Asthma inhaler use in young children

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One in three children under three and around 50% of children under six experience at least one or more episodes of wheezing (Bisgaard and Szefler, 2007). Consequently, asthma management has a huge economic impact on the NHS (Stevens et al, 2003). The highest cost involves asthma inhalers that are prescribed and dispensed, but never used. The second highest cost is managing children in hospital who are not given their inhaler with the correct advice, rendering it less effective.

Noisy breathing (snoring, ruttles) causes great anxiety to parents and is often misinterpreted as wheeze. When a parent says their child has been wheezing it is important for the health professional to discuss this further to establish that the noisy breathing is wheeze, as part of making a diagnosis and planning appropriate treatment (Cremonesini, 2014).

Wheezing is 'a continuous high-pitched musical sound emitting from the chest during expiration' (Brand et al, 2008). In children it can be a symptom of transient viral-induced wheeze in which the child has wheezing with viral infections, no eczema or allergies and will, generally, grow out of symptoms by the time they go to school. Children who are atopic ie, with allergies such as a food allergy, hayfever or eczema, are more likely to have persistent wheeze, even without a cold. Family history of allergy also makes it more likely.

Treatment for wheezing

The type of wheezing will influence the child's treatment. Asthma treatments have changed over the years from oral medication, such as syrups, to inhaled medications. Inhaled medication has two main advantages over oral syrups: the drug is delivered directly to the lungs for maximum effect; and when it is inhaled there are fewer systemic side-effects. This article will cover the use of inhalers and spacers in the treatment of wheeze in pre-school children.

Metered dose inhalers

The most common way to deliver medication for treatment of wheeze is directly to the airways by a metered dose inhaler (MDI). This delivers a metered (measured or defined) dose of medication on each actuation of the inhaler. MDIs are also called inhalers or puffers.

Using an MDI requires good co-ordination, and many adults and children are unable to use these devices correctly (Rodriguez et al, 2003). Research by Levy et al (2013) demonstrated that asthma control improved with use of an MDI plus spacer (a clear plastic tube or rugby ball-shaped container) compared with MDI alone. All young children with wheeze should be given inhalers using an MDI and spacer.

The National Institute for Health and Care Excellence (NICE) (2000) recommends that children under the age of five years with chronic stable asthma should use an MDI and spacer. There are no guidelines for viral wheezing. Occasionally, dry powder devices in children aged three to five years can be used. Adding a spacer to an MDI reduces the speed of the aerosol and holds it in suspension, allowing effective inhalation.

There are a number of spacers available on prescription. The large-volume spacers, such as the Volumatic®, are gradually being replaced by small-volume spacers, such as the AeroChamber®, Able Spacer® and SpaceChamber Plus®, which are small and more portable and can easily be carried in handbags or school bags. It is important that the spacer is compatible with the MDI – this is particularly the case with the Volumatic as all the small-volume spacers have generic ports and can be used with all MDIs. A spacer has two ends: one for the MDI and the other with either a mask or mouthpiece. A pre-school child should be given a spacer with mask. As the child becomes more co-operative and is able to follow instructions they should move from using a spacer plus mask to spacer using the mouthpiece.

The Aerochamber spacer with mask is a valved holding chamber with a soft, integrated silicon face-shaped mask, which creates a secure seal on the child's face with minimal effort. It has pictures of teddies to distract and engage the child. The valve allows the child to breathe in and out of the holding chamber (tidal breathing) without diluting the aerosol in the spacer. Parents should be shown how to use the MDI and spacer with the child at the time of prescribing. The technique should be regularly checked and good technique reinforced (Scottish Intercollegiate Guidelines Network (SIGN), 2012) (Figures 1 and 2).

How to use the MDI and spacer

Get the child ready to take their inhaler. Depending on their age, sit them down (for example, on a lap, in arms, highchair, pushchair or car seat) while giving the inhaler so that they don't make an escape bid.

- Take the cap off the end of the MDI.
- Shake the MDI to well mix the contents.
- Put the MDI into the end of the spacer.
- Place the mask on the child's face ensuring a good seal over nose and mouth.
- Encourage the child to breathe in and out gently – this is called tidal breathing.

- Press the MDI once.
- Let the child breathe in and out five times (and count out loud '1, 2, 3, 4, 5', as they breathe).
- If further doses are required, shake the MDI each time before pressing it.
- When finished, replace the inhaler cap.

Babies and toddlers are often unhappy with the mask on their face; as far as they are concerned it will be held on their face forever. A spoken counting technique is useful to help the child learn to tolerate the mask on their face quickly, as they know that by the count of five the mask will be taken off their face. It is important that positive reinforcement is given in the form of smiling, playing, clapping and distraction.

Common questions asked by parents

'My child has been given two inhalers, a blue and brown one – what's the difference?'

