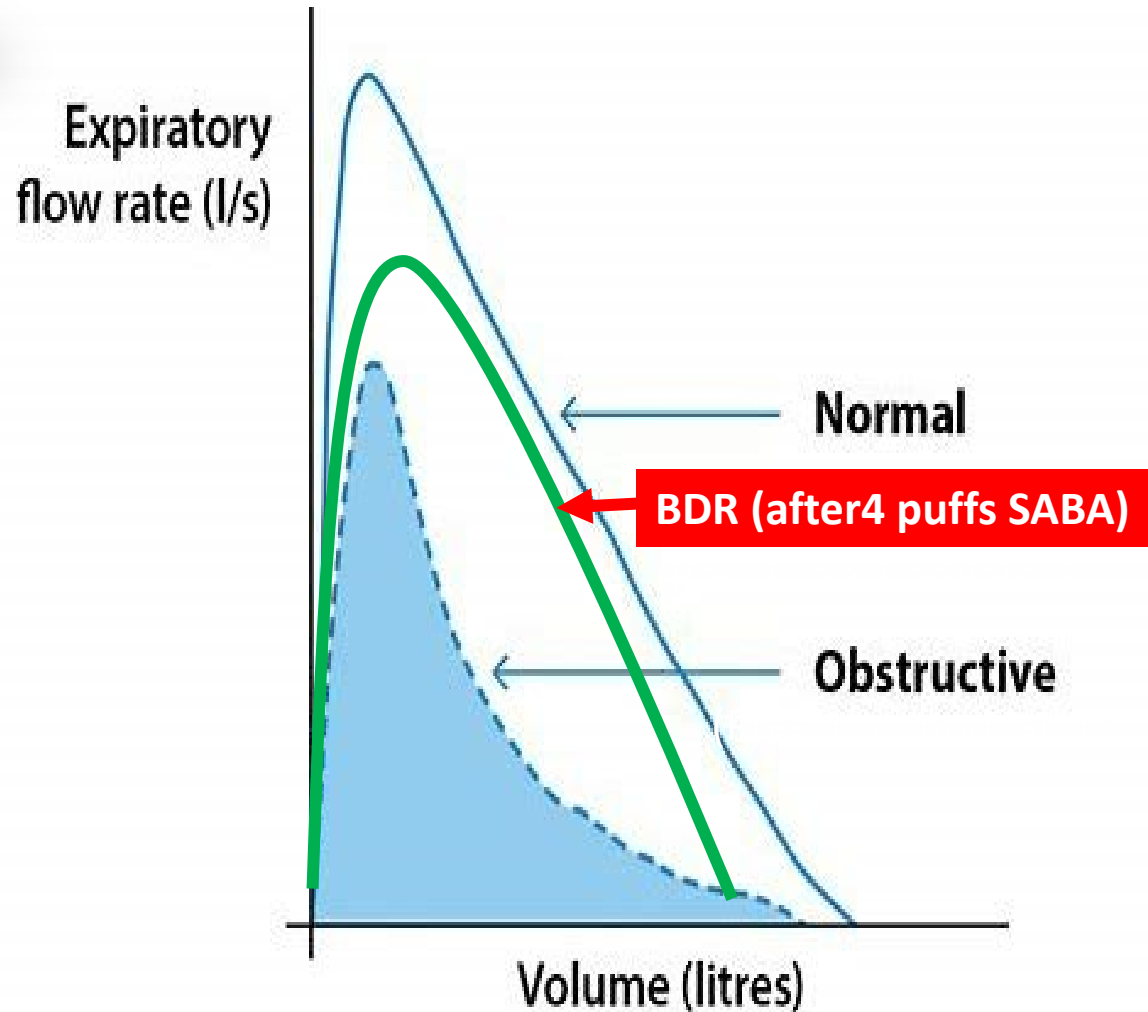
Positive test threshold:

FEV₁/FVC ratio
< 70%

(or below the lower limit of normal if available)



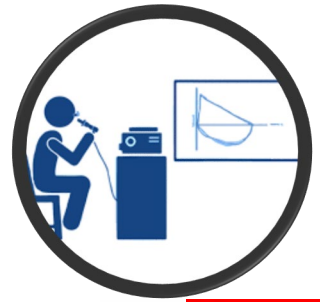
Spirometry: Broncho-Dilator Reversibility (BDR)



Positive test thresholds:

