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Asthma

Asthma is a common condition that affects the airways. The typical symptoms are wheeze, cough, chest tightness, and shortness of breath. Symptoms can range from mild to severe. Treatment usually works well to ease and prevent symptoms.

Treatment is usually with inhalers. A typical person with asthma may take a preventer inhaler every day (to prevent symptoms developing) and use a reliever inhaler as and when required (if symptoms flare up). This leaflet gives a general overview of asthma. There are other separate leaflets in this series.

What is asthma and who does it affect?

Asthma is a condition that affects the smaller airways (bronchioles) of the lungs. From time to time the airways narrow (constrict) in people who have asthma. This causes the typical symptoms. The extent of the narrowing, and how long each episode lasts, can vary greatly.

Asthma can start at any age but it most commonly starts in childhood. At least 1 in 10 children and 1 in 20 adults have asthma. Asthma runs in some families but many people with asthma have no other family members affected.

What are the symptoms of untreated asthma?

The common symptoms are cough and wheeze. You may also become breathless and develop a feeling of chest tightness. Symptoms can range from mild to severe between different people and at different times in the same person. Each episode of symptoms may last just an hour or so, or persist for days or weeks unless treated.

What are the typical symptoms if you have mild untreated asthma?

You tend to develop mild symptoms from time to time. For example, you may develop a mild wheeze and a cough if you have a cold or a chest infection, or during the hay fever season, or when you exercise. For most of the time you have no symptoms. A child with mild asthma may have an irritating cough each night but is often fine during the day.

What are the typical symptoms if you have moderate untreated asthma?

You typically have episodes of wheezing and coughing from time to time. Sometimes you become breathless. You may have spells, sometimes long spells, without symptoms. However, you tend to be wheezy for some of the time on most days. Symptoms are often worse at night, or first thing in the morning. You may wake some nights coughing or with a tight chest. Young children may not have typical symptoms. It may be difficult to tell the difference between asthma and recurring chest infections in young children.

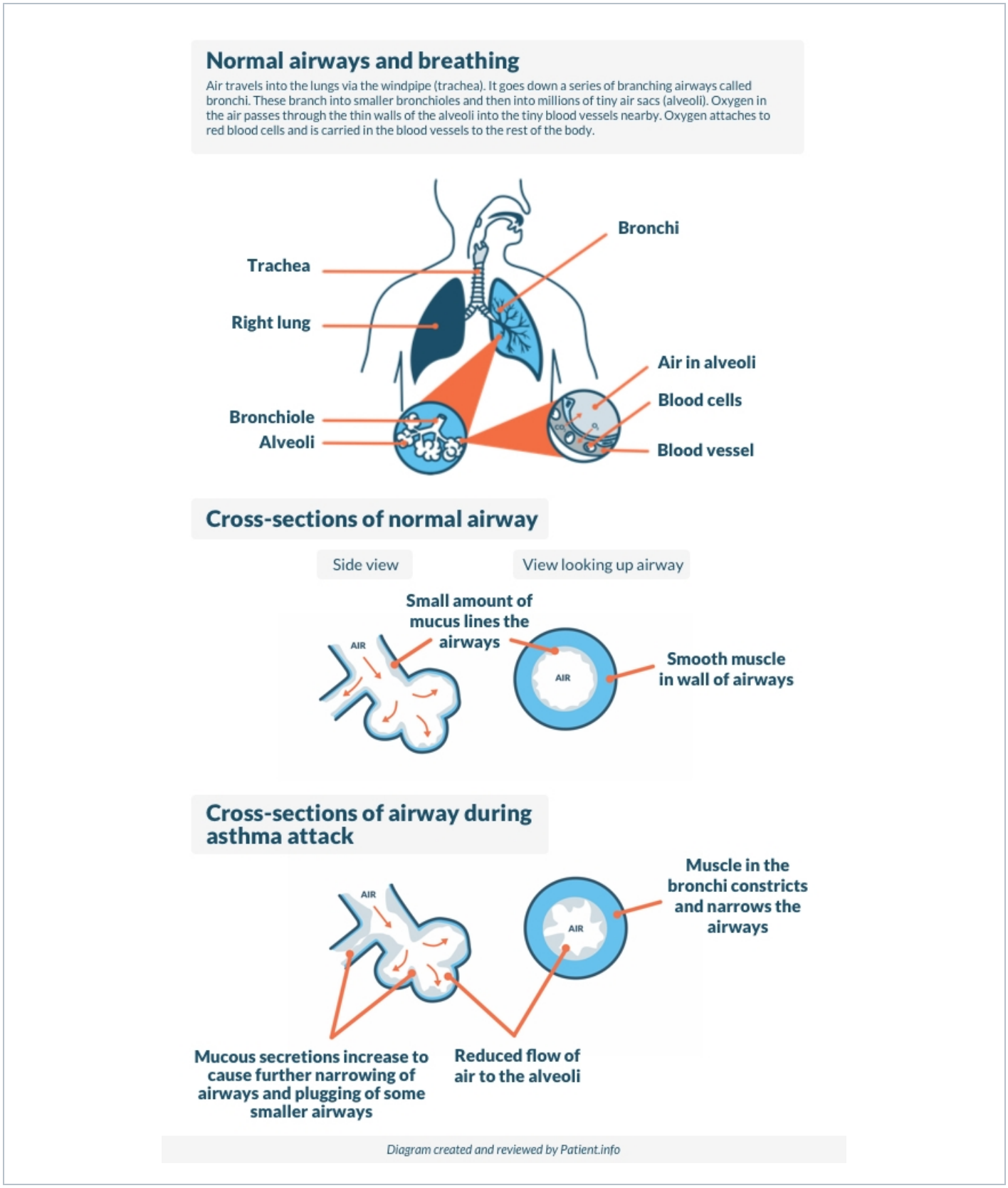
What are the typical symptoms of a severe attack of asthma?