The blue inhaler is a reliever inhaler or bronchodilator. This is given as needed for acute wheeze and quickly relaxes the smooth muscle of the airways, reducing wheeze. Two puffs should be given as needed. If a child is very wheezy with recessions (sucking in of the chest/tummy), 10 puffs of salbutamol can be safely given. If the child requires 10 puffs more than twice (or more often than every four hours) medical help should be sought.

Children with recurrent wheezing who have eczema or allergies may respond well to regular inhaled corticosteroid (ICS) treatment (SIGN, 2012). This is called a preventer and is usually a brown inhaler. This reduces inflammation in the airways and has to be taken twice daily, every day, to prevent symptoms developing.

Research suggests that treatment with ICS in pre-school children who wheeze only with viral infections do not prevent wheezy episodes (Wilson et al, 1995). Giving ICS to wheezy children with no allergies when they have a cold and are symptomatic is not effective. After taking the preventer inhaler the child's the face should be wiped and the child should be given a drink – this is to prevent thrush. When a child is on ICS their growth should regularly be measured.

'My child went to see a hospital paediatrician and was prescribed montelukast. How does this work?'

Montelukast is an oral medication that may be given to children with recurrent wheezing. It is often started by a hospital paediatrician. When the airways are in contact with a virus or allergens, airway leukotrienes are released causing airway inflammation and muscle spasms, resulting in asthma symptoms, including shortness of breath, wheezing and coughing. Montelukast blocks the action of leukotrienes as it stops the airway muscles from contracting, the inflammation of airways is prevented and there are no asthma symptoms (or less severe ones).

Not all children respond to montelukast. Usually, a trial of treatment is given. Sometimes montelukast is given all the time, particularly if the child is allergic. At other times it is only given with upper respiratory tract infections alongside the reliever medication. Parents may notice side-effects, such as sleep or behavioural disturbances. In these cases treatment should be stopped, making sure the person prescribing the medication is told.

'I've been told that I must always give the blue inhaler before the preventer to open up the airways. Is this true?'

This is unnecessary, unless the child is wheezy. If the blue inhaler is given all the time without the child really needing it for treatment of respiratory symptoms, it may become less effective. If the blue inhaler has to be given three or four times a week for wheezing, parents should seek help from their GP or asthma nurse.

'When I went to A&E the nurse gave my child 10 puffs of inhaler. Isn't this too much?'

This is often the treatment for acute, mild-to-moderately severe asthma attack (Cates et al, 2012). If you have to give 10 puffs more than twice (or more often than every four hours) while at home you should seek medical help. All children should have a written action plan to help them manage their child's wheezing at home.

'Will my child's nursery or childminder have to give the inhalers?'

It is important that those caring for the child are shown how the spacer and MDI are used. Make sure the MDI is in date and labelled with the child's name. It is important that the child has 100% access to a reliever inhaler. Parents should be told when the reliever inhaler has to be given while in someone else's care. All children prescribed inhalers should have an asthma plan with clear guidance about what to do when the child is acutely breathless, including what treatment to take and when to call for help and who.

'I want a nebuliser to use at home'

There is a lot of evidence that 10 puffs of salbutamol by MDI plus spacer is as effective as nebulisers (Cate, 2003) in an acute, mild-to-moderately severe asthma attack. The main concern health professionals have is that if a child is particularly breathless, parents feel they need nebulisers at home. However, this may delay coming to hospital, by which time the child might be a lot sicker. Children can only be safely managed at home if they improve on inhalers alone.

'How will I know when the inhaler is empty?'

Most MDIs have 200 doses in them. The medication name, dose and expiratory date are on the canister label. Some MDIs have a counter, making it easy to know when they are running out. People who regularly use an MDI notice a change in the feeling of the MDI – it feels less heavy. Sometimes the MDI still puffs the propellant even when empty – in this case throw the inhaler away. Some co-operative pharmacies accept empty inhalers as part of a recycling scheme. If you haven't used the MDI recently you should check it is in date, shake it and squirt a few puffs into the air.

'Should I wait for 30 seconds between actuations (or puffs) into the spacer?'

This is not needed. As long as the MDI is shaken between puffs it is good to go. You should only put one puff of MDI into the spacer at a time. Putting more than one puff at a time means that the aerosol sticks to each other and isn't available for inhalation.

'My child has a big spacer called a Volumatic with a plastic mask – how do I use it?'

To use a Volumatic spacer and mask you will have to hold the spacer at 45° on the child's face, covering the mouth and nose to ensure the medication goes through the 'clicking' valve. Tipping it will stop the valve from clicking. When the Volumatic + mask is used in toddlers the spacer should be held horizontally. In this case the valve will make a clicking sound. The Volumatic spacer plus MDI is used in the same way as other spacers – one puff at a time and shaking between puffs.