Improvement in FEV1 of 12% or more

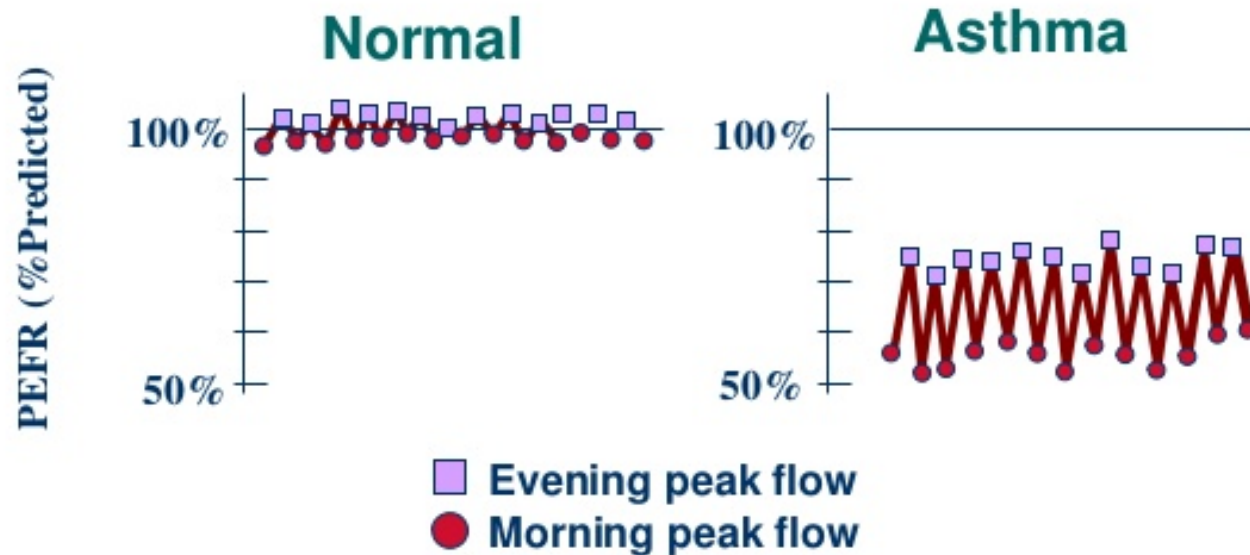
Normal Spirometry does not exclude asthma



Peak Flow Variability

Circadian Changes in PEFR

PEFR recorded twice-daily over 2 weeks



Lowest/HighestX100 e.g. 250/370X100= 68 % i.e variability 32%

**PEFR diary
(Aged 5 to 16)**



- Regard a value of > 20% variability on ≥ 3 days in a week is an alternative to identify reversibility and as a positive test.



Airway Inflammation Test (FeNO)



A normal
FeNO does
not exclude
asthma.

Fractional exhaled Nitric Oxide (FeNO)

- Positive test thresholds in school aged children :
FeNO: 35 ppb or more support the presence of airway inflammation.



Order of Objective Asthma Tests >5 Yr. old

N
I
C
E

Symptoms suggestive of asthma

1 In children with symptoms of asthma:
(1) Spirometry+(2) BDR test if spirometry shows an obstruction

2 If still diagnostic uncertainty after spirometry + BDR:
then do **FeNO**

3 If diagnostic uncertainty remains after FeNO,
monitor **Peak Flow** variability for 2 to 4 weeks

- 4**
- If a child cannot perform a particular test, try to perform at least 2 other objective tests.
 - If still is unable to perform these tests then:
(1) Treat based on observation and clinical judgement and
(2) Try doing the tests again every 6 to 12 months

House Dust Mite Allergy

- A study found up to **85% of people with asthma** are allergic to house dust mites.



IgE and Asthma

- There is a **strong association** between specific immunoglobulin E (IgE) antibodies or total IgE and asthma.
- Serum IgE level is **predictive in asthma**, and it may be used **to differentiate between asthmatic and non-asthmatic** individuals in conjunction with other biomarkers.



