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iGUIDE
Supporting best practice for child health in primary care

Fever

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St Mary's Hospital

December 9th 2015

Fever

- Is the most common childhood presentation to medical professionals
- Wide range of differential diagnoses
- Diagnosis can be challenging…..

- Usually associated with mild self limiting condition

- But infection remains leading cause of mortality in the under 5s

Once you have physically examined the child you should be able to place them in the green, amber or red category

- What should you assess and how?
- What is best method for measuring temperature in children?
- How do you best measure heart rate and respiratory rate?
- What are normal parameters?

Age variable parameters

Age (years)	Respiratory rate (breaths/min)	Heart rate (beats/min)	Systolic blood pressure (mmHg)
<1	30–40	110–160	70–90
1–2	25–35	100–150	80–95
2–5	25–30	95–140	80–100
5–12	20–25	80–120	90–110
>12	15–20	60–100	100–120

Table 2

Traffic light system for identifying risk of serious illness*

	Green – low risk	Amber – intermediate risk	Red – high risk
Colour (of skin, lips or tongue)	• Normal colour	• Pallor reported by parent/carer	• Pale/mottled/ashen/ blue
Activity	• Responds normally to social cues • Content/smiles • Stays awake or awakens quickly • Strong normal cry/not crying	• Not responding normally to social cues • No smile • Wakes only with prolonged stimulation • Decreased activity	• No response to social cues • Appears ill to a healthcare professional • Does not wake or if roused does not stay awake • Weak, high-pitched or continuous cry
Respiratory		• Nasal flaring • Tachypnoea: – RR >50 breaths/ minute, age 6–12 months – RR >40 breaths/ minute, age >12 months • Oxygen saturation ≤95% in air • Crackles in the chest	• Grunting • Tachypnoea: RR >60 breaths/minute • Moderate or severe chest indrawing
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Other	• None of the amber or red symptoms or signs	• Age 3–6 months, temperature ≥39°C • Fever for ≥5 days • Rigors • Swelling of a limb or joint • Non-weight bearing limb/not using an extremity	• Age <3 months, temperature ≥38°C • Non-blanching rash • Bulging fontanelle • Neck stiffness • Status epilepticus • Focal neurological signs • Focal seizures

CRT, capillary refill time; RR, respiratory rate

'Feverish illness in children', NICE clinical guideline 160 (May 2013)

Assessing febrile children

- Red - urgent paediatric review
- Amber - if no clear diagnosis, consider referral, or give safety net advice
- Green - reassure, advice self care and safety net

