Diagnosing asthma in children 1–5 years

Recommendation

Take a focused history.

Ask about:

- current signs and symptoms (wheeze, difficult breathing, feeling of tightness in chest, cough)
- whether signs/symptoms are accompanied by increased work of breathing, tracheal tug, or subcostal recession (describe these to parents)
- pattern of signs/symptoms (how often in daytime, whether symptoms cause nighttime waking)
- whether wheezing or other signs/symptoms occur only when child has a viral cold, or are unrelated to colds
- what else provokes signs/symptoms (e.g. playing or laughing, cold dry air, allergens, exposure to smoking/vaping)
- whether child is generally alert and active
- home environment (pets, indoor air pollution, carpet)
- exposure to smoking/vaping
- history of allergies (including atopic dermatitis, allergic rhinitis, food allergies)
- history of respiratory and other infections
- neonatal history (premature birth, difficulty breathing soon after birth, admission to a neonatal ICU)
- respiratory health in first year of life (e.g. hospitalisation due to a lower respiratory tract infection, bronchiolitis)
- family history of asthma and allergies.

Sources & rationale

Recommendation type: Consensus recommendation

History features that suggest an alternative diagnosis, including red flags, are listed in Table: Signs and symptoms that suggest an alternative diagnosis in children

Table

Signs and symptoms that suggest an alternative diagnosis in children

Feature	**Consider:**
Symptoms present from birth	Cystic fibrosis Structural abnormality Bronchopulmonary dysplasia Primary ciliary dyskinesia
Abnormal voice	Acute viral laryngitis Vocal cord nodules Structural abnormalities Inducible laryngeal obstruction
Sudden breathlessness at rest	Panic attacks
Cough	

Acute onset	Inhaled foreign body
Dry cough occurring during daytime only	Somatic cough (previously called ‘habit’ cough)
Persistent productive cough	Bronchiectasis Cystic fibrosis Primary ciliary dyskinesia Protracted bacterial bronchitis
Persistent cough	Post-viral cough Allergic rhinitis Primary ciliary dyskinesia Pertussis
🚩Cough with haemoptysis	Infection Inhaled foreign body Congestive heart disease Vascular abnormality Bronchial mass Cystic fibrosis
Upper respiratory tract	
Chronic production of sputum	Protracted bacterial bronchitis
Nasal polyps	Cystic fibrosis
Chest sounds	
🚩 Unilateral wheeze	Inhaled foreign body
No variation in wheeze	Structural abnormality
Inspiratory wheeze	Inducible laryngeal obstruction
Sudden wheeze at rest	Panic attacks
Exercise-induced wheeze that stops immediately when exertion ceases	Inducible laryngeal obstruction Anxiety
Stridor	Croup Inducible laryngeal obstruction
Localised crepitation	Pneumonia
Cardiac murmur	Congenital heart disease
Skin and integument	
Finger clubbing	Cystic fibrosis Primary ciliary dyskinesia Bronchiectasis Immunodeficiency
Systemic signs	
Weight loss/lack of weight gain	Immunodeficiency
Fevers	Chronic infection
Growth failure	Cystic fibrosis Immunodeficiency
Recurrent or atypical infections	Immunodeficiency

Additional information

These findings require further investigation or specialist referral. Flag symbol 🚩 indicates urgent referral needed.

The probability of asthma is higher if signs and symptoms are frequent, triggered by common asthma triggers, sometimes occur in the absence of upper respiratory tract infections, or there is a family history of allergies or asthma (Table: Features suggesting higher or lower probability of asthma in children)

Table

Features suggesting higher or lower probability of asthma in children

Asthma more likely	Asthma less likely
More than one of the typical asthma signs/symptoms: wheeze, difficulty breathing, feeling of tightness, in the chest, cough Signs/symptoms frequent Signs/symptoms worse at night and in the early morning Signs/symptoms triggered by exercise, exposure to pets, cold air, damp air, emotions, laughing Signs/symptoms occur when child doesn't have a cold History of allergies (e.g. allergic rhinitis, atopic dermatitis, food allergies) Family history of allergies Family history of asthma Widespread wheeze heard on auscultation Signs/symptoms respond to treatment trial of reliever, with or without a preventer Lung function measured by spirometry increases in response to rapid-acting bronchodilator Lung function measured by spirometry increases in response to a treatment trial with inhaled corticosteroid (where indicated)	Symptoms only occur when child has a cold, but never between colds* Isolated cough in the absence of wheeze or difficulty breathing History of moist cough Exercise-induced dyspnoea with noisy inspiration Chest pain Dizziness, light-headedness or peripheral tingling Repeatedly normal physical examination of chest when symptomatic Focal wheeze Normal spirometry when symptomatic (children old enough to perform spirometry) No response to a trial of asthma treatment with adequate dose and correct inhaler technique Clinical features that suggest an alternative diagnosis

Additional information

* In preschool children, wheezing that only occurs during viral respiratory infections may not be due to asthma, but this finding does not rule out asthma. Viral respiratory infection is the most common trigger for severe acute asthma exacerbations in children of all ages.