D
R
A
F
T

Allergy Tests

D
R
A
F
T

- **Perform skin prick testing to house dust mite**
- OR**
- **Blood test- Measure IgE level and Eosinophil count.**
- Diagnose asthma if there is evidence of sensitisation or a raised IgE level and the eosinophil count is more than 0.5×10^9 per litre.
- **Exclude asthma if there is no evidence of sensitisation to house dust mite on skin prick testing or if the total serum IgE is not raised.**



D
R
A
F
T

Order of Objective tests for diagnosing asthma in children aged 5 to 16

D
R
A
F
T

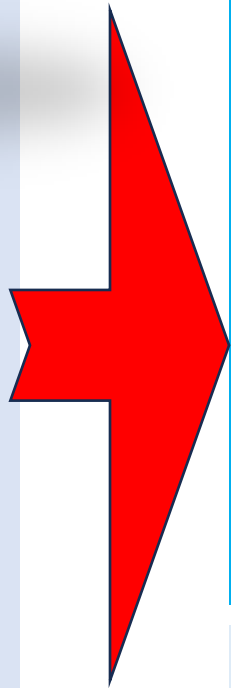
Symptoms suggestive of asthma

1. Measure the FeNO level in children with a history suggestive of asthma.
 - Diagnose asthma if the FeNO level is more than 35 ppb.
2. If the FeNO level is not raised, or if FeNO is not available, measure Spirometry with BDR.
 - Diagnose asthma if BDR is greater than 12% from baseline (or greater than 10% of predicted normal).
3. If asthma is not confirmed by FeNO or BDR but still suspected on clinical grounds,
 - Either perform skin prick testing to house dust mite or measure IgE level and eosinophil count.
 - Exclude asthma if there is no evidence of sensitisation to house dust mite on skin prick testing or if the total serum IgE is not raised.
 - Diagnose asthma if there is evidence of sensitisation OR a raised IgE level and the eosinophil count is more than 0.5×10^9 per litre.
4. If there is still doubt about the diagnosis, refer to a paediatric respiratory specialist for a second opinion, including consideration of a bronchial challenge test.



Objective tests >5 Years Old

Symptoms suggestive
of asthma



**N
I
C
E**

If young person or child (>5Years) with
symptoms suggestive of asthma
cannot perform a particular test,
try to perform other objective tests.

Be aware that
the results of **Spirometry** and **FeNO tests** may be
affected in people who have been treated with inhaled
corticosteroids (ICS)



Objective tests for Acute Symptoms at Presentation

If symptomatic - take the opportunity and do tests:

- If possible and appropriate test before treating immediately of acutely unwell child at presentation
- Do objective tests for asthma (e.g. eosinophil count, fractional exhaled nitric oxide [FeNO], spirometry or peak flow with bronchodilator reversibility) if the equipment is available.

If objective tests cannot be done immediately for people who are acutely unwell at presentation:

- Treat immediately and do tests when acute symptoms have been controlled, and advise people to contact their healthcare professional immediately if they become unwell while waiting to have objective tests.

Asthma Diagnosis and Age of the Child



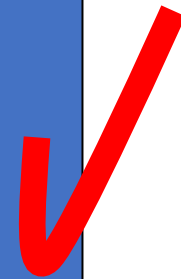
Tests are
not easily
available
to do

< 5 years

- Infants and preschool aged children

> 5 years

- School aged children



Scenario: is it asthma?

- GP referral to Hospital Clinic:

? Diagnosis: is it asthma?

- 3 years old , with recurrent cough and wheeze with or without cold.
- Not always preceded by cold (URTI)
- Uncertain response to salbutamol on PRN basis
- **Parents worried and we are uncertain: Could it be asthma?**

Tests to confirm Asthma in the under 5 years.

- No easily available tests and there are no good reference standards.
- **Diagnosis of asthma is Primarily Clinical, based on identification of risk factors i.e. key features of asthma and no key features of other diagnosis**
- How.....?

If they still have symptoms when they reach 5 years, attempt objective tests.

Asthma Predictive Index in under 5 years

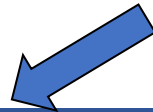
Look for risk factors

The risk of Asthma in Wheezing Children

A

- Identify high risk children: Recurrent wheeze
- ≥ 4 wheezing episodes in the past year (at least one must be physician diagnosed)

PLUS



B

One major criterion

- 1) Parent with asthma
- 2) Atopic dermatitis
- 3) Aero-allergen sensitivity

OR



C

Two minor criteria

- Food sensitivity
- Peripheral eosinophilia ($\geq 4\%$)
- Wheezing not related to infection

Positive mAPI result is associated with the Highest Risk of Persistent Asthma

mAPI

MODIFIED ASTHMA PREDICTIVE INDEX

Guilbert JACI 2004; 114: 1282

➤ 4 wheezing episodes/year

+

1 major criteria
or
2 minor criteria

65% probability
of asthma

no criteria

5% probability
of asthma

Consider a trial
of treatment,
and review
response in 4-8
weeks.