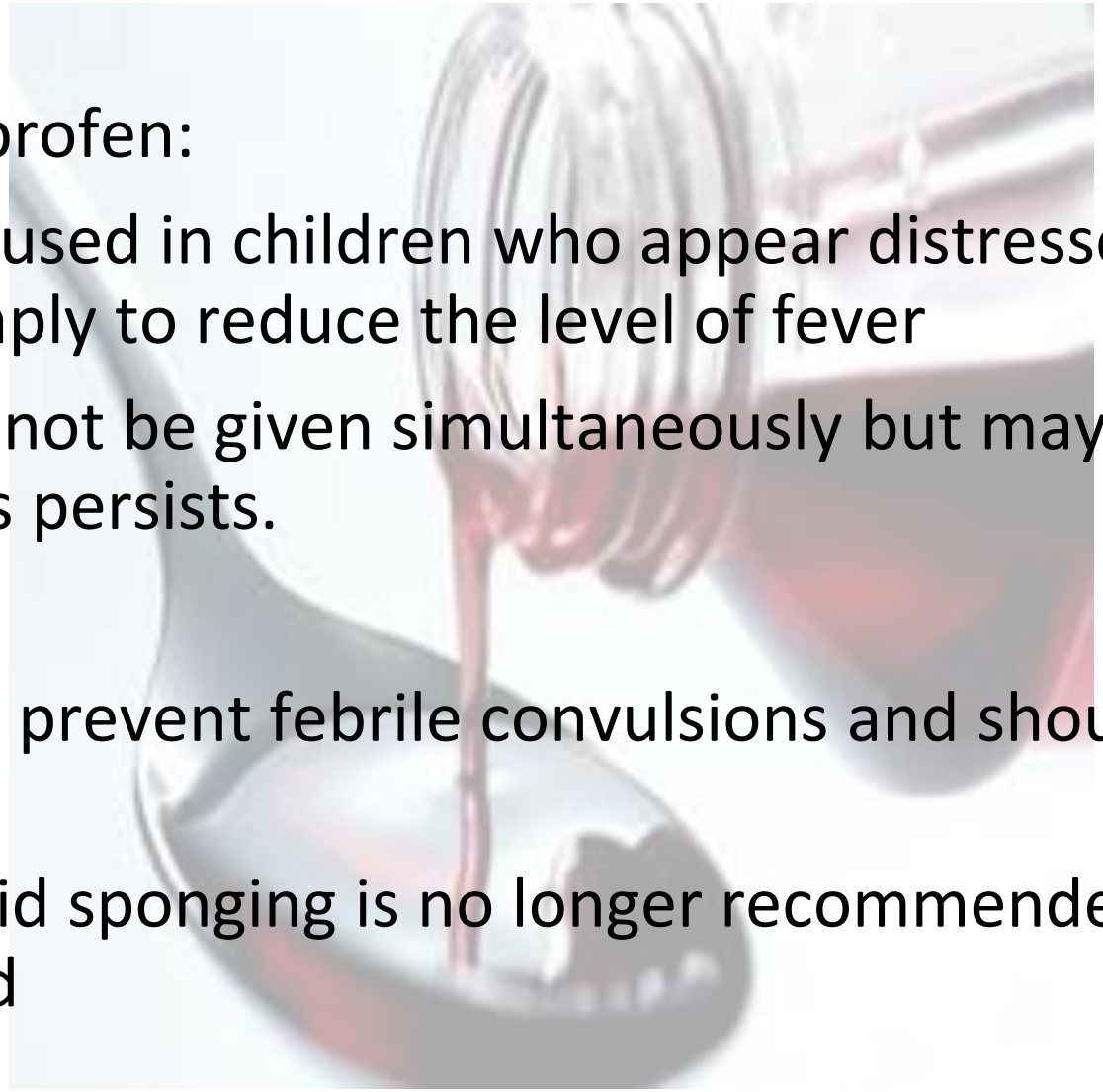
Treatment

- All children with fever and no specific focus should have a urine dipstick test.
- Febrile children with no specific focus should **NOT** routinely receive oral antibiotics.
- Children that have suspected meningococcal disease should, as early as possible in the community, receive intramuscular injections of antibiotic:

  *Benzylpenicillin - under 1 year old 300 mg, over 1 year old 600 mg

  * Chloramphenicol if penicillin allergic – 25 mg per kg

Managing fever



Paracetamol or ibuprofen:

- can be used in children who appear distressed with fever, but not simply to reduce the level of fever
- should not be given simultaneously but may be alternated if distress persists.

Anti-pyretics do not prevent febrile convulsions and should not be used for this purpose.

Remember that tepid sponging is no longer recommended to reduce temperature in child

Signs of specific diseases

- Can you think of specific febrile illnesses that are apparent from history and examination findings?

Signs of specific diseases

- Urinary tract infection
- Meningitis (bacterial/viral)
- Pneumonia
- Meningococcal Sepsis
- Septic arthritis
- Kawasaki disease

Case 1

- **An 11 month old has woken from nap febrile and miserable and have attended the out of hours service. She is lethargic and miserable.**
- **T39, HR 170, RR38, sats 98% air, CRT 2s centrally, cool peripherally**
- **No obvious focus of infection**

  - How unwell is she according to NICE guidance?
  - What further examination/investigation would you do?
  - What is your differential diagnosis?
  - How would you manage her?

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CRT, capillary refill time; RR, respiratory rate

11 months
T = 39
HR = 170
RR = 38
SaO2 = 98%

'Feverish illness in children', NICE clinical guideline 160 (May 2013)

specific signs
urinary tract infection

- vomiting
- poor feeding
- lethargy
- irritability
- abdominal pain or tenderness
- frequency or dysuria

specific signs
bacterial meningitis/encephalitis

- neck stiffness
- bulging fontanelle
- decreased level of consciousness
- convulsive status epilepticus
- focal seizures or neurological signs

Case 2

- **A 5 week old baby is brought into your surgery. He is not feeding as well as before. Parents measured a temperature of 38.2 at home. Now the baby is sleeping, settled.**
- **T37.8, HR 150, RR36, sats unable to obtain, CRT 2s centrally, fontanelle soft**

  - What else would you want to know from her history?
  - What is your differential diagnosis?
  - What is your management plan?