Resources

Royal Children's Hospital Melbourne's What is asthma? video for parents explaining how to identify wheeze and other signs

Recommendation

Perform a general physical examination including vital signs and chest auscultation.

Include the following:

- Record vital signs.
- Observe breathing.
- Auscultate chest.
- Measure height and weight compared with normal range for age (and track growth history within child's percentile band).
- Inspection of chest for deformity
- Inspect upper airway for signs of allergic rhinitis (e.g. swollen turbinates, transverse nasal crease, mouth breathing, darkness and swelling under eyes caused by sinus congestion) or polyps.
- Inspect fingers for clubbing
- Inspect skin for signs of atopic dermatitis.

Sources & rationale

Recommendation type: Consensus recommendation

Physical examination findings that suggest an alternative diagnosis, including red flags, are listed in Table: Signs and symptoms that suggest an alternative diagnosis in children.

Table

Signs and symptoms that suggest an alternative diagnosis in children

Feature	Consider:
Symptoms present from birth	Cystic fibrosis Structural abnormality Bronchopulmonary dysplasia Primary ciliary dyskinesia
Abnormal voice	Acute viral laryngitis Vocal cord nodules Structural abnormalities Inducible laryngeal obstruction
Sudden breathlessness at rest	Panic attacks
Cough	
Acute onset	Inhaled foreign body
Dry cough occurring during daytime only	Somatic cough (previously called 'habit' cough)
Persistent productive cough	Bronchiectasis Cystic fibrosis

	Primary ciliary dyskinesia Protracted bacterial bronchitis
Persistent cough	Post-viral cough Allergic rhinitis Primary ciliary dyskinesia Pertussis
🚩Cough with haemoptysis	Infection Inhaled foreign body Congestive heart disease Vascular abnormality Bronchial mass Cystic fibrosis
Upper respiratory tract	
Chronic production of sputum	Protracted bacterial bronchitis
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Stridor	Croup Inducible laryngeal obstruction
Localised crepitation	Pneumonia
Cardiac murmur	Congenital heart disease
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Finger clubbing	Cystic fibrosis Primary ciliary dyskinesia Bronchiectasis Immunodeficiency
Systemic signs	
Weight loss/lack of weight gain	Immunodeficiency
Fevers	Chronic infection
Growth failure	Cystic fibrosis Immunodeficiency
Recurrent or atypical infections	Immunodeficiency

Additional information

These findings require further investigation or specialist referral. Flag symbol 🚩 indicates urgent referral needed.

Usually no abnormalities are detected on physical examination of a child with asthma.

Objective confirmation of wheeze is useful. Check medical records for wheeze confirmed by a health professional. If wheeze is not detectable during the consultation, ask parents to record an episode (video or audio).

The chest may be silent in severe acute asthma.

Resources

Royal Children's Hospital Melbourne's What is asthma? video for parents explaining how to identify wheeze and other signs

Recommendation

Assess clinical response to salbutamol.

Clinical response can be verified by either of the following:

- resolution of signs within minutes after administration of salbutamol via pMDI and spacer (with facemask, if needed) by parents or in primary care
- history of documented response to salbutamol administered in an emergency department during an acute respiratory episode (e.g. partial resolution within minutes).

Sources & rationale

Consensus recommendation

If symptoms rapidly and consistently resolve after administration of inhaled salbutamol, this supports the diagnosis of asthma.

Notes

Table

Salbutamol doses for children 1–5 years

Situation	Total dose per occasion	Administration
Cough or wheeze without visibly increased work of breathing	2 actuations x salbutamol 100 microg/actuation If symptoms do not resolve within a few minutes, give 2 more actuations.	Administer via spacer (and mask, if needed) Add 1 actuation to spacer – child takes 4 breaths in and out of spacer. Immediately repeat for second and subsequent actuations until the recommended number of actuations have been given.
Symptoms with increased work of breathing	6 actuations x salbutamol 100 microg/actuation If symptoms do not resolve within a few minutes, give 6 more actuations and call 000 for an ambulance. If symptoms still do not resolve, or recur within 3 hours, parents/carer should take child to ED or call 000 for an ambulance.	

Recommendation

Consider a treatment trial of maintenance low-dose ICS plus inhaled salbutamol as needed for 8–12 weeks.

A treatment trial with ICS is indicated for children with any of the following:

- frequent symptoms (daytime symptoms more than twice per week or night-time symptoms more than twice per month)
- symptoms restricting activity or sleep (when child does not have an acute wheezing episode or respiratory viral infection)
- history of recurrent acute wheezing episodes (more than 4 per year)
- more than one acute wheezing episode within the past 12 months managed in the emergency department or treated with systemic corticosteroids
- previous PICU admission for an acute salbutamol-responsive wheezing episode.

