Summary

Nebulised bronchodilators are useful, especially for asthmatic children, but there is a growing concern about poorly informed parents who over-rely on home nebulisers, with rising mortality as a result. The use of home nebulisers is evaluated, the dangers explained and practical advice given to doctors based on sound research findings.

Introduction

It is of concern that home nebulisers are freely prescribed by doctors for asthmatic children. It is common for patients in recent years to request a prescription for a nebuliser for their asthmatic child and it takes a firm doctor to refuse to comply with this request. Whilst there is no doubt that nebulised bronchodilators are useful for acute, severe and brittle asthma in a hospital environment, the concern is mainly about the increasing use of nebulisers for regular domiciliary therapy. In this context, particularly, concern should be about regular nebulised bronchodilators rather than prophylactic drugs.

Why Nebulisers?

Nebulisers have two distinct advantages when compared with delivery systems such as Metered Dose Inhalers (MDI) or Powdered Inhaler Devices (PID).

1. Dose:
   Nebulisers can be used to deliver high doses of prophylactic bronchodilator drugs to the
airways of asthmatic children. This can be achieved with devices such as the MDI or PID but multiple actuations are necessary.

2. **Ease of Administration:**
Nebulisers are a convenient method of delivering drugs to the airway since co-ordination and respiratory gymnastics are not necessary as with the MDI and PID. The disadvantage of nebulisers however is that they are cumbersome, awkward to set up and depend on a power source.

**Efficiency of Nebulisers**
Studies have demonstrated that 10% of drugs used in a nebuliser chamber reach the lungs and this is similar to deposition achieved with usage of MDI and spacers as well as with PID. However, to achieve a similar concentration of drug reaching the lung, would require about 50 puffs from a MDI. Therefore nebulisers have a useful role to perform in acute attacks of asthma of mild to moderate severity as well as in the delivery of prophylactic drugs such as sodium cromoglycate and beclometasone dipropionate in young children unable to use MDI or PID.

**Asthma Deaths and Nebulisers**
Many reports have suggested that over-reliance on nebulisers and consequent delay in obtaining medical help have contributed to rising asthma mortality. A parallel increase in the sales of home nebulisers and the asthma mortality rate in New Zealand was noted in the late seventies and early eighties. Subsequently more reports were published on the subject and concluded that whilst there was evidence of direct toxicity of nebulised drugs, many of the deaths could have been prevented by timeous consultation with medical practitioners. These reports also highlighted the alarming widespread use of unsupervised nebulisers. Many of these patients did not use peak flow meters and were not on adequate asthma prophylaxis. Oxygen, which is life saving in severe acute attacks, was not provided for patients with previous near fatal asthmatic attacks.

**Paediatric Home Nebuliser Survey**
Many home nebuliser surveys conducted in the United Kingdom have been published recently. They have demonstrated and highlighted once again the inadequate instructions given to patients with regard to their nebuliser usage. They highlighted the following points:
- Poor patient instruction on when and how to use a home nebuliser.
- Patients used widely varying doses of bronchodilator drugs.
- Patients were not given proper written instructions.
- No crisis management plan discussed.
- Inadequate peak flow meter usage.
- Children (more than 50%) experienced side effects from bronchodilators, ie hyperactivity, tremor, vomiting and drowsiness.

**Nebulisers and Other Delivery Systems**
Many researchers have compared the B2 agonist drugs from domiciliary nebulisers and MDIs and PIDs and found no difference between them. Similar results were demonstrated for ipratropium bromide delivered via a nebuliser and a MDI, Spacer and Mask. Therefore there is an increasing body of evidence which suggests that the dose of broncho-
dilator medication is more important than the delivery system. High doses can be delivered via large volume spacer devices to increase MDI efficiency.

**Indications**

With the availability of spacer devices commercially as well as powdered inhaler devices the indication for home nebulisers has diminished over the years. There are however, some clear indications for home nebuliser usage.

1. Children under four years of age who require prophylactic drugs such as sodium cromoglycate or inhaled steroids. Some children in this age category will also benefit from nebulised bronchodilators for acute mild and moderately severe attacks. However, consider use of a MDI with a spacer. If this has been found to be ineffective and large doses of drugs are needed, consider a home nebuliser.

2. Children who have brittle asthma will benefit from regular high dose nebulised bronchodilators in addition to their regular prophylactic drugs. In this context, the child must be on maximum prophylactic drugs and only if this is inadequate, should nebulised B2 agonist be considered.

3. Children with previous severe life threatening asthmatic attacks, where parents can be relied on to follow a crisis management plan if the nebuliser in unhelpful. Oxygen must be provided as well.

**Guidelines for Nebuliser Usage**

Before considering a home nebuliser:

1. Explore other methods of drug administration especially spacers with the MDI.

2. Ensure patient is complying with prophylactic drugs.

3. Conduct a two week domiciliary nebuliser trial to clearly demonstrate benefit and clinical efficacy.

4. Give verbal and written instructions on:
   - method and frequency of use
   - nebuliser cleanliness
   - crisis management plan
   - regular follow up.

5. All children able to use a peak flow meter must be issued with one.

6. All nebulisers should carry a warning with regard to over-reliance and delay in seeking medical help.

Finally, use of a nebuliser by non-compliant parent or parents with a poor understanding of their child’s asthma is positively dangerous.

**Spacer Devices**

Several spacer devices are available for use by children. They confer the advantage of better drug deposition into the peripheral airways. They do this by allowing the particles of drugs to be held in suspension for 3-5 seconds during which time the child can inhale the drug. They reduce deposition of drug in the mouth and oropharynx and therefore may prevent candidiasis sometimes seen with inhaled steroid use.

Large and small volume spacer devices are available for use. In general larger volume spacer devices are useful in smaller children (less than 4 years of age) whereas small volume spacers are suitable in children over 4 years of age. Spacers with a mask are much more efficient and convenient. A simple device used by many of us is the plastic disposable coffee cup method. However, larger doses need to be used and its value...
has only been confirmed for bronchodilators but not yet for Lomudal or inhaled steroids.

In most children MDI should be used with spacers because of the difficult technique involved with the MDI.

References