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CRT, capillary refill time; RR, respiratory rate

5 weeks
T = 37.8 (38.2)
HR = 150
RR = 36
CRT = 2 sec

Infant < 3months

- signs of sepsis subtle
- any fever >38 significant and warrants investigation and observation
- low threshold for full septic screen including lumbar puncture
- organisms: group B strep, listeria, e coli,

Case 3

3 year old is brought to the surgery with history of fever for 5 days. He is refusing to drink, and looks lethargic and miserable

T39.3, HR 140, RR36, sats 99% air, CRT 2s centrally,

After antipyretics, T37.6, HR 120, RR 28, more active.

- What investigations/examinations would you do?
- What is the differential diagnosis?
- What would your next step be?

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CRT, capillary refill time; RR, respiratory rate

3yo
Fever for 5 days
T = 39.3 (37.6)
HR = 140 (120)
RR = 36 (28)
SaO2 = 99%
CRT = 2secs

'Feverish illness in children', NICE clinical guideline 160 (May 2013)

specific signs
kawasaki disease

fever for >5 days and at least 4 of the following:

- bilateral conjunctival injection
- change in mucous membranes
- polymorphous rash
- cervical lymphadenopathy

Case 4

3 year old girl is brought to you after nursery. She has had fever today, and is refusing to walk.

On examination she is lethargic and miserable

T38.7, HR 150, RR36, sats 98% air, CRT 3s centrally, cool hands and feet

c/o pain legs, blanching erythematous rash on trunk.

- What examination/investigation would you do?
- What is your differential diagnosis?
- How are you going to manage her?

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CRT, capillary refill time; RR, respiratory rate

3yo
T = 38.7
HR = 150
RR = 36
SaO2 = 98%
CRT = 3 secs
- Leg pain
- Rash
- Cool hands and feet

'Feverish illness in children', NICE clinical guideline 160 (May 2013)

specific signs
septic arthritis and osteomyelitis

- swelling of limb or joint
- not using extremity
- non-weight bearing

specific signs
meningococcal disease

- non blanching rash - lesions >2mm, out with SVC distribution
- ill looking child
- capillary refill time >3s
- neck stiffness

specific signs
pneumonia

- tachypnoea (>60 0-5m; >50 6-12m; >40 >12m)
- crackles in chest
- nasal flaring
- chest indrawing
- cyanosis
- oxygen saturations <95%

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Diarrhoea and Vomiting

Dr Fran Cleugh

D&V

- Diarrhoea and vomiting is **very** common in childhood; 1 in 6 presentations to the Emergency Department are due to diarrhoeal illness
- There are a range of differential diagnoses
  - What are these?
- Acute viral gastroenteritis accounts for 10% presentations to healthcare in under 5s

History and examination

- What is important to ascertain in the history?
- How will you assess a child with diarrhoea?
- What investigations might you consider?

Red Flags

- Unwell, deteriorating
- Signs of severe dehydration
- Abdominal distention
- Bilious vomiting

What are important differential diagnoses to exclude?

Assessing Hydration

- What parameters do you use to assess hydration?
- What are signs of mild,moderate and severe dehydration?

Clinical Assessment	Mild Dehydration	Moderate Dehydration	Severe Dehydration
Weight Loss	3-5%	6-9%	10% or more
Mental status	Alert, appears well	Fatigued, irritable, restless	Lethargic, difficult to rouse
Heart Rate	Normal to slight increase	Tachycardia	Marked Tachycardia – bradycardia in severe cases
Respiratory Rate	Normal	Tachypnoea	Marked Tachypnoea, Deep Respiration
Quality of pulse	Normal	Normal to decreased	Weak, Thready, impalpable
Capillary Refill	<2s	Prolonged 2-4s	Prolonged >5s
Eyes	Normal	Sunken	Deeply Sunken
Mucous Membrane	Moist	Dry/sticky	Very dry
Skin Turgor	Instant recoil	Prolonged (2s)	Prolonged (>2s)
Urine Output	Normal	Decreased	Markedly decreased/absent
Skin Perfusion	Warm extremities	Cool extremities	Cool, mottled

Who are at increased the risk of dehydration?