Sources & rationale

Recommendation type: Consensus recommendation

Resolution or significant improvement of signs and symptoms during a treatment trial with low-dose ICS supports the diagnosis of asthma.

If symptoms do not resolve during a trial of low-dose maintenance ICS, check inhaler technique, adherence, triggers, reconsider the diagnosis, and consider specialist referral.

Notes

The treatment trial should be performed at a time when the child is likely to be exposed to usual triggers.

A treatment trial is unlikely to provide evidence useful for supporting or ruling out the diagnosis if it is performed under conditions in which the child typically does not experience symptoms or have exacerbations (e.g. outside the cold and influenza season or when there is no relevant allergen exposure).

Table

Low and medium/high ICS doses in children 1–5 years

Active ingredient	Total daily dose (microg)	
	Low	Medium/high
Fluticasone propionate	100 (50 twice daily)	200 (100 twice daily)

Additional information

ICS: inhaled corticosteroid

Medium/high doses should be avoided except under specialist supervision

Recommendation

Consider specialist referral if the diagnosis is unclear but the child has clinically significant respiratory signs and symptoms.

Sources & rationale

Recommendation type: Consensus recommendation

Recommendation

Do not diagnose asthma in a child younger than 12 months.

If a child younger than 12 months shows persistent wheezing, refer to a specialist.

Sources & rationale

Recommendation type: Consensus recommendation

In children younger than 12 months, episodes of acute wheeze with increased work of breathing are usually caused by bronchiolitis, which is most commonly due to respiratory syncytial virus.[Dalziel 2022]

Transient early wheeze (noisy breathing in infants younger than 12 months who are otherwise well and thriving) should not be diagnosed as asthma or treated with bronchodilators.

References

Dalziel SR, Haskell L, O'Brien S, et al. Bronchiolitis. Lancet 2022; 400: 392-406.

Notes

Suitable specialists for referral include paediatricians, paediatric respiratory physicians, and allergists.

Consideration

If wheeze is the predominant sign reported, verify and ascertain clinical significance.

Confirm that more than one episode has occurred.

Confirm that the sound reported by the child or parents is actually wheeze – ask parents to video/audio record the wheeze to verify.

Determine whether wheeze only occurs during viral respiratory tract infections, or also occurs during physical activity and at other times.

Sources & rationale

Recommendation type: Consensus recommendation

Careful questioning or recordings may be necessary to correctly identify respiratory signs. Parents may not be able to recognise wheezing, stridor, snoring or normal breathing. [Fernandes 2011]

Asthma is more likely if wheezing occurs during play or exposure to allergens.

References

Fernandes RM, Robalo B, Calado C, et al. The multiple meanings of "wheezing": a questionnaire survey in Portuguese for parents and health professionals. BMC Pediatr 2011; 11: 112.

Resources

Royal Children's Hospital Melbourne's **What is asthma?** video for parents explaining how to identify wheeze and other signs

Consideration

If cough is the predominant sign reported, investigate and manage according to current Australian guidelines.

Sources & rationale

Recommendation type: Consensus recommendation

Coughing is normal in preschool children in the context of frequent respiratory infections. Isolated dry cough in an otherwise well preschool child is rarely due to a specific diagnosis.[Bush 2023] Intermittent wet cough during viral colds is normal; preschool children typically have many colds per year with symptoms lasting up to 3 weeks each time.[Bush 2023]

Asthma is among the most common causes of chronic cough in children with no abnormality detected on physical examination, chest radiography or spirometry.[Marchant 2024] Asthma may cause episodic cough that is associated with expiratory wheeze and/or exertional dyspnoea.[Marchant 2024]

In children, cough due to asthma typically resolves within one month of treatment with ICS.[Marchant 2024] ICS treatment is not indicated unless there are specific features to suggest asthma.[Marchant 2024]

Chronic cough in the absence of other symptoms/signs is rarely due to asthma.[Marchant 2024] The diagnosis of preschool asthma should not be made unless the child also has breathlessness, chest tightness, or wheeze.[Bush 2023] Other causes of chronic cough in children include respiratory tract infections, airway anomaly, aspiration, rhinitis/rhinosinusitis and somatic syndrome.[Marchant 2024, Kantar 2022] Wet cough persisting beyond 3 weeks suggests protracted bacterial bronchitis requiring antibiotic treatment. Specialist referral should be considered for children with multiple episodes of prolonged wet cough or failure to resolved with antibiotic treatment.[Marchant 2024]

References

Bush A. Basic clinical management of preschool wheeze. Pediatr Allergy Immunol 2023; 34: e13988.

