The delivery of respiratory drugs via inhalation offers the balance between efficacy and safety of the therapy. However, poor inhalation technique especially in children, limits the efficacy of this approach. Most asthma children being treated with inhaler medication do not use such devices appropriately. Clinical observation has shown that many children and their parents are not familiar with appropriate techniques for inhaler use. This may result in misuse, overdose, or diminished response of the administered therapeutic drugs, or result in unnecessary, repeated hospitalization.

The device for administration of pharmacologically aerosol to the lower airway should produce particles with a mass median aerodynamic diameter (MMAD) of 2-5 microns. These devices include metered dose inhalers (MDI), MDIs with accessory device (eg, spacer), dry powder inhalers (DPI), small volume nebulizer (SVN). If medication is administered the wrong way, little aerosol may deposit in the airway.

Metered dose inhalers usually require the coordination of actuation with inhalation, it is recommend to inhale with a valved holding chamber to decrease coarse particle deposition in the oral pharynx and the need to coordinate canister actuation with inhalation. For the holding chamber, their size may lead to different deposition efficiencies for different ages. The valves may have high resistance, the dead space may be too large or the chamber may be too large for infants. These factors need to be taken into account when choosing a holding chamber.

Different holding chambers also have differing electrostatic properties. They cause significant dose variations compared with the metal neubuchamber and deliver a substantially smaller dose to the patient. Different techniques can be used with an MDI and holding chamber: tidal breathing with sufficient flow to move the valve, 5 breaths, or taking 1 deep breath and holding it for 10 s. These have been demonstrated to be equivalent in school-age children. Multiple actuations of the MDI into the holding chamber also decrease the amount of medication available to the patient.

For medication administered by aerosol to be deposited in the airway, children must use either a mouthpiece or a mask that is sealed tightly against the face and must inhale quietly, slowly, and deeply. A slow, deep inhalation allows the medication to enter the lower airway by minimizing turbulence. Medication then can be deposited in the airway by sedimentation. It has been shown in children that breathing through a mask via the nose decreases lung deposition by up to 67% compared with breathing through a mouthpiece using a jet nebulizer. However, a recent study using a model of the upper airways and face to simulate aerosol delivery in young children from an MDI and spacer showed the importance of maintaining a good seal between the face and the mask. If the patient will not wear the mask closely to the face, the small breaks in the mask can significantly reduce medication delivery. Another mistaken belief that "make the infants cry", this will lead the child to inhale the medication more deeply. Crying is a long exhalation followed by a very rapid inhalation for the child to breathe. Nebulization during crying deposits almost nothing into the lower respiratory tract. Thus, aerosols should never be administered to a crying child. For the DPI, the medication must be reloaded and then disaggregated to an aerosol while being inhaled. Since the energy from the patient's inspiratory flow disperses the drug powder, the magnitude and duration of the patient's effort influences aerosol generation from a DPI. So the DPI requires a rapid deep inspiration, whereas the MDI requires a slow one.

The type of device for children is important. MDI with a holding chamber are strongly preferred to MDI alone in all children. For the older children are self-conscious of bulky devices like the chambers, they may need to take to sporting events or to the school. Once a child can use the DPI, devices should be the preferred device. Nevertheless, many asthma children still use their inhaler devices poorly to result in reliable drug delivery, even after carefully inhalation instruction. Comprehensive inhalation instruction and repeated check-ups inhalation technique are needed to assure reliable safety and efficacy of the therapy.

REFERENCES
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