Adenoviruses are a group of viruses that can affect different parts of your body depending on the adenovirus type. Types 40 and 41 are common causes of gastroenteritis, especially in children under the age of two. Gastroenteritis is an infection of the gut (intestines) which causes diarrhoea, often with vomiting too. In most cases the infection clears within a few days, but sometimes takes longer. The main risk is dehydration. The main treatment is to have plenty to drink. Once any dehydration is treated with drinks, you should eat as normally as possible. See a doctor if you suspect that you are becoming dehydrated, or if you have any worrying symptoms such as those which are listed below.

What is adenovirus?

Adenoviruses are a group of viruses that can affect different parts of your body, depending on the adenovirus type. They are a common cause of respiratory tract infections (including colds, pneumonia and bronchiolitis). They are also a common cause of gastroenteritis, especially in young children. Gastroenteritis is an infection of the gut (intestines) which usually causes diarrhoea, and often vomiting too. Adenoviruses can also infect the eyes, causing conjunctivitis, and the bladder, causing cystitis.

This leaflet focuses on gastroenteritis caused by adenovirus. There are other leaflets available that discuss respiratory tract infections, conjunctivitis and cystitis.

How is adenovirus gastroenteritis spread?

There are over 50 different types of adenovirus and they are quite hardy. They are able to survive for long periods outside humans - for example, on surfaces or objects touched by an infected person. Adenovirus infection doesn't have seasonal variation - it can occur throughout the year. Adenovirus types 40 and 41 are common causes of gastroenteritis. There are also other types of adenovirus that may also cause gastroenteritis.

Adenovirus types 40 and 41 tend to be spread by the faecal-oral route. That is, they live in the gut of an infected person and can pass out in their diarrhoea. They can easily spread from an infected person to another by close contact. This is usually because of the virus being present on the infected person's hands after they have been to the toilet. They touch another person, that person gets the virus on their hands, and then the virus enters the second person's body through their mouth. Surfaces or objects touched by an infected person can also allow transmission of the virus. As well as this, the virus can be passed on if an infected person prepares food, or if water is contaminated with adenovirus (for example, if sanitation is poor).

Nurseries and schools sometimes have outbreaks of gastroenteritis caused by adenovirus infection, affecting many children.

How common is adenovirus gastroenteritis and who gets it?

Adenovirus is the second most common virus causing gastroenteritis in young children in the UK. It is especially common in children under the age of two. The most common cause of gastroenteritis in young children is another virus called rotavirus. (See separate leaflet called ‘Rotavirus‘ for more details.) However, adenovirus infection can occur in anyone of any age. Outbreaks of adenovirus infection can occur in young adults living closely together - for example, military trainees. Since there are many different types of adenovirus, repeated infections with adenovirus can occur.

What are the symptoms of adenovirus gastroenteritis?

Nausea (feeling sick) is often the first symptom. This is followed by diarrhoea which tends to be watery. You may also start vomiting around the same time. Sometimes there are other symptoms such as a fever, a headache, and aching muscles in your arms and legs.

The symptoms tend to be relatively mild and short-lived. Most people fully recover within 1-2 weeks. However, in a few people symptoms can last longer. If symptoms are severe, dehydration can occur. Dehydration is when there is a lack of fluid in the body. You should consult a doctor quickly if you suspect that you or your child are becoming dehydrated. Mild dehydration is common and is usually easily reversed by drinking lots of fluids. Severe dehydration can be fatal unless quickly treated because the organs of your body need a certain amount of fluid to function.
Symptoms of dehydration in children

- Symptoms include: passing little urine, a dry mouth and lips, fewer tears when crying, sunken eyes, weakness, being irritable or being lethargic.
- Symptoms of severe dehydration in children include: drowsiness, pale or mottled skin, cold hands or feet, very few wet nappies, fast (but often shallow) breathing. Severe dehydration is an emergency and immediate medical attention is needed.

Dehydration is more likely to occur in:

- Babies under the age of one year (and particularly those under six months old). This is because babies don't need to lose much fluid to lose a significant proportion of their total body fluid.
- Babies under the age of one year who were a low birthweight and who have not caught up with their weight.
- A breast-fed baby that has stopped breast-feeding during their illness.
- Any baby or child who does not drink much when they have gastroenteritis.
- Any baby or child with severe diarrhoea and vomiting (particularly if they have passed six or more diarrhoeal stools and/or vomited three or more times in the previous 24 hours).

Symptoms of dehydration in adults

- Symptoms of dehydration in adults include: tiredness, dizziness or light-headedness, headache, muscular cramps, sunken eyes, passing little urine, a dry mouth and tongue, weakness, and becoming irritable.
- Symptoms of severe dehydration in adults include: profound apathy, weakness, confusion, rapid heart rate, coma, and producing very little urine. Severe dehydration is a medical emergency and immediate medical attention is needed.