Pragmatic approach to Management Wheezing children <5 years

Clinical pattern consistent with asthma (no features or other diagnoses form history and examination)

- 4 or more wheezy episodes during last 12 months Plus**
- Personal history of atopy**
- Parental history of atopy**

- **High risk for developing asthma and would lend support to a trial of asthma treatment**
- **Adequate response to treatment provide further support to a diagnosis of possible asthma..**

Good Clinical Practice in Asthma Diagnosis

Record the basis

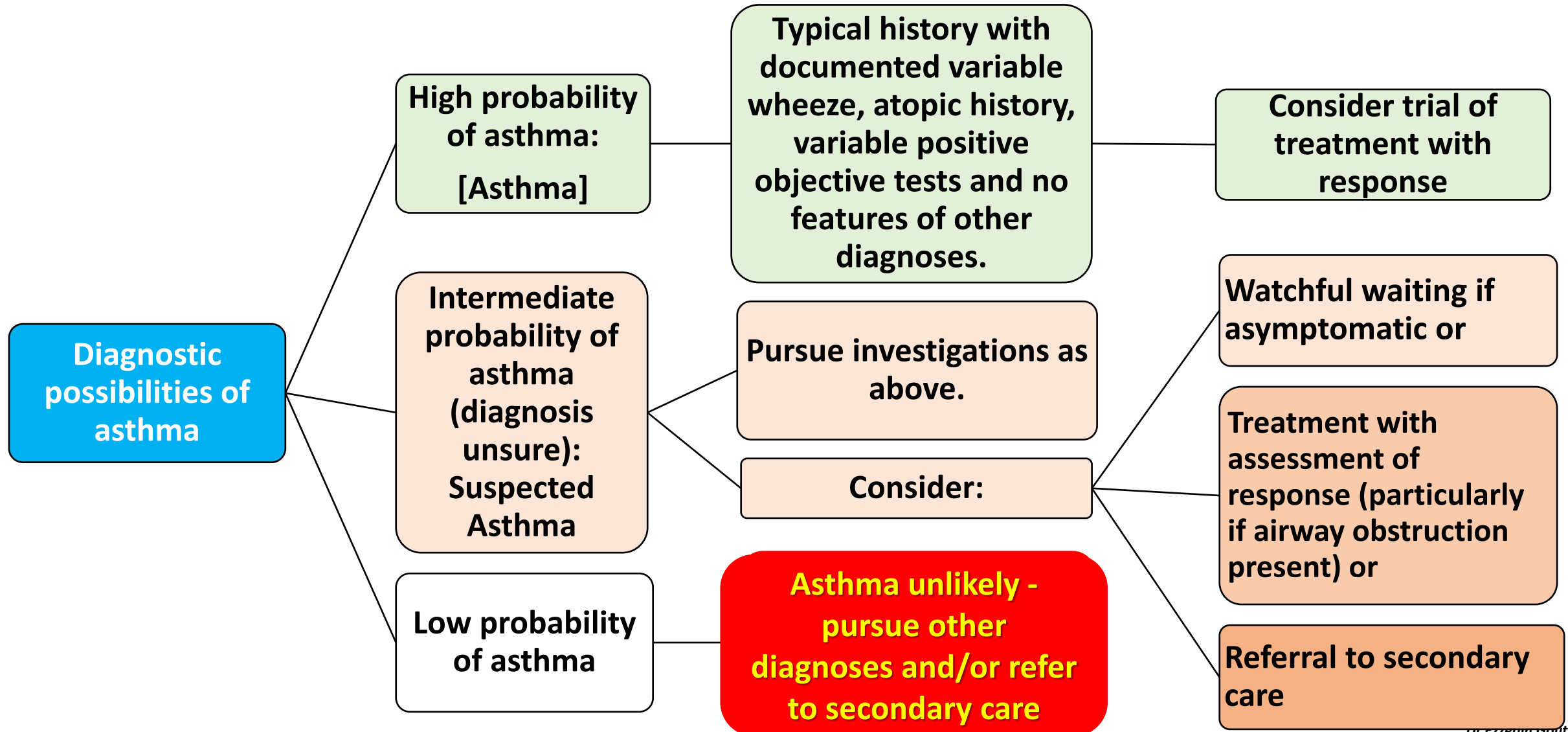
for a diagnosis of asthma in a single entry in the person's medical records, alongside the coded diagnostic entry.

