

INHALER THERAPY FOR OBSTRUCTIVE AIRWAY DISEASE

Chronic Obstructive Pulmonary Disease (COPD) is common all over the world. It is predicted that by 2020, COPD will rise from its current ranking as the 12th most prevalent disease worldwide to the 5th and from 6th most common cause of death to the 3rd.^{1,2} Similarly, Asthma is a substantial health problem worldwide, with high and increasing prevalence rates in many countries.^{4,5} The obstructive diseases are quite common in Nepal, as evidenced from the community reports^{5,6} and from hospital data^{7,8}. Aerosolized medications are the mainstay of pharmacological treatment of airway disease. Administration by inhalation delivers the drug directly to the bronchi and is therefore effective in smaller doses with fewer side-effects. The systemic side effects are typically less than when the drugs are administered by other routes. Inhaled beta₂-adrenergic agonists continue to be first-line therapy for rapid symptomatic improvement in patients with acute bronchoconstriction. Although oral and parenteral forms are available, reversal of airflow obstruction is achieved most effectively by the repetitive administration of inhaled beta₂-agonist bronchodilators.⁹ Inhaled corticosteroids are safe and effective for the treatment of chronic asthma. Apart from these, anti-cholinergics like ipratropium bromide and other anti-inflammatory drugs like sodium cromoglycate are available as inhaler therapy. The proper management of the obstructive airway diseases may not be possible without inhalers. Clinicians may assume that many patients can not use inhaler therapy. But there are varieties of inhalers available; thus, some type of inhaler may be possible for almost every patient.

Pressurised aerosol inhaler, commonly known as metered dose inhaler (MDI) is the most common type of inhaler available. The real benefits of MDIs lie in their ease and portability of use. The only precaution required is synchronization of breathing with the administration of the aerosol. While pressing the MDI to release one dose, the patients should simultaneously or initially start inhalation. If they press the canister first, much of the dose of the drug will get wasted. Most patients can be successfully taught to use pressurised (aerosol) inhalers but some patients particularly the elderly, the arthritic, and small children experience difficulty using them; some patients are unable to synchronise their breathing with the administration of aerosol.¹⁰ A variety of spacing devices is now available for use with pressurised (aerosol)

metered dose inhalers. By providing a space between inhaler and mouth, they reduce the velocity of the aerosol and subsequent impaction on the oropharynx; in addition they allow more time for evaporation of the propellant so that a larger proportion of the particles can be inhaled and deposited in the lungs; also co-ordination of inspiration with actuation of the aerosol is less important. An in vivo radiotracer study showed that a large volume spacer deposited 21% of the dose in the lungs as compared to 10-15% only in the lungs by MDIs used alone.¹¹ The relative superiority of the spacer in achieving lung deposition of inhaled drug is likely to be even greater during an asthma attack.¹¹ Spacing devices are particularly useful for patients with poor inhalation technique, for children, for patients requiring higher doses, for nocturnal asthma, and for patients prone to develop candidiasis with corticosteroids.¹⁰ They are also useful for administration of bronchodilator when testing reversibility to establish the diagnosis of asthma.¹² With the spacing device, the patient can simply press the canister to release a dose of medicine into the chamber, and then breathe in; i.e. simply press and then breathe. Patients should inhale from the spacer devices as soon as possible after actuation since the drug aerosol is very short lived.¹⁰ Furthermore, patients should take one puff at a time through spacer. Five actuations of a corticosteroid inhaler into a large volume spacer before inhalation will deliver a similar dose as if a single dose had been actuated into the same spacer and inhaled immediately.¹³ The size of the spacer is important and the larger spacing devices with a one-way valve are the most effective.¹⁰ The smaller spacing devices have been found to be less efficient than the standard size ones in achieving lung deposition of various inhaled drugs.¹³ Use of a metered-dose inhaler (MDI) with a spacer device or reservoir is as effective as delivery of the drug by a nebulizer.⁹ Numerous studies have shown that MDIs and jet nebulizers are equally effective for both drug delivery and clinical response when equivalent doses are used and the MDIs are used with a spacer device. Equivalency studies have suggested that as many as 10 puffs from an MDI may be required to equal the dose of beta₂-agonist delivered by a nebulizer treatment.¹⁴ Indeed there is now also significant evidence to suggest that an MDI with spacer is more appropriate than nebulisers from both a clinical and cost-effective viewpoint for the treatment of asthma exacerbations in an acute setting, for both children and adults alike.¹⁵

The breath activated device of metered aerosol inhalation is also available, though not that easily in our local market. In the inhalation device, different MDIs can be easily fitted and used as required. As the name suggests, no specific synchronization of the breathing is required. The device functions as the actuator for the MDI canister and automatically and consistently delivers the dose as the patient inhales. The patient simply breathes in deeply through the mouth piece of the device. The other important device for outdoor therapy with aerosolized medications is dry powder inhaler. Dry powder inhalers are actuated by the patient's inhalation and are particularly useful for patients who are unable to use the aerosol inhalers. They are also generally believed to improve drug deposition to the lung (around 30% of dose compared to only 10-20% with MDIs) and as such suggest both clinical and cost benefits.¹⁵ Some occasionally cause coughing. It is available as Rotahaler along with its dry powder shell Rotacap. Dry powder inhaler is easy to use. No specific synchronisation of the breathing is required. After making the capsule ready to be used inside, the patient should put mouthpiece of the inhaler between the teeth and simply breathe in through the mouth as deeply as possible. Then breath is hold for as long as comfortably possible. The dry powder inhaler is relatively cheap and the shell can be bought as required and gradually; though the total cost of therapy is only a little less than the MDI. The portability of the dry powder inhalers compared to MDIs with spacers is seen as attraction, as is the increased ability to monitor closely delivered dosage.¹⁵ Because of these reasons, and as it is easy to use also, it is useful, and indeed more likely to be accepted as well, among poor and illiterate patients.

The dosage of inhalation forms of the drugs have to be prescribed like any other forms e.g. oral or parenteral. The dose in terms of the number of inhalations at one time, the frequency, and the maximum number of inhalations allowed in 24 hours should be stated explicitly to the patient.¹⁰ Merely prescribing the inhalers is not enough. Patients should be given careful instruction on the use of their inhalers. It is important to check that they continue to use them correctly. If the clinician is busy to do that, a nurse or other health worker should be especially assigned for that purpose. Otherwise inadequate technique is not just wastage of the therapy but it may also be taken for drug failure or for even mistaken diagnosis of disease. With the availability of different types of inhalation devices, the drugs can now be easily delivered to the lungs directly with increased efficacy and lesser toxicity. This has become a major advantage to the patients with airway diseases, particularly chronic bronchial asthma. The medical professionals have to pursue the advantages to their patients. We should insist on and support the use of inhalation forms of the drugs in the management of airway diseases, particularly bronchial asthma. The unfamiliarity of the clinicians

themselves with inhalers may discourage them to advise their patients. So now all medical professionals should know about inhaler therapy in obstructive airway diseases of the lung. We should try to remove any misconception about the inhalation forms of therapy among the people and chemists and rightly promote its use in obstructive airway diseases.¹⁶

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