Dehydration in adults is more likely to occur in:

- Elderly or frail people.
- Pregnant women.
- People with severe diarrhoea and vomiting - in particular, if you are not able to replace the fluid lost with sufficient drinks.

How is adenovirus gastroenteritis diagnosed?

Adenovirus gastroenteritis can be diagnosed by sending a sample of stool (faeces) to the laboratory for testing. However, for most people who have a bout of gastroenteritis, it is not necessary to send a stool sample to be tested. This is because the treatment is usually the same for most causes of gastroenteritis. So, if you have gastroenteritis, you may well have adenovirus. But, it is usually not necessary to test a stool sample to confirm this.

When should I seek medical advice?

Children

Most children who have gastroenteritis (including gastroenteritis caused by adenovirus infection) have mild symptoms which will get better within a few days. The important thing is to ensure that they have plenty to drink. In many cases, you do not need to seek medical advice. However, you should seek medical advice in the following situations (or if there are any other symptoms that you are concerned about):

- If they are under the age of six months.
- If they have an underlying medical condition (such as heart or kidney problems, diabetes, history of premature birth).
- If they have a high fever.
- If you suspect dehydration is developing (see earlier).
- If they appear drowsy or confused.
- If they are vomiting and unable to keep fluids down.
- If there is blood in their diarrhoea or vomit.
- If they have severe abdominal pain.
- If they have a weakened immune system because of, for example, chemotherapy treatment, long-term steroid treatment, HIV infection.
- Infections caught abroad.
- If they have severe symptoms, or if you feel that their condition is getting worse.
- If their symptoms are not settling - for example, vomiting for more than 1-2 days, or diarrhoea that does not start to settle after 3-4 days.
Adults

Again, most adults who have gastroenteritis (including gastroenteritis caused by adenovirus infection) have mild symptoms which will get better within a few days. The important thing is to ensure that you have plenty to drink. In many cases, you do not need to seek medical advice. However, you should seek medical advice in the following situations (or if there are any other symptoms that you are concerned about):

- If you suspect that you are becoming dehydrated.
- If you are vomiting a lot and unable to keep fluids down.
- If you have blood in your diarrhoea or vomit.
- If you have severe abdominal pain.
- If you have severe symptoms, or if you feel that your condition is getting worse.
- If you have a persisting high fever.
- If your symptoms are not settling - for example, vomiting for more than 1-2 days, or diarrhoea that does not start to settle after 3-4 days.
- Infections caught abroad.
- If you are elderly or have an underlying health problem such as diabetes, epilepsy, inflammatory bowel disease, kidney disease.
- If you have a weakened immune system because of, for example, chemotherapy treatment, long-term steroid treatment, HIV infection.
- If you are pregnant.

What is the treatment for adenovirus gastroenteritis in children?

Usually there is no medication needed to treat adenovirus gastroenteritis. The aim is to make sure that your child has plenty of fluids to avoid dehydration whilst their immune system clears the infection. Children can usually be cared for at home.

Admission to hospital may be needed if symptoms are severe, or if complications develop.

The following are commonly advised until symptoms ease.

**Fluids to prevent dehydration**

You should encourage your child to take plenty of fluids. The aim is to prevent dehydration (low body fluid). The fluid lost in their vomit and/or diarrhoea needs to be replaced. Your child should continue with their normal diet and usual drinks. In addition, they should also be encouraged to drink extra fluids. However, avoid fruit juices or fizzy drinks, as these can make diarrhoea worse.

Babies under six months old are at increased risk of dehydration. You should seek medical advice if they develop gastroenteritis. Breast-feeds or bottle-feeds should be encouraged as normal. You may find that your baby's demand for feeds increases. You may also be advised to give extra fluids (either water or rehydration drinks) in between feeds.

Rehydration drinks may be advised by a doctor for children at increased risk of dehydration (see above for who this may be). They are made from sachets available from pharmacies and on prescription. You should be given instructions about how much to give. Rehydration drinks provide a perfect balance of water, salts, and sugar. The small amount of sugar and salt helps the water to be absorbed better from the gut into the body. Home-made salt/sugar mixtures are used in developing countries if rehydration drinks are not available but they have to be made carefully as too much salt can be dangerous to a child. Rehydration drinks are cheap and readily available in the UK, and are the best treatment for your child.

Anti-secretory medicines are designed to be used with rehydration treatment. They reduce the amount of water that is released into the gut during an episode of diarrhoea. They can be used for children who are older than 3 months of age, and adults.