- Children younger than one year, particularly those younger than six months
- Infants who were of low birth weight
- Children who have passed more than five diarrhoeal stools in the previous 24 hours
- Children who have vomited more than twice in the previous 24 hours
- Children who have not been offered or have not been able to tolerate supplementary fluids before presentation
- Infants who have stopped breastfeeding during the illness

Nice Guidance 2009

Treatment

Primary prevention of dehydration:

- continue breast feeding and other milks feeds
- encourage oral intake
- aim for oral rehydration solution (ORS)
- discourage fizzy drinks or fruit juices

Treating dehydration:

Use ORS solution to rehydrate children, including those with hypernatraemia, *unless intravenous fluid therapy is indicated*

- give 50 ml/kg for fluid deficit replacement over 4 hours as well as maintenance fluid
- give frequently and in small amounts
- consider supplementation with their usual fluids (including milk feeds or water, but not fruit juices or carbonated drinks) if they refuse to take sufficient quantities of ORS solution and do not have red flag symptoms or signs for severe dehydration

NB if referring to paediatrics for fluid management, we would often commence nasogastric rehydration before intravenous, unless the child is shocked

Treatment

After rehydration:

- encourage breastfeeding and other milk feeds - full strength
- encourage fluid intake
- reintroduce solids as tolerated
- in children at increased risk of dehydration recurring, consider giving 5 ml/kg of ORS solution after each large watery stool
- safety net advice about signs of dehydration

Antibiotics not routinely indicated :

- if concern needs treatment discuss with paediatric and microbiology teams
- this includes the returning traveller

Advice for parents

- the usual duration of diarrhoea is 5–7 days and in most children it stops within 2 weeks
- the usual duration of vomiting is 1 or 2 days and in most children it stops within 3 days
- they should seek advice if the child's symptoms do not resolve within these timeframes

Preventing primary spread of diarrhoea and vomiting:

- washing hands with soap (liquid if possible) in warm running water and careful drying are the most important factors in preventing the spread of gastroenteritis
- towels used by infected children should not be shared
- children should not go back to their school or other childcare facility until at least 48 hours after the last episode of diarrhoea or vomiting
- children should not swim in swimming pools for 2 weeks after the last episode of diarrhoea

Antiemetics

- Oral or intravenous **ondansetron** increased the proportion of children and young people who stopped vomiting compared with placebo in those with acute gastroenteritis
- Oral ondansetron also reduced the proportion of children and young people needing intravenous fluid therapy and reduced the immediate hospital admission rate compared with placebo.
- Ondansetron was associated with increased episodes of diarrhoea.
- Now commonly used in paediatric ED

Cochrane review 2014

Case 1

A 5 year old boy presents to you, his GP, with a 3 day history of D&V. He has had at least 5 watery stools daily for the last 3 days and vomited twice yesterday. He has not eaten properly for 48hr. He is drinking small amounts of fizzy drinks

On examination his observations are within normal limits. He is alert and talking to you, though not as boisterous as usual according to his mum. He does not look clinically dehydrated. His abdomen is soft but minimally tender on deep palpation.

- What else would you want to know from the history?
- What investigation(s) would you do?
- How would you manage this?

The urine dip has 1 + ketones and otherwise normal

- How would you manage this?
- What advice would you give to the family?

- Introduce the usual solid diet once the child has been rehydrated
- Fizzy drinks can be given when the diarrhoea has stopped
- He should stay off school for 48hrs after the last episode of D&V
- Diarrhoea can last up to 2 weeks and milk can be introduced into the diet as soon as the child is rehydrated

Case 2

A 10 month old girl attends your surgery with a 2 day history of persistent D&V

She is taking small amounts of breastmilk but refusing solids

On examination she is pale and withdrawn although alert

Her observations are as follows: HR 180, RR 35, Sats 98% air, Temp 37.7

- What else would you want to know from her history?
- What is your differential diagnosis and assessment?
- What is your management plan?

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Constipation in Children

Dr Bob Klaber

Consultant Paediatrician

Constipation

- Common paediatric presentation in GP practice
- Prevalence of between 5% and 30%
- Majority of cases are idiopathic
- Symptoms include bowel movement less than 3 times a week

Though most cases are idiopathic, it is important to rule out underlying pathology…

- What is important in the history and examination?
- What investigations might you consider?