You become very wheezy, have a tight chest and have difficulty in breathing. You may find it difficult to talk because you are so breathless. Severe symptoms may develop from time to time if you normally have moderate symptoms. Occasionally, severe symptoms develop suddenly in some people who usually just have mild symptoms.

What causes asthma?

The symptoms of asthma are caused by inflammation in the airways, which may be triggered by different things in different people. The inflammation causes the muscles around the airways to squeeze (contract). This causes narrowing of the airways. It is then more difficult for air to get in and out of the lungs. This leads to wheezing and breathlessness. The inflammation also causes the lining of the airways to make extra mucus which causes cough and further obstruction to airflow.

The diagram below shows how an episode of asthma develops.



Asthma symptoms may flare up from time to time. There is often no obvious reason why symptoms flare up. However, some people find that symptoms are triggered, or made worse, in certain situations. It may be possible to avoid certain triggers, which may help to reduce symptoms. Things that may trigger asthma symptoms include the following:

- **Infections** - particularly colds, coughs and chest infections.
- **Pollens and moulds** - asthma is often worse in the hay fever season.
- **Exercise** - however, sport and exercise are good for you if you have asthma. If necessary, you can use an inhaler before exercise to prevent symptoms from developing. But, as a rule, exercise-induced asthma often represents undertreated asthma. If it occurs, it may indicate a need to step up your usual preventer treatment (see below).
- **Certain medicines** - for example, about 1 in 50 people with asthma are allergic to aspirin, which can trigger symptoms. Other medicines that may cause asthma symptoms include:
    - Anti-inflammatory painkillers such as ibuprofen (for example, Nurofen®), diclofenac, etc.
    - Beta-blockers such as propranolol, atenolol, or timolol. This includes beta-blocker eye drops used to treat glaucoma.

- **Smoking and cigarette fumes** - if you smoke and have asthma, you should make every effort to stop. See a practice nurse for help if you find it difficult. Passive smoking can make asthma worse too. Even where adults smoke away from the presence of children, smoke on clothes, hair, etc, may make asthma worse. All children deserve to live in a smoke-free home - in particular, children with asthma.
- **Other fumes and chemicals** - for example, fumes from paints, solvents and pollution. The increase in air pollution may be a reason why asthma is becoming more common.
- **Certain pillows and mattresses** - feathers in pillows may trigger symptoms. It is thought that some people develop asthma symptoms from chemicals (isocyanates/methyl ethyl ketones, etc) that are emitted in very low quantities from memory foam pillows and mattress toppers.
- **Emotion** - asthma is not due to 'nerves'; however, such things as stress, emotional upset, or laughing may trigger symptoms.
- **Allergies to animals** - for example, pet cats and dogs, and horses. Animals do not trigger symptoms in most cases; however, some people notice that their symptoms become worse when close to certain animals.
- **House dust mite** - this is a tiny creature which lives in mattresses and other fabrics around the home. If you are allergic to it, it may make symptoms worse. It is impossible to get rid of house dust mite completely. To greatly reduce their number takes a lot of time and effort and involves taking various measures. For example, using special mattress covers, removing carpets and removing or treating soft toys. However, if symptoms are difficult to control with treatment and you are confirmed to be allergic to house dust mite, it may be worth considering trying to reduce their number. See separate leaflet called House Dust Mite and Pet Allergy for more details.
- **Some foods** - this is uncommon. Food is not thought to be a trigger in most cases.