If your child vomits, wait 5-10 minutes and then start giving drinks again, but more slowly (for example, a spoonful every 2-3 minutes). Use of a syringe can help in younger children who may not be able to take sips.

*Note: if you suspect that your child is dehydrated, or is becoming dehydrated, you should seek medical advice urgently.*

**Fluids to treat dehydration**

If your child is mildly dehydrated, this may be treated by giving them rehydration drinks. Your doctor or nurse will advise about how to make up the drinks and about how much to give. The amount can depend on the age and the
weight of your child. If you are breast-feeding, you should continue with this during this time. Otherwise, don't give your child any other drinks unless the doctor or nurse has said that this is OK. It is important that your child is rehydrated before they have any solid food.

Sometimes a child needs admission to hospital if they are dehydrated. Treatment in hospital usually involves giving rehydration solution via a special tube called a nasogastric tube. This tube passes through your child's nose, down their throat and directly into their stomach. An alternative treatment is with intravenous fluids (fluids given directly into a vein).

**Eat as normally as possible once any dehydration has been treated**

Correcting any dehydration is the first priority. However, if your child is not dehydrated (most cases), or once any dehydration has been corrected, then encourage your child to have their normal diet. Do not starve a child with gastroenteritis. This used to be advised but is now known to be wrong. So:

- **Breast-fed babies** should continue to be breast-fed if they will take it. This will usually be in addition to extra rehydration drinks (described above).
- **Bottle-fed babies** should be fed with their normal full-strength feeds if they will take it. Again, this will usually be in addition to extra rehydration drinks (described above).
- **Older children** - offer them some food every now and then. However, if he or she does not want to eat, that is fine. Drinks are the most important, and food can wait until the appetite returns.

**Medication is not usually needed**

You should not give medicines to stop diarrhoea to children under 12 years old. They sound attractive remedies, but are unsafe to give to children, due to possible serious complications. However, you can give paracetamol or ibuprofen to ease a high temperature or headache.

Antibiotics are not needed to treat adenovirus. It is a viral infection so antibiotics will not be effective. In rare situations where someone has a poor immune system, antiviral medicines may be considered to treat adenovirus infection.

**What is the treatment for adenovirus gastroenteritis in adults?**

Symptoms often settle within a few days or so as your immune system usually clears the infection. Occasionally, admission to hospital is needed if symptoms are severe, or if complications develop (see below). The following are commonly advised until symptoms ease.

**Fluids - have lots to drink**

The aim is to prevent dehydration, or to treat dehydration if it has developed. *(Note: if you suspect that you are dehydrated, you should contact a doctor.)*

- As a rough guide, drink at least 200 mls after each bout of diarrhoea (after each watery stool).
- This extra fluid is *in addition* to what you would normally drink. For example, an adult will normally drink about two litres a day, but more in hot countries. The advice above about 200 mls after each bout of diarrhoea is in addition to this usual amount that you would drink.
- If you vomit, wait 5-10 minutes and then start drinking again, but more slowly. For example, a sip every 2-3 minutes, but making sure that your total intake is as described above.
- You will need to drink even more if you are dehydrated. A doctor will advise on how much to drink if you are dehydrated.

For most adults, fluids drunk to keep hydrated should mainly be water. Also, ideally, include some soup. It is best not to have drinks that contain a lot of sugar, such as cola or pop, as they can sometimes make diarrhoea worse.

Rehydration drinks are recommended for people who are frail, or over the age of 60, or who have underlying health problems. They are made from sachets that you can buy from pharmacies. *(The sachets are also available on prescription.)* You add the contents of the sachet to water. Rehydration drinks provide a good balance of water, salts, and sugar. The small amount of sugar and salt helps the water to be absorbed better from the gut into the body. They do not stop or reduce diarrhoea. As with children do not use home-made salt/sugar drinks, as the quantity of salt and sugar has to be exact.

**Eat as normally as possible**

It used to be advised not to eat for a while if you had gastroenteritis. However, now it is advised to eat small, light meals if you can. Be guided by your appetite. You may not feel like food and most adults can do without food for a few days. Eat as soon as you are able - but don't stop drinking. If you do feel like eating, avoid fatty, spicy or heavy food at first. Plain foods such as wholemeal bread and rice are good foods to try eating first.
Medication
Antidiarrhoeal medicines are not usually necessary. However, you may wish to reduce the number of trips that you need to make to the toilet. You can buy antidiarrhoeal medicines from pharmacies. The safest and most effective is loperamide. The adult dose of this is two capsules at first. This is followed by one capsule after each time you pass some diarrhoea, up to a maximum of eight capsules in 24 hours. Loperamide works by slowing down your gut's activity. You should not take loperamide for longer than five days.