Kantar A, Marchant JM, Song WJ, et al. History taking as a diagnostic tool in children with chronic cough. Front Pediatr 2022; 10: 850912.

Marchant JM, Chang AB, Kennedy E, et al. Cough in Children and Adults: Diagnosis, Assessment and Management (CICADA). Summary of an updated position statement on chronic cough in Australia. Med J Aust 2024; 220: 35-45.

Resources

National cough guidelines: **Cough in Children and Adults: Diagnosis, Assessment and Management (CICADA). Summary of an updated position statement on chronic cough in Australia**.

Consideration

FeNO testing can be considered (if available) for children ≥ 4 years old.

Sources & rationale

Recommendation type: Consensus recommendation

FeNO ≥25 ppb supports the diagnosis of asthma in a child with and signs and symptoms strongly suggesting asthma.

In children and adolescents aged ≥5 years, a FeNO level > 24 ppb has a reported sensitivity of 0.50 and specificity of 0.91 for the diagnosis of asthma.[BTS-NICE-SIGN 2024]

Normal FeNO level does not rule out asthma.

References

Högman M, Bowerman C, Chavez L, et al; Global Lung Function Initiative FENO Task Force. ERS technical standard: Global Lung Function Initiative reference values for exhaled nitric oxide fraction (F_{ENO50}). Eur Respir J 2024; 63: 2300370.

Notes

The FeNO test is available in accredited respiratory function laboratories. Age restrictions differ between laboratories.

Normal reference ranges for FeNO vary between measuring devices and testing protocols.[Högman 2024]

The test can generally be performed correctly by children 4 years and older.

FeNO is elevated in the presence of active type-2 inflammation of the airway associated with asthma. It is also elevated in some other inflammatory conditions (e.g. allergic rhinitis).

FeNO is suppressed by ICS and systemic corticosteroids.

The FeNO test is more useful for ruling in a diagnosis of asthma than ruling it out. A normal FeNO level does not rule out asthma.

More information on **tests of airway inflammation**

Consideration

If allergic triggers are suspected, arrange allergy testing for common aeroallergens to inform management.

Arrange either skin-prick testing or serum test for allergen-specific IgE.

Sources & rationale

Recommendation type: Consensus recommendation

Allergy testing is not recommended as a standalone diagnostic test for asthma, due to its low specificity.[ERS 2021] However, allergy testing at the time of diagnosis is useful to inform management because most children with asthma have allergies, which may affect asthma control.

The presence of allergies in preschool children with asthma-like signs and symptoms is also associated with a higher probability that the child will have asthma at primary school age.[Kothalawala 2020]

The most common aeroallergens causing asthma or allergic rhinitis are dust mites, pollens (most often grass pollen, less often other wind-borne pollens from trees and weeds), animal epithelia, and moulds.[ASCIA 2020]

The history may help identify relevant aeroallergens for testing.

Either skin-prick testing or allergen-specific IgE antibody testing can be used to identify clinically relevant aeroallergens. [ASCIA 2024, ASCIA 2020]

References

ASCIA. Laboratory investigation for allergic diseases. Australasian Society of Clinical Immunology and Allergy, 2020.

ASCIA. Skin prick testing guide for diagnosis of allergic diseases. Australasian Society of Clinical Immunology and Allergy, 2024.

Gaillard EA, Kuehni CE, Turner S, et al. European Respiratory Society clinical practice guidelines for the diagnosis of asthma in children aged 5-16 years. Eur Respir J 2021; 58: 2004173.

Kothalawala DM, Kadalayil L, Weiss VBN, et al. Prediction models for childhood asthma: A systematic review. Pediatr Allergy Immunol 2020; 31: 616-627.

Resources

ASCIA's **Laboratory investigation for allergic diseases** (2020)

ASCIA's **Skin prick testing guide for diagnosis of allergic diseases** (2025)

Practice point

Common non-asthma causes of respiratory symptoms in preschool children include viral-induced wheeze, recurrent viral colds, and persistent bacterial bronchitis. Less common causes to consider include pertussis and foreign body inhalation.

Practice point

If the child has previously been treated for possible asthma, ask about frequency of reliever use, whether the child has received oral corticosteroids, ED visits, hospital admission, ICU admission, and any previous maintenance treatment for asthma.

Practice point

Treatment trials for the purpose of confirming the diagnosis should be performed at a time when the child is likely to be exposed to usual triggers. A treatment trial is unlikely to provide evidence useful for supporting or ruling out the diagnosis if it is performed under conditions in which the child typically does not experience symptoms or have exacerbations (e.g. outside the cold and influenza season or when there is no relevant allergen exposure).

Practice point

Oscillometry is an emerging test for lung function in children, but is not commonly used in clinical practice.

Resources

Lung function tests

https://www.asthmahandbook.org.au/lung-function-tests