Some people **only** develop symptoms when exposed to a certain trigger - for example, exercise-induced asthma. As mentioned above, exercise can make symptoms worse for many people with asthma. However, some people only develop symptoms when they exercise; the rest of the time they are fine. Another example is that some people only develop symptoms when exposed to specific chemicals.

How is asthma diagnosed?

Sometimes symptoms are typical and the diagnosis is easily made by a doctor. If there is doubt then some simple tests may be arranged. The two commonly used tests are called spirometry and assessment with a peak flow meter.

Spirometry

Spirometry is a test which measures how much air you can blow out into a machine called a spirometer. Two results are important:

- The amount of air you can blow out in one second - called forced expiratory volume in one second (FEV1).
- The total amount you can blow out in one breath - called forced vital capacity (FVC).

Your age, height and sex affect your lung volume. So, your results are compared with the average predicted for your age, height and sex.

A value is calculated from the amount of air that you can blow out in one second divided by the total amount of air that you blow out in one breath (called FEV1:FVC ratio). A low value indicates that you have narrowed airways which are typical in asthma (but a low value can occur in other conditions too). Therefore, spirometry may be repeated after treatment. An improvement in the value after treatment to open up the airways, is typical of asthma.

Note: spirometry may be normal in people with asthma who do not have any symptoms when the test is done. Remember, the symptoms of asthma typically come and go. Therefore, a normal result does not rule out asthma. However, if your symptoms suggest that you have asthma, ideally the test should be repeated when your symptoms are present. See separate leaflet called Spirometry for more details.

Clinical Editor's Note

November 2017 - Dr Hayley Willacy has read the newly released NICE guideline dealing with asthma diagnosis, monitoring and management - see Further reading below. In contrast to the existing guidance, NICE is now recommending objective testing with spirometry and FeNO for most people with suspected asthma. FeNO tests measure the levels of nitric oxide in the breath. Increased levels are thought to be related to lung inflammation and asthma. This is a significant change to current practice, which will take the NHS some time to set up. This may involve organising diagnostic centres to make testing efficient and affordable. It is hoped that the recommendations will help tackle inappropriate diagnosis and ensure that if a diagnosis is given, the person is monitored to ensure their symptoms still indicate asthma.

Assessment with a peak flow meter

This is an alternative test. A peak flow meter is a small device that you blow into. A doctor or nurse will show you how. It measures the speed of air that you can blow out of your lungs. No matter how strong you are, if your airways are narrowed, your peak flow reading will be lower than expected for your age, size and sex. If you have untreated asthma then you will normally have low and variable peak flow readings. Also, peak flow readings in the morning are usually lower than in the evening if you have asthma.

You may be asked to keep a diary over two weeks or so of peak flow readings. Typically, a person with asthma will usually have low and variable peak flow readings over several days. Peak flow readings improve when the narrowed airways are opened up with treatment. Regular peak flow readings can be used to help assess how well treatment is working. See separate leaflets called Asthma - Peak Flow Meter and Asthma - Peak Flow Diary for more details.

Other tests

If the diagnosis remains in doubt then a specialist may perform further, more complex tests. However, these are not needed in most cases.

What are the treatments for asthma?

For most people with asthma, the symptoms can be prevented most of the time with treatment. So, you are able to get on with normal life, school, work, sport, etc.

Inhalers

Most people with asthma are treated with inhalers. Inhalers deliver a small dose of medicine directly to the airways. The dose is enough to treat the airways. However, the amount of medicine that gets into the rest of your body is small so side-effects are unlikely, or minor. There are various inhaler devices made by different companies. Different ones suit different people. A doctor or nurse will advise on the different types. See separate leaflet called Inhalers for Asthma (including Inhaled Steroids) for more details.