Note: do not use antidiarrhoeal medicines if you pass blood or mucus with the diarrhoea or if you have a high fever. People with certain conditions should not take loperamide. Therefore, read the leaflet that comes with the medicine to be safe. For example, pregnant women and children should not take loperamide.

Paracetamol or ibuprofen are useful to ease a high temperature or headache. Antibiotics are not effective against viral infections so antibiotics are not needed to treat adenovirus infection. In rare situations where someone has a compromised immune system, antiviral medicines may be considered to treat adenovirus infection.

Are there any complications?
Complications of adenovirus gastroenteritis are not very common. If they do occur, they can include the following:

- **Dehydration and salt (electrolyte) imbalance** in your body. This is the most common complication. It occurs if the water and salts that are lost in your stools, or when you vomit, are not replaced by your drinking adequate fluids. If you can manage to drink plenty of fluids then dehydration is unlikely to occur, or is only likely to be mild, and will soon recover as you drink. Severe dehydration can lead to a drop in your blood pressure. This can cause reduced blood flow to your vital organs. If dehydration is not treated, kidney failure may also develop.

- **Lactose intolerance** can sometimes occur for a while after gastroenteritis. It is known as secondary or acquired lactose intolerance. The gut lining can be damaged by the episode of gastroenteritis. This leads to lack of an enzyme (chemical) called lactase that is needed to help the body digest a sugar called lactose that is in milk. Lactose intolerance leads to bloating, abdominal pain, wind and watery stools after drinking milk. The condition gets better when the infection is over and the gut lining heals. It is more common in children.

- **Irritable bowel syndrome** is sometimes triggered by a bout of gastroenteritis.

- **Persistent diarrhoea syndromes** may rarely develop.

- **Reduced effectiveness of some medicines**. During a bout of gastroenteritis, certain medicines that you may take for other reasons may not be as effective. This is because the diarrhoea and/or vomiting mean that reduced amounts of the medicines are absorbed into your body. Examples of such medicines are medicines for epilepsy, diabetes and contraception. Consult a doctor or practice nurse if you are unsure of what to do if you are taking other medicines and have gastroenteritis.

Preventing spread of infection to others
If you or your child have adenovirus infection, the following are recommended to prevent the spread of infection to others:

- Wash your hands thoroughly after going to the toilet. Ideally, use liquid soap in warm running water, but any soap is better than none. Dry your hands properly after washing. If your child wears nappies, be especially careful to wash your hands after changing nappies and before preparing, serving, or eating food.

- If a potty has to be used, wear gloves when you handle it, dispose of the contents into a toilet, then wash the potty with hot water and detergent and leave it to dry.

- Don't share towels and flannels.

- Don't prepare or serve food for others.

- If clothing or bedding is soiled, first remove any faeces into the toilet. Then wash in a separate wash at as high a temperature as possible.

- Regularly clean your toilet with disinfectant. Wipe the flush handle, toilet seat, bathroom taps, surfaces and door handles with hot water and detergent at least once a day. Keep a cloth just for cleaning the toilet (or use a disposable one each time).

- Stay off work, school, college, etc, until at least 48 hours after the last episode of diarrhoea or vomiting. Avoid contact with others as far as possible during this time.

- Food handlers: if you work with food and develop diarrhoea or vomiting, you must immediately leave the food-handling area. For most, no other measures are needed, other than staying away from work until at least 48 hours after the last episode of diarrhoea or vomiting.

Can adenovirus gastroenteritis be prevented?
The advice given in the previous section is mainly aimed at preventing you or your child from spreading adenovirus gastroenteritis to other people if you are infected. However, in general, good hygiene is essential to prevent the spread of many infections to others and to reduce your chance of picking up infections from others.

Hand washing is the most important thing that you and your child can do. In particular, always wash your hands and dry them thoroughly, and teach children to wash and dry theirs:

- After going to the toilet (and after changing nappies or helping an older child to go to the toilet).
- Before preparing or touching food or drinks.
- Before eating.

If you smoke, you should also wash your hands before smoking. The simple measure of washing and drying hands regularly and properly is known to make a big difference to the chance of developing adenovirus or other infections.

It is also thought that adequate chlorination of swimming pools may help to prevent waterborne outbreaks of adenovirus gastroenteritis.

Further reading & references

- Diarrhoea and vomiting in children under 5; NICE Clinical Guideline (April 2009)
- Gastroenteritis; NICE CKS, September 2009 (UK access only)
- Public Health England
- ESNM12: Acute diarrhoea in children: racecadotril as an adjunct to oral rehydration, NICE (Mar 2013)