Red Flags

1. Constipation from birth/first few weeks of life
2. Meconium passed > 48 hrs after term birth
3. Previously undiagnosed lower limb weakness or locomotor delay
4. Abdominal distention and vomiting
5. “Ribbon” stools

Amber Flags

- Evidence of faltering growth
- Safeguarding issues

Examination

- It is important to carry out a thorough examination including examination of the abdomen, lumbosacral spine and gluteal region, and a neuromuscular examination

- You may also consider coeliac screen, thyroid function test although they are usually only indicated in a small number of cases

Treatment

- The first line is Movicol paediatric (or Movicol in children over 12 years of age)
- Regimen depends on whether faecal impaction is present
- ‘Disimpaction’ then ‘Maintenance’

- Diet should focus on good fluid intake, high fibre food
- Sometimes a role for behavioural therapy

Management – disimpaction

Management - maintenance

- The key to managing constipation is to continue to the laxatives for several weeks after a regular bowel habit has been established, slowly reducing the dose over a period of months


Bristol stool chart
Type 1
Seperate hard lumps, (like nuts) hard to pass
Type 2
Sausage-shaped but lumpy
Type 3
Like a sausage but with cracks on its surface
Type 4
Like a sausage or snake, smooth and soft
Type 5
Soft blobs with clear cut edges (passed easily)
Type 6
Fluffy pieces with ragged edges, a mushy stool
Type 7
Watery, no solid pieces. Entirely liquid

Case 1

- A 5 year old boy is brought by his mother with episodes of soiling his trousers. He previously had no problems with going to the toilet. He now passes stool every 4-5 days which the mother describes as small, hard pellets.

  - What else would you want to know from the history?
  - What other investigations/examinations would you do?
  - How would you manage this?

Case 2

- A 7 year old girl is brought by her parents. She previously took Movicol paediatric plain for constipation over a period of 10 days. Once her stool returned to normal, her parents stopped the movicol. She is now constipated again and her mother is worried.

  - What do you advise the parents?
  - What else would you want to know from her history?

Case 3

- A 4 week old boy is brought in by his parents. He has not passed stool in a week.
  - What other information do you want to know?

- His mother reports that he was born at term and passed a small amount of meconium 3 days later. Since then he has passed small amount of stool and has been fussy. You see that the infant is pale with a distended abdomen.
  - What is the differential diagnosis?
  - What investigations/examinations would you consider?
  - What would your next steps be?

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Questions ?

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Asthma

Dr Mando Watson

Asthma

- Is a major cause of hospital admission in children
- Is associated with significant morbidity and mortality
- The key to good care is recognising that although asthma cannot be cured it can and should be managed well with the aim of ensuring a good quality of life and avoiding preventable mortality

In establishing a diagnosis of asthma, what is important to ascertain from your history and examination?

- Asthma often occurs alongside allergy and it is important to identify and actively manage both concurrently
- Triggers can include allergens, exercise, viral URTIs
- Are there smokers at home?

What investigations might be useful?

- Peak flow in over 5 years
- Formal pulmonary function in some cases
- Chest x-ray **rarely** helpful

- Remember that there is no definitive test for asthma, so your clinical assessment of history taking and clinical examination remains your most important diagnostic tool.

Management

- The chronic management of asthma in childhood including the importance of ongoing review, prevention and monitoring. Patient and family education are an essential aspect of this