An Example:

*High probability of Asthma [**or asthma diagnosed**] in view of clinical symptoms of asthma, personal and family history of atopy and a spirometry which is showing obstructive pattern with BDR. In addition, there is no other obvious alternative diagnosis.*

Now putting all elements together

In the Clinic: Diagnostic Possibilities and Management Options



Red flags

Requiring further evaluation.

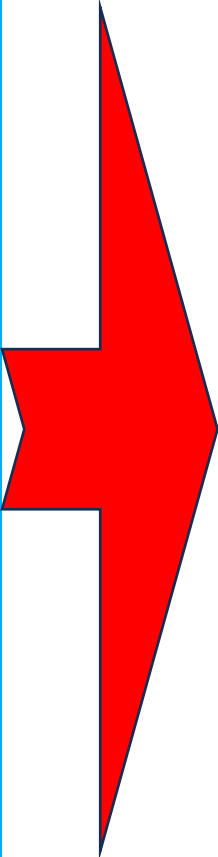


- Symptom onset from birth or neonatal period.
- Respiratory symptoms associated with feeds or vomiting
- Recurrent productive cough.
- Initial symptoms associated with choking episode
- Truly “present from birth”
- Failure to thrive, chronic diarrhoea
- Monotonous wheezing
- Failed therapeutic trial with conventional therapy.
- Clinical findings suggesting alternative diagnoses, e.g. finger clubbing, heart murmurs or focal lung signs.
- Underlying neurodevelopmental disease.
- Parental anxiety or need for reassurance.