Medicines delivered by inhalers can be grouped into relievers, preventers and long-acting bronchodilators:

- **A reliever inhaler** is taken as required to **ease** symptoms. The medicine in a reliever inhaler relaxes the muscle in the airways. This makes the airways open wider and symptoms usually quickly ease. These medicines are also called bronchodilators, as they widen (dilate) the bronchi and airways (bronchioles). There are several different reliever medicines - for example, salbutamol and terbutaline. These come in various brands made by different companies. If you only have symptoms every now and then, the occasional use of a reliever inhaler may be all that you need. However, if you need a reliever inhaler three times a week or more to ease symptoms, a preventer inhaler is usually advised.
- **A preventer inhaler** is taken every day to **prevent** symptoms from developing. The medicine commonly used in preventer inhalers is a steroid. There are various brands. Steroids work by reducing the inflammation in the airways. When the inflammation has gone, the airways are much less likely to become narrow and cause symptoms. It takes 7-14 days for the steroid in a preventer inhaler to build up its effect. Therefore, it will not give any immediate relief of symptoms. However, after a week or so of treatment, the symptoms have often gone, or are much reduced. It can take up to six weeks for maximum benefit. You should then continue with the preventer inhaler every day even when your symptoms have gone - to prevent symptoms from coming back. You should then not need to use a reliever inhaler very often (if at all).
- Bone strength (density) may be reduced following long-term use of high doses of inhaled steroids. Therefore people who regularly use steroid inhalers for asthma need to make sure they have a good supply of calcium in their diet. Milk is a good source of calcium but dairy products may need to be avoided for some people with asthma. Other good dietary sources of calcium include bread, some vegetables (curly kale, okra, spinach and watercress) and some fruits (for example, dried apricots). See separate leaflet called Preventing Steroid-induced Osteoporosis for more details.
- **A long-acting bronchodilator** may be advised in addition to a preventer inhaler. Long-acting bronchodilators relieve symptoms as they widen the lung airways (bronchi) but work for longer than reliever inhalers. The medicines in these inhalers work for up to 12 hours after each dose has been taken. They include salmeterol and formoterol. (Some brands of inhaler contain a steroid plus a long-acting bronchodilator for convenience.) A long-acting bronchodilator may be needed if symptoms are not fully controlled by the preventer inhaler alone.

Spacer devices are used with some types of inhaler. They are commonly used by children; however, many adults also use them. A spacer is like a small plastic chamber that attaches to the inhaler. It holds the medicine like a reservoir when the inhaler is pressed. A valve at the mouth end ensures that the medicine is kept within the spacer until you breathe in. When you breathe out, the valve closes. So, you don't need to have good co-ordination to inhale the medicine if you use a spacer device. A face mask can be fitted on to some types of spacers instead of a mouthpiece. This is sometimes done for young children and babies who can then use the inhaler simply by breathing in and out normally through the mask.

Tablets to open up the airways

Most people do not need tablets, as inhalers usually work well. However, in some cases a tablet (or in liquid form for children) is prescribed **in addition** to inhalers if symptoms are not fully eased by inhalers alone. Various tablets may be used which aim to open up the airways. Some young children use liquid medication instead of inhalers.

Steroid tablets

A short course of steroid tablets (such as prednisolone) is sometimes needed to ease a severe or prolonged attack of asthma. Steroid tablets are good at reducing the inflammation in the airways. For example, a severe attack may occur if you have a cold or a chest infection.

Some people worry about taking steroid tablets. However, a short course of steroid tablets (for a week or so) usually works very well and is unlikely to cause side-effects. Most of the side-effects caused by steroid tablets occur if you take them for a long time (more than several months), or if you take frequent short courses of high doses.

Omalizumab

Omalizumab is a medicine that is only used in a small number of people who have severe persistent allergic asthma that has not been controlled by other treatments. So, it is not a common treatment. It is given by injection. It works by interfering with the immune system to reduce inflammation in the airways which is present in asthma. Treatment with omalizumab can only be started by a specialist.

Clinical Editor's Note

November 2017 - Dr Hayley Willacy has read the recently published NICE guideline dealing with asthma - see Further reading below. This recommends people take a leukotriene receptor antagonist **tablet** before treatment with a long-acting $beta_2$ agonist (LABA). This is different to existing guidance. LABA is often given in a combination inhaler, or in two separate inhalers. NICE states that this change could save the NHS an estimated £2 million a year for every 10,000 people who are managed this way.

