

INHALED RESPIRATORY MEDICATIONS USED BY HOME CARE PATIENTS

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JCAHO recognizes two levels of respiratory home care service. One deals with respiratory equipment delivery and maintenance and the other with clinical respiratory services (CSR). Home care programs providing CSR are usually involved with the delivery of high-tech respiratory care such as mechanical ventilation or disease state management programs. Regardless, home care visitations by a licensed therapist include patient assessment along with a medication profile. It is essential that the therapist evaluating these patients be familiar with what a patient is taking, including all inhaled medications. In the past, this was simple, but with the plethora of inhalers and other preparations available for aerosolization, the process is more detailed. The purpose of this article is to shed some light as to what inhaled respiratory medications and delivery methods are currently available and used in the home care setting. This knowledge is important, not just to the home care therapist, but to facility-based RTs, since patients may be taking a medication not available in solution form for the typical treatment delivered in the hospital or skilled nursing facility via a hand-held nebulizer or small volume nebulizer. In fact, many institutions are now opting for drug delivery using pressurized metered dose inhalers or dry powder inhalers because of cost and time concerns.

The first choice of delivery method is the MDI. Medicare will not cover a home compressor-nebulizer system unless a MDI has been tried by a patient. There are a myriad of drugs available in

MDI form and the use of a spacer or holding chamber has made delivery of these medications easier and more efficient. The first group of medications available in MDI form are the short-acting bronchodilators of the beta-agonist class providing bronchodilation from 3 to 6 hours. Most MDIs contain 200 to 300 actuations for patient use. They include: albuterol sulfate (generic), albuterol sulfate HFA (hydrofluoroalkane), Proventil (albuterol sulfate), Proventil HFA, Ventolin HFA (albuterol sulfate), Xopenex (levalbuterol sulfate), Alupent (metaproterenol sulfate), Brethine or Bricanyl (terbutaline sulfate), Maxair Autohaler (pirbuterol acetate) and Primatene Mist (epinephrine) – available over the counter.

The anticholinergic class of bronchodilators provide a longer duration of action (4 to 6 hours) and are never used as rescuer inhalers because their onset of action is 30 minutes or more. These drugs include: ipratropium bromide (generic), Atrovent (ipratropium bromide) and Combivent (albuterol sulfate and ipratropium bromide) – both beta agonist and anticholinergic classes of bronchodilators.

Inhaled corticosteroids (ICSs) are also available in MDI form providing an anti-inflammatory effect for patients with COPD or bronchial asthma. Patients are often placed on this type of medication and delivery device for maintenance purposes and the expectation that systemic side-effects are minimized. Commonly administered ICSs via MDI include: AeroBid and AeroBid-M (flunisolide), Azmacort (triamcinolone acetonide), Flovent HFA in 44 mcg, 110 mcg and 220 mcg strengths (fluticasone propionate) and QVAR HFA in 40 mcg and 80 mcg strengths (beclomethasone dipropionate). Also included in this group, but not steroidal, are Intal (cromolyn sodium) and Tilade (nedocromil sodium).

An increasingly popular delivery device is the dry powder inhaler (DPI) capable of administering the medication in powder form with a lactose or glucose-based incipient as the carrier medium. These devices do not require spacers, holding chambers, hand to breath coordination or breath hold but a rapid, deep inhalation is necessary for proper delivery. Currently, a relatively small number of drugs are available in DPI form and include the long-acting bronchodilators: Foradil Aerolizer (formoterol fumarate) and Serevent Diskus (salmeterol xinafoate).

An anti-cholinergic bronchodilator that requires only once a day dosing is Spiriva HandiHaler (tiotropium bromide).

In terms of ICS, commonly used DPIs include: Asmanex Twisthaler (mometasone furoate), Flovent Rotadisk (fluticasone propionate) and Pulmicort Turbuhaler (budesonide).

Combination medications available as DPIs include: Advair Diskus (fluticasone propionate/salmeterol xinafoate) available in strengths of 100mcg/50 mcg, 250 mcg/50 mcg and 500 mcg/50 mcg). Please note that the salmeterol strength remains constant at 50 mcg but the fluticasone strength varies and these different Diskus inhalers are color-coded for easier identification.

Finally, inhaled respiratory medications are available in solution form for delivery via an HHN or SVN. The RT seems to have the most familiarity with these since they are delivered in

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optimal CMV, or conversely optimal CMV may be compared to sub-optimal HFOV. This would explain the apparent variation in findings in studies that appear to be similarly designed.

Another concern I have about HFOV is how it is being spread in the neonatal community. The use of these devices requires a lot of training, of all clinical disciplines. I have seen well-intentioned departments underestimate the magnitude of training required. I also believe there has been a lack of medical leadership about this in some circles. I think there is sometimes insufficient training of medical staffs. The scenario goes like this. Some doctors who were trained at a center that was excellent at HFOV join another neonatal practice group that does not do HFOV. They convince the hospital to buy HFOV ventilators. The RT department starts trying implement the use of the devices, including lots of required training for RT's and nurses, but sometimes the training of all physicians in the practice group is not mandatory. Thus, some physicians rotate onto service that neither understand the device nor are very convinced of its efficacy. Thus, the implementation is slowed or even halted. HFOV is a complex operation in some ways and doing it infrequently does not then generate enough skill on the RT and medical staffs to ensure competency. Thus, when someone does want to use the ventilator, there is a potential for increasing risk to patients, owing to misadventures of misapplication. Anyone wishing to start a HFOV program or expand an existing one is advised to spend a lot of time carefully planning training and competency assessment of all clinical disciplines, to minimize patient risk for in spite of these obstacles, and the sometimes confusing literature on HFOV, it can clearly be an important tool in the management of neonates with respiratory failure.

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hospitals, SNF, long-term care facility and home. The most commonly delivered medications include the beta-agonist bronchodilators, many of which are used as rescue inhalers: albuterol sulfate (generic), Proventil (albuterol sulfate), Ventolin (albuterol sulfate), Xopenex (levalbuterol sulfate) available in 0.63 mg and 1.25 mg strengths, Alupent (metaproterenol sulfate), AsthmaNefrin, MicroNefrin or VapoNefrin (racemic epinephrine) and Formoterol fumarate (generic – available as a compound). The anticholinergic bronchodilators include: Atropine sulfate (generic), Ipratropium bromide (generic), Atrovent (ipratropium bromide) and DuoNeb (albuterol sulfate and ipratropium bromide) – both beta-agonist and anticholinergic classes of bronchodilators.

ICSs that can be nebulized are Pulmicort Respules (budesonide) and Budesonide (generic – available as a compound).

Non-steroidal maintenance of asthma is available for nebulization as Intal (cromolyn sodium) and Cromolyn sodium.

Mucolytic and proteolytic agents can also be nebulized and include: Mucomyst and Mucosil (n-acetylcysteine) in 10% and 20% strengths and Pulmozyme (dornase alfa).

Anti-infective or antimicrobial agents available in solution for nebulization include: Tobramycin, Nebupent and Pentam 300 (pentamidine isethionate) and Colistin and ColyMycin (colistimethate sodium).

The number of inhaled respiratory medications will most likely increase in the years to come as the incidence of chronic lung diseases increase. On the horizon, are inhaled medications such as insulin and pain relievers that will add to the importance of aerosol therapy and the RTs involved.