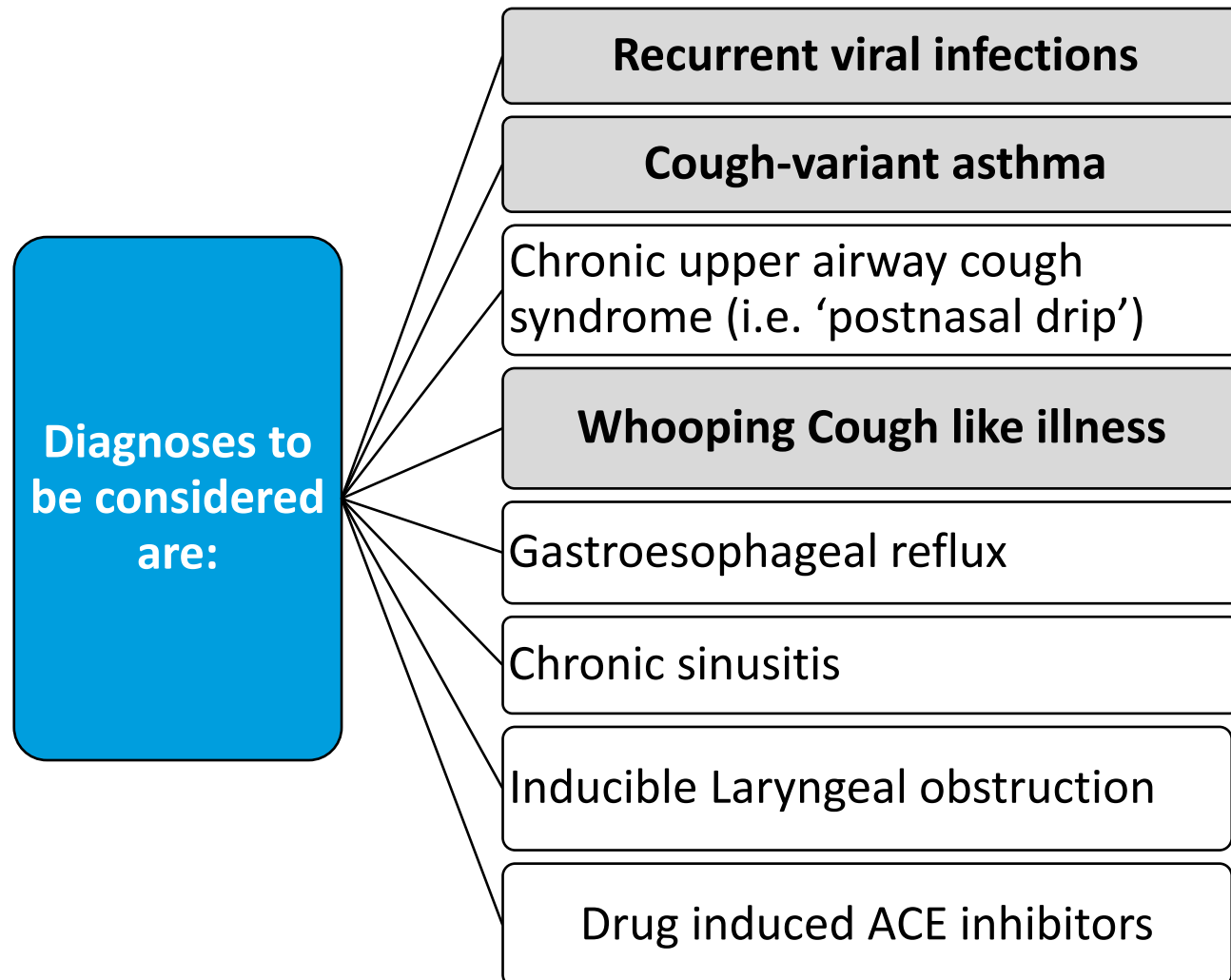
Investigation of Possible Causes

Investigate for alternative diagnoses if there are frequent symptoms despite good lung function.

Targeted tests

- 
- CXR: can demonstrate the presence of a foreign body, structural anomalies, an enlarged heart, masses and pulmonary infiltrates.
 - Sweat chloride test for cystic fibrosis.
 - Allergy testing-blood/Skin
 - PH studies/endoscopy for GER
 - Barium swallow for tracheo-oesophageal fistula and other anomalies, Videofluoroscopy
 - Bronchoscopy
 - Spirometry in children aged over 5 years.
 - Further investigations may be needed for rarer causes – e.g. echocardiogram, MRI/CT scan of the chest, etc.

Persistent Non-Productive Dry Cough as the ONLY respiratory symptom



Recurrent Viral infections

What is normal?

Expert opinion suggests that 6–10 self-limiting viral infections per year are within the normal range.

- More frequent infections can be expected in the **winter**, and an
- infection may last for 1–2 weeks.
- **Therefore, it may seem like a normal child is unwell for most of the winter period.**
- Young children with siblings, children attending **day care and those exposed to smoking** or living in deprived areas are known to have increased infection rates compared with those who do not have these risk factors.
- **Most of them will not have an immune problem or asthma.**

'Cough-Variant Asthma'

- Patients have persistent dry, nonproductive cough of more than 4 weeks in children.
- Cough is the principal or only symptom. An ongoing cough is often the only symptom. It is often more problematic at night.
- **Indoor and outdoor allergens often trigger it**
- **Associated with airway hyperresponsiveness.**
- Can progress to classic asthma in some cases, and uncontrolled asthma can be fatal

- Lung function may be normal, and for these patients, documentation of variability in lung function is important.

When suspected e.g. H/O atopy etc. consider trial of asthma treatment
Treatment similar to Asthma treatment



Pertussis-like illness (Syndrome)

Pertussis-like Syndrome is common and can occur at all ages but is more common in children

- The well-known symptoms of pertussis include prolonged coughing illness characterised by repeated paroxysmal cough, inspiratory whoop, and post-cough vomiting
- Caused by *Bordetella pertussis* and other pathogens such as adenovirus (ADV), influenza virus (IV), and *Mycoplasma pneumoniae* (MP) also can cause similar clinical symptoms , **collectively known as pertussis-like syndrome.**
- It is difficult to distinguish the symptoms of infection with *B. pertussis* from infection with viruses.
- **IX. Respiratory secretion PCR**

The effect of available medications is poor leading to anxiety in parents

Exercise Induced Bronchoconstriction (EIB)

EIB is a condition of bronchoconstriction of the airways following intense physical activity, that may occur in people with or without bronchial asthma.

- **EIB is different from Exercise-Induced Asthma(EIA).**
- EIA is a real pathology, characterized by bronchial hyperactivity and chronic inflammation, while the EIB represents the transitory airway narrowing, that may also occur in non-asthmatic patients.
- **Most asthmatic people have EIB, but not all patients with EIB have asthma.**
- The two conditions also differ therapeutically:
 - EIA benefits from corticosteroid treatment to manage the underlying chronic inflammation,
 - while EIB, in most cases, is managed with a short-acting B2-agonist before exercise.

Assessment of Asthma Control

If Asthma Control is Suboptimal

Confirm the person's adherence to prescribed treatment

Review the person's inhaler technique

Ask about triggers including school-related symptoms

Deal with multimorbidities

Review diagnosis

Review if treatment needs to be changed

How to assess asthma control?