What are the dosages of treatment?

Everyone is different. The correct dose of a preventer inhaler is the lowest dose that prevents symptoms. A doctor may prescribe a high dose of a preventer inhaler at first, to 'get on top of symptoms' quickly. When symptoms have gone, the dose may then be reduced by a little every few weeks. The aim is to find the lowest regular dose that keeps symptoms away.

Some people with asthma put up with symptoms. They may think that it is normal still to have some symptoms even when they are on treatment. A common example is a night-time cough which can cause disturbed sleep. But, if this occurs and your symptoms are not fully controlled, tell your doctor or nurse. Symptoms can often be prevented - for example, by adjusting the dose of your preventer inhaler, or by adding in a long-acting bronchodilator.

A typical treatment plan

A common treatment plan for a typical person with moderate asthma is:

- A preventer inhaler (usually a steroid inhaler), taken each morning and at bedtime. This usually prevents symptoms throughout the day and night.
- A reliever inhaler may be needed now and then if breakthrough symptoms occur. For example, if symptoms flare up when you have a cough or cold.
- If exercise or sport causes symptoms then a dose of a reliever inhaler just before the exercise usually prevents symptoms.
- The dose of the preventer inhaler may need to be increased for a while if you have a cough or cold, or during the hay fever season.
- Some people may need to add in a long-acting bronchodilator, or tablets, if symptoms are not controlled with the above.

At first, adjusting doses of inhalers is usually done on the advice of a doctor or nurse. In time, you may agree an asthma action plan with your doctor or nurse.

What is an asthma action plan?

An asthma action plan is a plan agreed by you with your doctor or nurse. The plan enables you to make adjustments to the dose of your inhalers, depending on your symptoms and/or peak flow readings. The plan is tailored to individual circumstances. The plan is written down, usually on a standard form, so you can refer to it at any time. Research studies suggest that people who complete personal asthma action plans find it easier to manage their asthma symptoms and that their plan helps them to go about their lives as normal. Asthma UK provides asthma action plans which you can download from www.asthma.org.uk/advice-personal-action-plan.

Does asthma go away?

There is no once-and-for-all cure. However, about half of the children who develop asthma grow out of it by the time they are adults.

For many adults, asthma is variable with some good spells and some spells that are not so good. Some people are worse in the winter months and some are worse in the hay fever season. Although not curable, asthma is treatable. Stepping up the treatment for a while during bad spells will often control symptoms.

Some other general points about asthma

- **It is vital that you learn how to use your inhalers correctly**. In some people, symptoms persist simply because they do not use their inhaler properly and the medicine from the inhaler does not get into the airways properly. See your practice nurse or doctor if you are not sure if you are using your inhaler properly.
- **See a doctor or nurse if symptoms are not fully controlled**, or if they are getting worse. For example, if:
    - A night-time cough or wheeze is troublesome.
    - Sport is being affected by symptoms.
    - Your peak flow readings are lower than normal.
    - You need a reliever inhaler more often than usual.

  An adjustment in inhaler timings or doses may control these symptoms.
- **See a doctor urgently if you develop severe symptoms** that are not eased by a reliever inhaler. In particular, if you have difficulty talking due to shortness of breath. You may need emergency treatment with high-dose reliever medicine and other treatments, sometimes in hospital. A severe asthma attack can be life-threatening.
- **You should have an influenza immunisation every autumn** (the flu jab) if you need continuous or repeated use of high-dose inhaled steroids and/or take steroid tablets and/or have had an episode of asthma which needed hospital admission.

Further reading & references

- British Guideline on the management of asthma; Scottish Intercollegiate Guidelines Network - SIGN (2016)
- Asthma: diagnosis, monitoring and chronic asthma management; NICE Guideline (Nov 2017)
- Global Initiative for Asthma (GINA)
- Asthma; NICE CKS, Dec 2013 (UK access only)
- Corticosteroids - inhaled; NICE CKS, September 2015 (UK access only)
- Inhaled corticosteroids for the treatment of chronic asthma in adults and in children aged 12 years and over; NICE Technology Appraisal Guidance, March 2008
- Inhaled corticosteroids for the treatment of chronic asthma in children under the age of 12 years; NICE Technology Appraisal Guidance, November 2007
- Omalizumab for treating severe persistent allergic asthma (review of technology appraisal guidance 133 and 201); NICE Technology Appraisal Guidance, April 2013

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