

NEBULISER THERAPY

This factsheet has been written to assist you and your medical advisers. It is not intended to replace any advice you may receive from your Specialist CF Centre or CF Clinic.

Introduction

Nebuliser therapy has a well-established role in the delivery of drugs to the lungs of people with cystic fibrosis. Nebulisation involves the conversion of a drug into a very fine aerosol or 'mist' so that it can be breathed straight into the lungs. Patients may have to nebulise several different drugs at different times of the day, therefore nebuliser therapy can be very time consuming. However, over the years, manufacturers have tried to make the process as efficient as possible, and the equipment has become more portable and lightweight.

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What types of nebuliser are available?

Ultrasonic nebulisers

Ultrasonic nebulisers are self contained electrical devices where the aerosol or mist is generated by vibrating the drug put in them. You should check with your CF team which drugs can be nebulised in this way, as heat generated by the vibrations may degrade certain drugs which take longer to nebulise. Ultrasonic nebulisers are generally smaller and quieter than conventional nebulisers and some patients may prefer them for routine bronchodilator treatment (see below for details).

Conventional nebulisers

The most commonly used nebulisers are conventional or jet nebulisers, which require a nebuliser pot and air compressor to convert the drug into a breathable mist.

With jet nebulisation the nebuliser is the container, which holds the liquid drug. A compressor provides the airflow, which drives the nebuliser and converts the liquid drug into a mist for inhalation.

Not all nebulisers and compressors are the same. If different combinations of the two are used, an unknown amount of drug will be delivered to the lungs. A proven combination of nebuliser and compressor will provide the optimum amount of drug to the patient. Nebulisers and compressors from the same supplier are the best combination to ensure quality of treatment.

Commonly used combinations of compressor and nebuliser:

1. Porta-neb compressor with sidestream or ventstream nebuliser.
2. PARI TurboBOY with PARI LC SPRINT nebuliser.

Portable systems

There are now portable and efficient systems, which allow patients to travel at home and abroad. These systems are also useful for those patients who need to nebulise during the day when at school, college or in full time employment.

The compressor and nebuliser systems can be used anywhere in the UK with a mains lead, but when

travelling abroad an adapter may be needed. Some systems can be battery operated and some will operate from a 12-volt DC cigarette lighter socket.

These systems should make travel abroad easier as they are portable and lightweight. It is important to check with the airlines about using a compressor on board a flight. Some will allow a battery operated nebuliser while others will want to provide their own nebuliser – this is not recommended due to the risk of cross infection.

Examples of portable models available:

Freeway Lite Compressor
PARI BOY Mobile S

If travelling by air, patients should always take a letter from their doctor stating **all** the equipment and drugs that they need to take with them. This will help with customs officers and overcome potential security problems.

Mesh nebulisers

Systems are now available which use new technology, called Vibrating Mesh Technology (VMT), to convert the liquid to an aerosol.

These systems have several advantages over conventional nebulisers, which make them very patient friendly. They are very quiet to operate, completely portable and can be used anywhere. VMT has also significantly shortened the time needed for nebulisation of a drug.

Example:
e-flow rapid system.

Adaptive aerosol delivery (AAD) devices can also adapt to the patient's breathing pattern and stop drug delivery when a pre-set dose has been delivered.

Example:
I-neb AAD system

It is important to discuss with your CF team about the types of drugs suitable for use in the different types of devices.

How to look after your nebuliser

A nebuliser and compressor issued to a patient is for the use of that patient only and must not be shared with other patients. It is essential to keep your systems clean and in good working order to ensure optimum drug delivery.

Compressors

Compressors must be serviced at least annually and this would include an electrical and performance check.

The inlet filter will become dirty and must be changed at least every three months or more frequently if required.

The compressor should not be kept on the floor to avoid dust being drawn in and should be wiped with a damp cloth frequently to keep it free of dust.

Jet nebulisers

These nebulisers will be either disposable or durable. Disposable nebulisers should usually be changed every month. Durable nebulisers should last for up to 12 months. Manufacturer's recommendations for the different kinds of nebuliser should be followed.

All nebulisers should be **cleaned after every use** as drug residue can build up and block the jets:

- After every use disconnect the nebuliser from the tubing and switch on the compressor. This will clear moisture from the tubing.
- Separate the nebuliser into its different parts and wash in hot soapy water.
- Rinse in running water.
- It is essential to dry the nebuliser parts completely before they are reassembled and used.
- Durable nebulisers should also be boiled with two drops of washing up liquid for between six and ten minutes at least once a week. This process helps to clear the venturi jets within the nebuliser chamber of any residue and ensure efficient running of the system.