Assessment of Asthma in Adolescents & Children 6–11 years

1. Assess Asthma Control =

- **Symptom control AND**
- **Future risk of adverse outcomes**

2. Assess Lung Function

3. Assess Triggers and Exposure

4. Assess Multimorbidity

5. Assess Treatment Issues

**Clinic Review
and
Annual Review**

Monitoring Asthma Control

Assess symptom control over the last 4 weeks

Assess symptom control from the frequency of:

Daytime

Night-time

Night waking

Activity limitation

SABA use (if used)

- Do not use regular peak PEF monitoring to assess asthma control unless there are person-specific reasons for doing so e.g. low perception of asthma symptoms.
- **Consider FeNO monitoring for people with asthma: At their regular review, and Before and after changing their asthma therapy.**

Exacerbations
Admissions
OCS courses
School absence

Consider using symptom control tools include Asthma Control Test (ACT) and Asthma Control Questionnaire (ACQ).

Assess Risk Factors for Exacerbations

Factors that increase the risk of exacerbations even if the patient has few asthma symptoms:

Risk factors for exacerbations:

Medications:

Inadequate ICS:

Other medical conditions:

Exposures

Psychosocial

Lung function

Type 2 reaction

Exacerbation

Risk factors for exacerbations that are independent of symptom control include:

1. History of ≥ 1 exacerbation in the previous year,
2. Previous HDU/ITU treatment for asthma attacks
3. SABA-only treatment (without any ICS),
4. Over-use of SABA , 3 or more MDI/year
5. Socioeconomic problems,
6. Poor adherence,
7. Incorrect inhaler technique,
8. Low forced expiratory volume in 1 second (FEV1),
9. Exposures such as smoking,
10. Blood eosinophilia.

Assess Treatment Issues

Document the patient's current treatment step

Watch inhaler technique,

Assess adherence

Assess any side-effects.

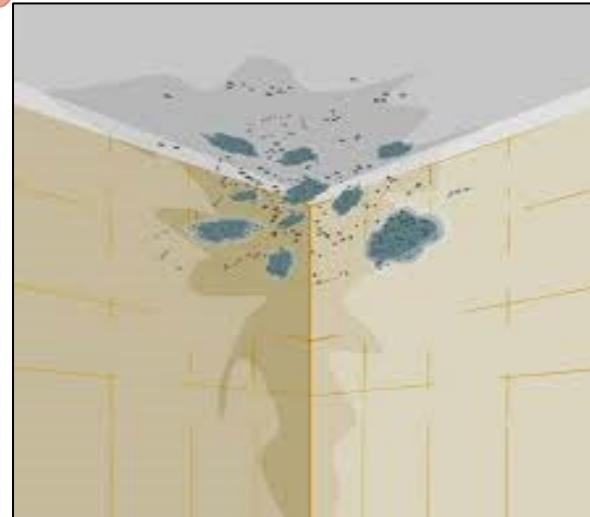
Check that the patient has a written asthma action plan (PAAP)

Ask about the patient's attitudes and goals for their asthma and medications.



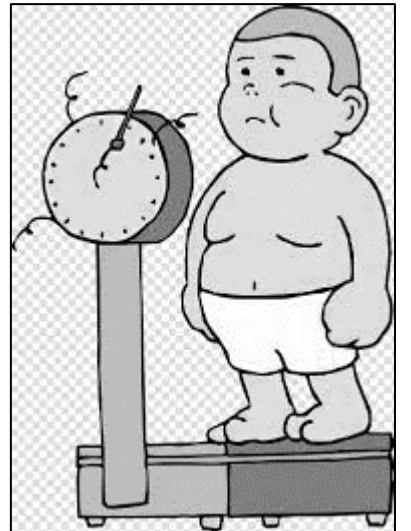
Assess Triggers and Exposure

- Exercise
- Infections
- Cigarette smoking
- e-cigarettes
- Indoor triggers
- Outdoor pollution



Assess Multimorbidity and Treat

- Rhinitis
- Rhinosinusitis
- Gastroesophageal reflux
- Obesity
- Obstructive sleep apnoea,
- Depression and anxiety can contribute to symptoms and poor quality of life, and sometimes to poor asthma control





Assess Lung Function

Measure lung function (spirometry) at:

Diagnosis/start of treatment,

3–6 months after starting ICS-containing treatment,

Then periodically, e.g., at least once every 1–2 years, but more often in at-risk patients and those with severe asthma.