BTS Guidance - stepwise approach

Figure 1: Algorithm for management of asthma in under 5s

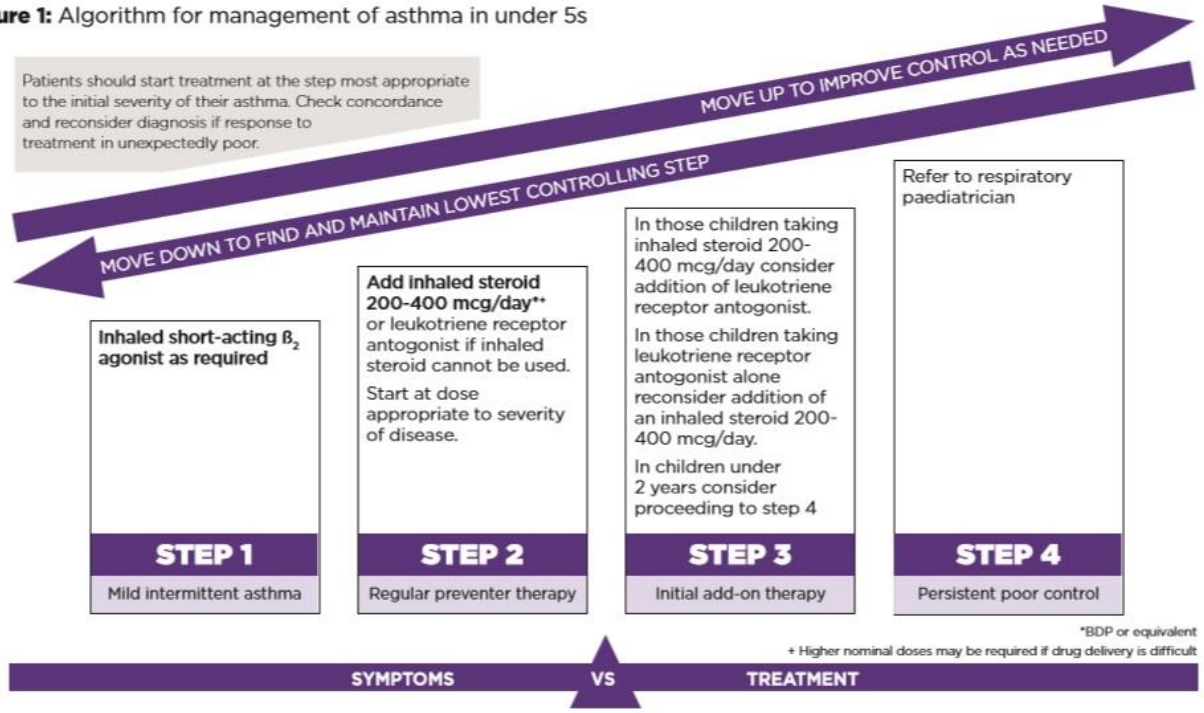
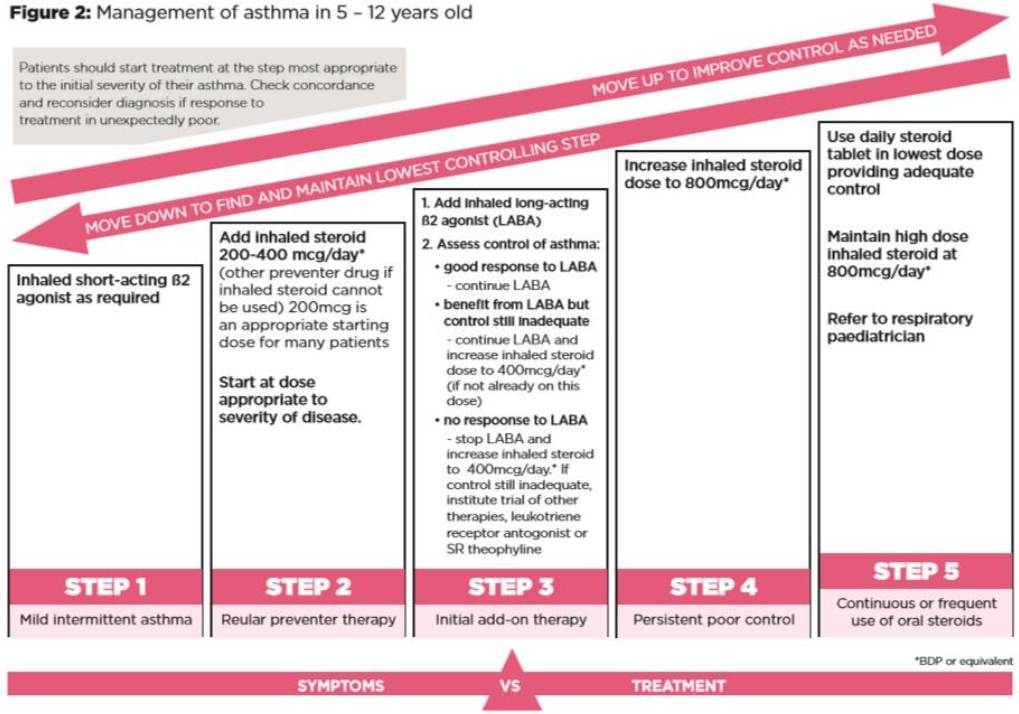


Figure 2: Management of asthma in 5 – 12 years old



When should you consider referral to allergy team?

