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## Inhaler Use in Children a Boon or Not: A Review



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### ABSTRACT

Inhaled therapy for these conditions has a lot of advantages over systemic therapy which includes less number of side effects, quicker onset of action etc. The effectiveness of inhalation depends on the ability of children to use the medication properly. The correct use of inhalers can reduce the reoccurrence of asthma to an extent. When inhaler alone is used the drug will be spread over mouth, throat, stomach and lungs. But if children are using spacer along with the inhaler, most of drug will be directly deposited in lungs more than other parts of the body. Anyway, studies on inhaler usage in children have proven that correct use of inhaler has been a real boon to them to get relief from asthma attacks. If the inhaler is used not in a correct way and misuse that will be a curse. The burden of asthma on children is immense. The choice of inhaler devices is mandatory to ensure that medications are effective to reach the airways of children with asthma. This review article highlights usage of inhaler devices and dose counting in children.



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## INTRODUCTION

Asthma and COPD are two respiratory diseases which uses inhalers mostly. Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing. Asthma is more prevalent in children now a day. Inhaler therapies for these conditions have lot of advantages over systemic therapy which includes less number of side effects, quicker onset of action etc. The effectiveness of inhalation depends upon ability of children to use the medication properly. The correct use of inhalers can reduce the reoccurrence of asthma to an extent in children. Poor inhaler technique can lead to decreased lung drug deposition that results in reduced asthma control in children.<sup>[1]</sup>

The child and their parents should be given proper training regarding inhaler usage to ensure optimum therapy. Asthma and other chronic airway diseases can be effectively treated by inhaler therapy in children. Inhaler devices are of different types such as metered dose inhalers (MDI) or Dry powder inhalers (DPI). The outcome of inhaler therapy largely depends on appropriate use of inhaler not the type of inhaler device used. Appropriate use of inhaler means correct usage of inhalation technique. A poor inhalation technique may reduce lung drug deposition; and more the mistakes in the inhalation technique the lower the benefits on lung function. But sometimes children faces difficulties in inhaler usage.<sup>[2]</sup>

Appropriate inhaler use can be determined by comparing actual use with the advised regimen by the prescriber. Several studies have shown that children should have proper compliance with inhalation corticosteroids (ICS) for its effectiveness. Overuse of bronchodilators has also been increased and some parents are confused about the corticosteroid inhaler that is used for maintenance therapy and bronchodilator inhaler which is used for relieving symptoms. The parents were asked about how they assessed the number of remaining doses and how they cleaned the device after use. Questionnaires can also be necessary to determine the level of knowledge of children and their parents associated with the correct use of inhaler and also to identify inconsistencies between uses of inhalers with prescriber's advice.<sup>[3]</sup>

The drugs used for inhalation in treatment of asthma includes corticosteroids like Beclomethasone propionate, Budesonide, Fluticasone propionate etc. Anticholinergic drugs like Ipratropium bromide, Tiotropium bromide etc. Beta two sympathomimetic drugs like Salbutamol, Salmeterol, Formoterol etc.<sup>[4]</sup>

## **INHALER DEVICES IN CHILDREN; USAGE AND CLEANING**

**Metered dose inhalers (MDI):-** In metered dose inhalers, the active drug is suspended under high pressure in Freon propellants and when device is actuated, small diameter particles leave at the mouthpiece at very high velocity.

### **Steps in using MDI:-**

1. Remove cap on the mouthpiece.
2. Hold inhaler upright and shake well.
3. Breathe out gently as far as comfortable.
4. Put mouthpiece in your mouth and close lips around it to form a good seal.
5. Start to breathe in slowly through your mouth and at the same time press down firmly on the canister.
6. Hold your breath for up to 10 seconds, then remove inhaler from your mouth.
7. Breathe out gently away from mouthpiece, replace cap.
8. Repeat steps 3-6 if second dose is required, wait 1 minute between puffs.

### **Cleaning of MDI:-**

Metered dose inhalers must be cleaned on a regular basis to prevent building up of medication and blockages. Mouthpiece must be cleaned for at least once per week.