Figure 1. Boy using his own spacer and inhaler

Figure 2. One-year-old boy helped to use a spacer and inhaler by his parent

'Do I have to wash the spacer before I use it?'
Before using the spacer for the first time it should be washed in warm, soapy water and left to air dry. Do not dry it with a cloth. This is to reduce static of the plastic spacer. Without doing this, much of the aerosol will cling to the plastic and will not be available for inhalation. After this, clean the spacer the same way monthly. The mask can be removed from the main part of the spacer and washed more often as it will attract dust from the surrounding environment. Some of the new spacers on the market have fewer problems with static so it is important that the information leaflet is read before it is used.

'How often should the spacer be changed?'
Every six months, or as recommended on the manufacturer's label.

'My baby/toddler cries while being given their inhaler. I've been told this is OK as more medication gets into the airways with crying?'
Giving an inhaler to a crying child means less medication is inhaled (Iles et al, 1999) than if the child is content. A good seal of the spacer mask covering the child's mouth and nose is important in ensuring that a significant amount of the medication is inhaled (Janssen et al, 2007). In the beginning, allow the child to play with the spacer and mask. Let them get used to its feel and what the spacer and MDI look like. Use the technique as mentioned above.

The Asthma UK website (www.asthma.org.uk) gives the following advice:

- Cuddle your baby on your knee or cradle them in your arms
- Gently tuck their arms out of the way with one hand if they try to knock the mask away
- Be positive and smile! Your baby will be aware if you are anxious
- Gently stroke your baby's cheek with the mask so that they get used to the feel of it
- Reassure your child by pretending to take the medicine yourself or giving it to a favourite toy
- Distraction with music or videos can be useful
- Use it when your baby is asleep
- Wipe your baby's face after using a preventer.

'My child is OK with the mask on their face until they hear the 'firing' of the MDI' – then they refuse to have the mask on their face'

Get the child ready for taking their inhalers. Hold the spacer and MDI right away from the child's face and 'fire' the MDI into the spacer. You will then have about 10 seconds to get it onto their face and do the counting technique. Remember the positive reinforcement is important. It is vital to carry on with the counting technique until the child is about four or five years old.

'I can only give the inhalers to my baby while he is asleep. Is this OK?'

Giving inhaled medication to a child when they are asleep is often suggested as an option. It is important to try to get the child used to the MDI and spacer when awake for the following reasons:

- It is not always possible or safe to wait for a wheezy child to sleep to give them treatment
- Children often wake up when the mask is put on their face when asleep and become distressed (Esposito-Festen et al, 2006) resulting in less medication being inhaled
- Parent and child should be shown how to use the MDI and spacer when the child is awake.
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'I've been told that smoking outside is as bad as smoking inside the house. It can't be true!'

Smoking around your child will have a detrimental effect on your child's lung health (SIGN, 2012). Research has demonstrated that whether you smoke inside or outside the house, the child will be inhaling second-hand smoke (Pool et al, 2012). If your child is on a steroid preventer inhaler there is good evidence passive smoking will mean the steroids have less effect and might need higher doses to get protection. Encourage parents to seek help for smoking cessation.

Conclusion

Inhalers will only work if they are given correctly, and for the right reasons. Education of parents will empower them to manage their child's wheezing at home and it is the responsibility of the prescribing health professional to ensure parents are properly trained in taking inhalers correctly. Every child should have an action plan provided by a health professional whether in primary or secondary care. The Asthma UK website can be recommended as a fantastic, informative site with a forum for parents.

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CPD questions (please visit www.communitypractitioner.com/CPD to submit your answers)

1. What percentage of children under six experience at least one or more episodes of wheezing?
   A. 20%
   B. 30%
   C. 40%
   D. 50%

2. What colour is a reliever inhaler or bronchodilator?
   A. Green
   B. Black
   C. Blue
   D. Brown

3. What colour is a preventer inhaler?
   A. Brown
   B. Yellow
   C. Pink
   D. White

4. The blue inhaler must always be given before the preventer to open up the airways. True or false?
   A. True
   B. False

5. How many doses to metered dose inahalers (MDIs) contain?
   A. 100
   B. 200
   C. 300
   D. 400

6. How many puffs of MDI should be put into the spacer at one time?
   A. 1
   B. 2
   C. 3
   D. 4

7. How often should spacers be cleaned?
   A. After every use
   B. Daily
   C. Every two days
   D. Monthly

8. Approximately how often should spacers be changed?
   A. Fortnightly
   B. Monthly
   C. Every three months
   D. Every six months

9. How many seconds do you have between firing the inhaler into the spacer and placing it onto their face?
   A. 4
   B. 6
   C. 8
   D. 10

10. Passive smoking can lessen the effect of steroid inhalers. True or false?
    A. True
    B. False