- a history of anaphylaxis (although this should hopefully have been organised when the anaphylaxis occurred)
- significant on-going allergic rhinitis/eczema despite treatment
- difficulty in allergen/trigger identification and ongoing symptoms despite treatment where investigation and allergen identification can help with trigger avoidance
- multi-systemic allergy such as asthma and eczema both requiring daily preventative treatment

Acutely unwell asthmatic

- How do you assess severity of an acute exacerbation?
- What are signs of respiratory distress in children?
- How will you manage severe, moderate and mild distress?

Medication in acute asthma

- What and how much bronchodilator do you prescribe?
- What is the best way to administer it?
- What other medication can you consider?
- When should you refer for paediatric review?

Severe respiratory distress

Regardless of the cause, a child with moderate or severe respiratory distress, hypoxia or altered conscious state will require immediate treatment and transfer to the Emergency Department (ED).

Moderate respiratory distress

For a child with mild to moderate symptoms of respiratory distress who may potentially have asthma or who has an established diagnosis of asthma, you could treat the child with:

- bronchodilators
- a dose of oral steroids.

You should review in four to five hours.

Mild respiratory distress

For mild cases you should assess the recurrent or persistent nature of the symptoms. You may decide on a trial of treatment for your probable diagnosis of asthma, followed by an assessment of response.

Your treatment trial may involve:

- the use of bronchodilators at home
- a course of oral steroids
- preventer therapy.

Case 1

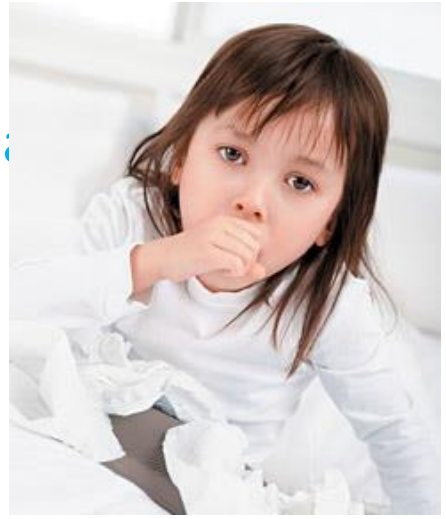
A 5 year old boy has developed acute breathing difficulties with cough and wheezing

- What else would you want to know from the history?
- What examination/investigations would you do?
- What is the likely differential diagnosis
- How would you manage this?

Case 2

A 6 year old girl presents to your surgery with shortness of breath and wheeze. Her heart rate is 120 beats per minute, her respiratory rate is 28 breaths per minute, and her oxygen saturations are 94% on air. She is able to talk in sentences.

- How would you grade the severity of her exacerbation?
- What would be your next step in the management of this exacerba



Case 3

You see a 10 year old girl in your surgery who is known to have asthma.

She takes salbutamol 100 µg as required, and beclometasone 100 µg (one puff twice daily) via a spacer.

She has taken five courses of oral steroids over the past year.

She needs to use her salbutamol inhaler at least three times a day.

- What other information do you want to know?
- What treatment should you give next?

Moderate acute asthma

- Able to talk
- Respiration (breaths/minute); child 2–5 years ≤ 40, 5–12 years ≤ 30, 12–18 years < 25
- Pulse (beats/minute); child 2–5 years ≤ 140, 5–12 years ≤ 125, 12–18 years < 110
- Arterial oxygen saturation ≥ 92%
- Peak flow; child 5–12 years ≥ 50% of predicted or best, 12–18 years > 50%

Severe acute asthma

- Child under 12 years too breathless to talk or feed, 12–18 years cannot complete sentences in one breath
- Use of accessory breathing muscles
- Respiration (breaths/minute) Child 2–5 years > 40, 5–12 years > 30, 12–18 years ≥ 25
- Pulse (beats/minute) Child 2–5 years > 140, 5–12 years >125, 12–18 years ≥ 110
- Arterial oxygen saturation Child under 12 years < 92%, 12–18 years ≥ 92%
- Peak flow Child 5–12 years < 50% of predicted or best, 12–18 years 33–50%