- Remove drug canister and cap from the mouthpiece. Never wash the canister or immerse it in water.
- Run warm tap water through the top and bottom of the plastic mouthpiece for 30-60 seconds.
- Shake off excess water and allow the mouthpiece to dry completely.

- If you need the inhaler before the mouthpiece is dry, shake off inhaler to remove excess water, replace the canister, and test spray two times that should be done away from the face.<sup>[5]</sup>

**Dry powder inhalers (DPI):**-They are single dose inhalers. But are less convenient one than MDI. Many children have difficulties in loading and splitting of capsules.

#### **Types of DPI:**

- Single dose devices – In this type of device, the person has to place a single capsule in the device slot before each treatment. Capsule should not be swallowed.
- Multiple dose devices – It contains up to 200 doses.

#### **Steps in dry powder inhaling:-**

1. Open the device.
2. Slide the lever until it clicks.
3. Keep device level while inhaling.
4. Exhale deeply away from the mouthpiece.
5. Put mouthpiece between teeth and close lips around.
6. Inhale deeply and forcefully.
7. Hold breath for 10 seconds.
8. Inhaler is removed from the mouth without exhaling into it.
9. Breathe out slowly.

**Cleaning of DPI:** -Dry powder inhalers should not be washed with soap and water. The mouthpiece can be cleaned with a dry cloth approximately once per week.<sup>[6]</sup>

**Spacers:** - The use of spacers to mouthpiece of MDI ensures that the aerosol particles have slower velocity when they reach patients. Spacer is a holding chamber which is made up of

plastic mainly in shape of a football or hollow tube. It makes easy inhaling through a metered dose inhaler.

#### **Usage of metered dose inhalers along with spacers:-**

1. Remove cap, hold inhaler upright and shake well.
2. Insert inhaler upright into the hole in the spacer.
3. Breathe out gently as far as comfortable.
4. Put mouthpiece on spacer between teeth without biting and close lips to form good seal.
5. Hold spacer level and press down firmly on canister to release one puff.
6. Breathe in slowly and deeply then hold breathe for about 10 seconds or as long as comfortable .breathe in and out normally for 4 breathes.
7. Remove spacer from mouth and breathe out gently. Repeat steps 3-6 if 2<sup>nd</sup> dose is required .you need to shake the canister again and ideally wait 1 minute between puffs.
8. Remove inhaler from spacer, and replace cap. Check patient knows how to clean spacer each month.