Mesh nebulisers

Like conventional nebulisers, these devices need to be washed after each treatment and boiled at least once a week. Great care must be taken with the mesh in these devices as they can be easily damaged.

It is important not to touch the mesh and it may be necessary to use distilled / de-ionised water for boiling. A meshcare system to backwash the mesh and chamber can be used once a week to prolong the life of the mesh. The mesh should normally be replaced every six months.

Your CF team will provide you with detailed cleaning/sterilising instructions in writing when they issue you with the equipment.

Which medications can be nebulised?

When nebulising any medication your own breathing pattern will have an effect on the amount of drug delivered to the lungs. Steady, normal breathing, interspersed with occasional deep breaths in an upright posture with the nebuliser horizontal, is likely to be optimal. Your physiotherapist will advise you how to breathe for best drug delivery.

The drugs taken via a nebuliser will fall into three main groups:

Bronchodilators

Bronchodilators relax the muscle around the airways and are used to relieve tightness and shortness of breath. They should give immediate relief.

They help prepare the chest for airway clearance and should therefore be taken before chest physiotherapy.

Ten minutes should be sufficient for conventional nebulisation of bronchodilators.

Many patients who are well and at home will be able to use an inhaler to deliver their bronchodilator.

Antibiotics

Antibiotics are used to prevent and fight infection.

They are inhaled once or twice a day as prescribed by your doctor. They should be inhaled **after** chest physiotherapy.

When nebulising antibiotics a filter should be used to prevent possible environmental contamination. The filters will have a disposable pad, which should be changed after every treatment. Antibiotics can take longer to nebulise (15–20mins) but the new mesh nebulisers are much quicker.

Each CF Centre will have its own local policy for

hospital and home nebulisation of antibiotics.

Mucolytics

DNase (Pulmozyme)

DNase is used to make sputum thinner and therefore easier to clear.

It is normally prescribed once a day. You can decide when to take the DNase as how long it takes to work will vary between patients.

You should however not perform chest physiotherapy too soon after taking the DNase as it needs time to work and would only be coughed out. A minimum of 30 minutes should be left after taking DNase before doing chest physiotherapy.

Hypertonic saline

Hypertonic saline is used either to obtain an induced sputum sample in patients who do not clear sputum easily or to facilitate sputum clearance during chest physiotherapy.

It should be nebulised immediately **before** chest physiotherapy.

As hypertonic saline – especially the higher strengths – can have a salty taste, patients should rinse their mouth with mouthwash following nebulisation.

Are there any side effects to nebulisation?

Any side effects can be due to the drug, the temperature of the drug or the nebulisation process itself. A member of your CF team should supervise the first dose of any drug. The team will check your lung function before and after nebulisation to make sure your chest has not 'tightened up'. You should report any side effects you may have to your CF team so that a solution can be found.

NB Medications (e.g. DNase) stored in the fridge should be allowed to warm to room temperature before inhaling.

In children too young to use a mouthpiece, a facemask can be used to deliver the medication. Potential problems are that some of the drug will land on the face, some may be inhaled through the nose, or, if a seal is not achieved, there may be some drug leakage. It is recommended that after nebulisation using a facemask a child's face and eyes are washed. If

a child is crying, most of a drug will not be inhaled and it will therefore be ineffective.

References:

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2. Nikander.K. Adaptive Aerosol Delivery: The principles. European Respiratory Review (1997) 7: 51, 385-387.
3. Littlewood JM et al. Cystic Fibrosis and Nebuliser Therapy – Your questions answered. Educational leaflet. Cystic Fibrosis Trust. 2002.

Further information

For further information about any aspect of cystic fibrosis, please contact:

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Helplines

General helpline 0300 373 1000

A confidential service offering advice, support and information on any aspect of cystic fibrosis, including benefits and welfare grants.

Other publications

The Cystic Fibrosis Trust publishes a range of publications on a wide variety of topics relating to cystic fibrosis. You can view our complete publications list, order publications and download publications free of charge from the CF Trust website www.cftrust.org.uk/publications. Alternatively, you can telephone the CF Trust switchboard on 020 8464 7211.

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