Life-threatening acute asthma

- Silent chest, cyanosis, poor respiratory effort
- Arrhythmia, hypotension
- Exhaustion, altered consciousness, agitation, confusion
- Arterial oxygen saturation <92%
- Peak flow < 33% of predicted or best

Child 5–18 years

Step 1: occasional relief bronchodilator

- Inhaled short-acting beta2 agonist as required (up to once daily)
- Move to step 2 if needed more than twice a week, or if night-time symptoms at least once a week, or if exacerbation in the last 2 years.

Step 2: regular inhaled preventer therapy

- Inhaled short-acting beta2 agonist as required plus
    - Regular standard-dose inhaled corticosteroid (alternatives to inhaled corticosteroid are leukotriene receptor antagonists, theophylline, inhaled sodium cromoglicate, or inhaled nedocromil sodium, but are considerably less effective).

Step 3: inhaled corticosteroid + long-acting inhaled beta2 agonist

- Inhaled short-acting beta2 agonist as required plus
    - Regular standard-dose inhaled corticosteroid plus
    - Regular inhaled long-acting beta2 agonist (salmeterol or formoterol fumarate); if asthma not controlled increase dose of inhaled corticosteroid to upper end of standard dose range; and
    - Either stop long-acting beta2 agonist if of no benefit or continue long-acting beta2 agonist if of some benefit; if asthma still not controlled and long-acting beta2 agonist stopped, add one of:
    - Leukotriene receptor antagonist
    - Modified-release oral theophylline.

Child 5–18 years

Step 4: high-dose inhaled corticosteroid + regular bronchodilators

- Inhaled short-acting beta2 agonist as required with
    - Regular high-dose inhaled corticosteroid plus
    - Inhaled long-acting beta2 agonist (if of benefit) plus
    - A 6-week sequential therapeutic trial of one or more of:
    - Leukotriene receptor antagonist
    - Modified-release oral theophylline
    - Modified-release oral beta2 agonist.

Step 5: regular corticosteroid tablets (refer to a respiratory paediatrician

- Inhaled short-acting beta2 agonist as required with
    - Regular high-dose inhaled corticosteroid and
    - One or more long-acting bronchodilators (see step 4) plus
    - Regular prednisolone tablets (as single daily dose); in addition to regular prednisolone, continue high-dose inhaled corticosteroid (in exceptional cases may exceed licensed doses).

Stepping down

- Review treatment every 3 months; if control achieved, stepwise reduction may be possible; reduce dose of inhaled corticosteroid slowly (consider reduction every 3 months, decreasing dose by up to 50% each time) to the lowest dose which controls asthma.

Child under 5 years

Step 1: occasional relief bronchodilator

- Short-acting beta2 agonist as required (not more than once daily); preferably by inhalation (less effective and more side-effects when given as tablets or syrup)
- Move to step 2 if needed more than twice a week, or if night-time symptoms at least once a week, or if exacerbation in the last 2 years.

Step 2: regular preventer therapy

- Inhaled short-acting beta2 agonist as required plus
- Either regular standard-dose inhaled corticosteroid
- Or (if inhaled corticosteroid cannot be used) leukotriene receptor antagonist.

Step 3: add-on therapy

- Child under 2 years: Refer to respiratory paediatrician
- Child 2–5 years: Inhaled short-acting beta2 agonist as required plus regular inhaled corticosteroid in standard dose plus Leukotriene receptor antagonist

Step 4: persistent poor control

- Refer to respiratory paediatrician.

Stepping down

- Regularly review need for treatment.

Standard-dose inhaled corticosteroids

- **Beclometasone dipropionate or budesonide:**
- *Child under 12 years* 100–200 micrograms twice daily
- *Child 12–18 years* 100–400 micrograms twice daily
- **Fluticasone propionate:**
- *Child 4–12 years* 50–100 micrograms twice daily
- *Child 12–18 years* 50–200 micrograms twice daily
- **Mometasone furoate:**
- *Child 12-18 years* 400 micrograms as a single dose in the evening or in 2 divided doses
- Dose adjustments may be required for some inhaler devices, see individual preparations.