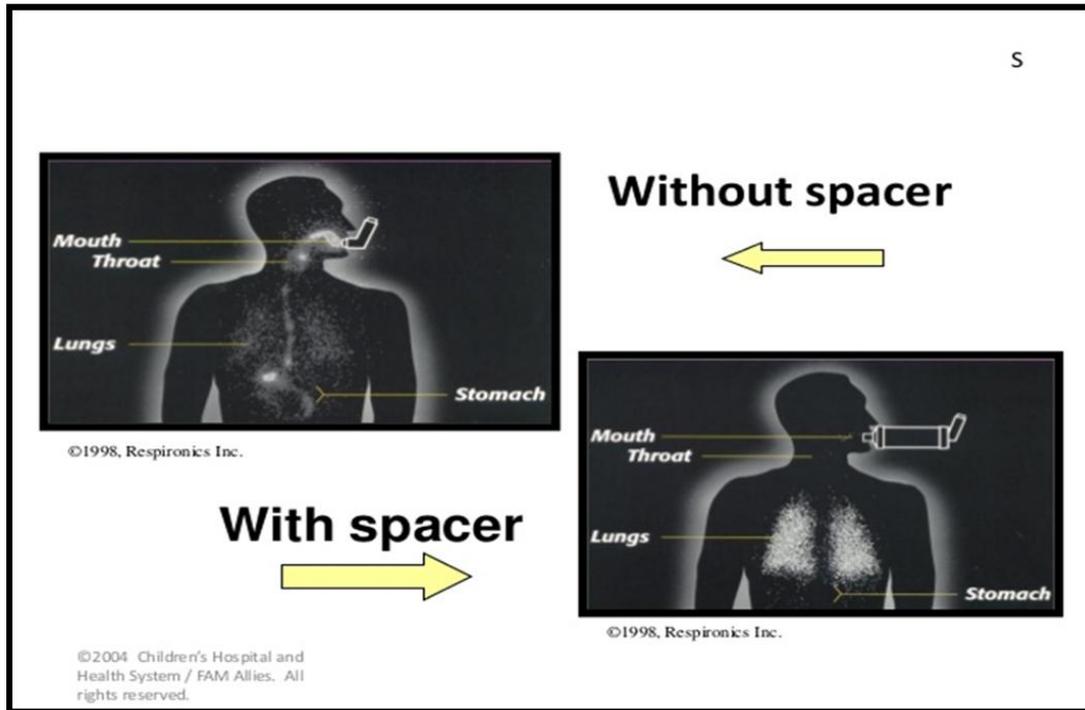
#### **Cleaning the spacer:-**

We considered only cleaning the spacer with soap and water, and letting it dry in the air will be correct. Do not touch its inner surface with hands.

#### **NEED OF SPACER IN CHILDREN**

When inhaler alone is used, the drug will be deposited and will spread over mouth, throat, stomach, and lungs. But if children are using spacer along with the inhaler, most of drug will be directly deposited in lungs more than other parts of the body it reduces the problems related to MDI. Children can also use them effectively during attacks. A spacer holds the medicine in its chamber after it has been released from the inhaler that will allow the child to inhale slowly and deeply once or twice.

A spacer is given for a child who has difficulty in squeezing the canister and inhaling at the right time. It is mainly used for children less than five to six years. Spacers are also provided for all children who use inhaled glucocorticoids. Many spacers are available in the market but larger one having a capacity of 100-700 ml spacer is found to be more effective than smaller ones. Proper inhaling technique and frequent cleaning are also important.<sup>[7]</sup>



### COMMON MISTAKES DURING INHALATION TECHNIQUE

- Forgot to shake inhaler before use.
- After MDI activation, waiting for a time less than 5 minutes.
- Not pressing spacer mask on face.
- Not holding breath for 5 seconds after inhalation.
- When two doses are needed, doing activation of inhaler for two times before inhaling through spacer.
- Not rinsing the mouth after using ICS inhaler.
- Making less than five inhalations through spacer.<sup>[8]</sup>

The most common mistakes in inhaler usage include not shaking the inhaler before use which was the most frequently made mistake. Some children used their bronchodilator 'as needed' instead of daily and few children used their bronchodilator 'daily' instead of 'as needed'. Some were using inhaled corticosteroids as needed. Some did not use the prescribed bronchodilators. Using more than one inhaler at a time is one of the most frequent reasons for inappropriate use. Parents decide when and how the inhaler to be used in case of the children. It indicates their important role in compliance with inhaler usage. Few children used their ICS in case of symptoms only, but ICS are used for long term maintenance therapy and should be administered daily.<sup>[9]</sup>

### **DOSE COUNTING:-**

The methods for assessing an inhaler for remaining doses of drug includes looking on counter of inhaler, spraying on dark background, if inhaler floats in water, it is empty; and counting remaining doses with agenda.<sup>[10]</sup>

### **CONCLUSION**

Unfortunately, many children with asthma do not use the inhaler technique properly. Children can learn proper inhaler technique by giving proper training and practice. However, studies indicate that inhalers can be used to deliver medications to the lungs effectively, even in infants. Giving one or more doses of a short acting bronchodilator via inhaler with a spacer and face mask is better than giving the same medication by nebulizer in most infants and children. For children who suffer difficulty in timing their breath and spraying the medication, now a days there are inhalers that can automatically release the medication when the child breathes in. One of the disadvantages of this is that some children cannot be able to inhale forcefully enough to cause the drugs release, during asthma attacks. Depending upon the severity of child's asthma, the treatment includes daily visits by practitioner, use of one or more medications, avoiding asthma triggers, monitoring of symptoms. At each visit, the child or parent should demonstrate how they used the inhaler to check the correctness. Any way studies on inhaler usage in children has proven that correct use of inhaler has been a real boon to them to get relief from asthma attacks. If the inhaler is used not in a correct way and misuse of inhalers like double use at a time, double activation will be a curse. The burden of asthma on children is immense. The choice of inhaler devices is mandatory to ensure that medications are effective to reach the airways of children with asthma.

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