Consider FeNO monitoring for people with asthma:

- **At their regular review, and**
- **Before and after changing their asthma therapy**

Investigate for Impaired Perception of Bronchoconstriction

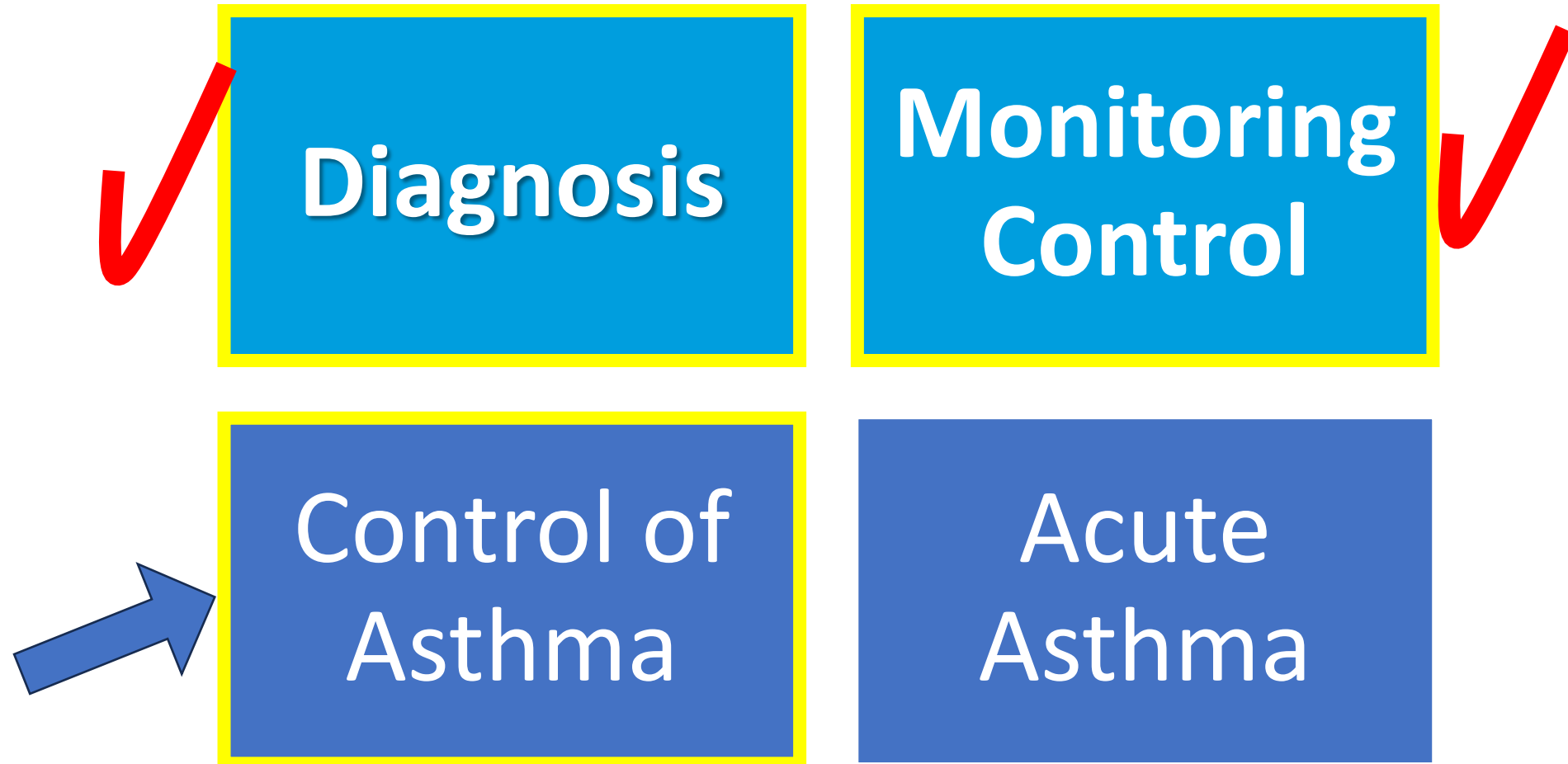
- Investigate for impaired perception of bronchoconstriction if:
 - There are no or few symptoms **BUT**
 - There are clinical signs of bronchospasm **and/or** low lung function.

Risk factor for Life-Threatening Asthma

Long-term PEF monitoring is recommended for patients with severe asthma, or those with impaired perception of airflow limitation.

Objectives of this talk

GP Management of Childhood Asthma





Any Questions

NICE Updated Asthma Guidelines, Expected Nov 2024

Next Talk....!

**Management of Asthma
in children**