



## STEROID RAGE: INHALED CORTICOSTEROIDS

By Doug Gardenhire EdD, MS, RRT-NPS

In the public eye steroids can seem to get a bad rap, but as a respiratory therapist corticosteroids are an important piece of the pharmacological puzzle. Like other respiratory care pharmacological agents, the number of agents continues to grow as does the apparatus in which we administer them. This article will review aerosolized corticosteroid agents available and their indication for use. In the next issue we will discuss the pharmacology of corticosteroids, as well as hazards and side effects.

### Indications for Aerosolized Corticosteroids

Aerosolized corticosteroids are available in formulations for oral inhalation (lung delivery) and intranasal delivery. General clinical indications for the use of aerosolized corticosteroids are as follows:

- Orally inhaled agents: Maintenance, control therapy of chronic asthma, identified by the National Asthma Education and Prevention Program Expert Panel Report 3 Guidelines for the Diagnosis/Management of Asthma

**Like other RC pharmacological agents, the number of corticosteroids for aerosolization continues to grow**

- Inhaled agents can be used together with systemic corticosteroids in severe asthma, and may allow systemic dose reduction or elimination for asthma control.

- Inhaled corticosteroids are recommended by the American Thoracic Society (ATS) and the Global Initiative for Chronic Obstructive Lung Disease

(GOLD) for chronic obstructive pulmonary disease (COPD).

- Intranasal aerosol agents: Management of seasonal and perennial allergic and nonallergic rhinitis.

### Aerosolized Corticosteroid Agents

Beclomethasone dipropionate (QVAR) has been known by several names such as Vanceryl and Beclvent; however, with the transition from chlorofluorocarbon (CFC)-propelled MDI formulations, beclomethasone dipropionate has been reformulated with an HFA propellant, in a 40- and 80-microgram MDI strength as QVAR. Along with the change in propellant, many components of the MDI system were reengineered, significantly increasing the efficiency of this drug delivery system. Lung deposition with QVAR has been measured at 50 to 60% of the emitted dose, the usual starting dose of QVAR is 40 to 80 micrograms twice daily. Beconase AQ is the brand name for intranasal delivery.

Triamcinolone acetonide (Azmacort) is also topically active and was available as Aristocort and Kenalog before its release as an aerosol. Triamcinolone acetonide is nonpolar and water insoluble,

resulting in a lower potential for systemic absorption. This drug is slightly less topically active than beclomethasone dipropionate. High initial doses of 12-16 inhalations/day may be needed in severe asthma. This agent is marketed with a built-in spacer device. Currently, Azmacort remains a CFC-driven MDI. Nasocort HFA and Nasocort AQ is the brand name for intranasal delivery.

Flunisolide (AeroBid, Aerospan) is another topically active aerosol preparation, similar in potency to triamcinolone, and is said to have a longer duration of action. Because of the phase-out of CFC propellant in beta agonists and the increased deposition seen with other HFA MDIs. Flunisolide is currently available as a CFC MDI (AeroBid) and as an HFA MDI (Aerospan). AeroBid, as the name indicates, is given twice daily at 250 micrograms/puff. Aerospan is also prescribed twice daily at 80 micrograms/puff, which is noticeably much less than the AeroBid dosage. This difference between doses is due to the delivery characteristics of each formulation. Aerospan, like Azmacort, is manufactured with a spacer attached to the actuation device. Nasarel is the brand name for intranasal delivery.

Fluticasone propionate (Flovent HFA, Flovent Diskus) is a synthetic glucocorticoid with high topical antiinflammatory potency and is available in MDI and DPI form. The MDI is available in three different strengths: 44, 110, and 220 micrograms. The DPI form is available in three different strengths as well: 50, 100, and 250 micrograms. The drug is a further analog of previous agents with high topical potency, synthesized in an attempt to avoid systemic side effects. Flonase is the brand name for intranasal delivery. A newer intranasal corticosteroid has been recently introduced, Fluticasone furoate (Veramyst) is thought to have more affinity for the corticosteroid receptor.

Budesonide (Pulmicort Respules, Pulmicort Turbuhaler) is available as a DPI (Pulmicort Turbuhaler) or as an inhalation solution (Pulmicort Respules). The Turbuhaler delivers 200 micrograms/metered dose, whereas Pulmicort Respules is available in doses of 0.25, 0.5, and 1.0 milligrams. The benefit of using Respules is that it can be mixed with other agents such as bronchodilators (e.g., albuterol, levalbuterol, and ipratropium). Numerous studies have shown that mixing the agents had no effect on the drugs mixed. Rhinocort Aqua is the brand name for intranasal delivery.

Mometasone furoate (Asmanex Twisthaler) is available as a DPI with 220 micrograms/actuation dosing. Asmanex can be given once or twice daily. The single-day dosing may be a benefit to increase consistency in usage of an inhaled corticosteroid. It has been found that pulmonary function results

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increased in patients receiving once-daily Asmanex compared with placebo in patients previously using twice-daily doses of inhaled corticosteroids. Nasonex is the brand name for intranasal delivery.

Ciclesonide (Alvesco) the newest corticosteroid on the market received FDA approval in January of this year. Ciclesonide (Alvesco) is a pro-drug, once it enters the body it is enzymatically converted to des-ciclesonide. Des-ciclesonide has a 120 times greater affinity for the glucocorticoid receptor. Alvesco is available as an HFA MDI in 80 and 160 micrograms/puff with once daily dosing. Since Alvesco is a pro-drug there is no need to rinse the mouth after use. Omnaris is the brand name for intranasal delivery.

Fluticasone propionate/salmeterol (Advair) is a combination product of the corticosteroid fluticasone with the long-acting beta-agonist bronchodilator salmeterol. Advair is available as a DPI and HFA MDI in three different strengths (fluticasone/salmeterol): DPI: 100/50, 250/50, and 500 /50 micrograms, HFA MDI: 45 /21, 115/21, and 230/21 micrograms .

Budesonide/formoterol (Symbicort) is a combination product of the corticosteroid budesonide with the long-acting beta-agonist bronchodilator formoterol. Symbicort is available as an MDI in two strengths (budesonide/formoterol: 80/4.5 and 160/4.5 milligrams, respectively).

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*News from the Joint Commission...continued from page 12*

- Support surveillance with tiered, non-confrontational interventional strategies.
- Conduct all interventions within the context of an organizational commitment to the health and well-being of all staff.
- Encourage inter-professional dialogues in a variety of forums.
- Document all attempts to address intimidating and disruptive behaviors.

Any seasoned respiratory therapist has experienced disruptive or intimidating behavior at some point during their career. Depending on the facility and the therapist's personal confidence drives the therapist's response to the situation. Each of us has had the uncomfortable experience of trying to decide whether or not to contact a certain doctor or nurse because of the response that we anticipate. There is no doubt that this has compromised quality and patient safety. Let's be confident that this focus by The Joint Commission is the beginning of a new, healthier environment in which we can work and concentrate on our primary goal, the patient.

This Sentinel Event Alert is the latest release in the Sentinel Event Alert series that The Joint Commission began in February 1998. The information contained in the Sentinel Event Alerts is compiled from information voluntarily reported to The Joint Commission. Healthcare organizations must implement the recommendations in the Sentinel Event Alert or reasonable alternatives. For more information regarding all Sentinel Event Alerts, visit the Joint Commission International Center for Patient Safety website at [www.jcpatientsafety.org](http://www.jcpatientsafety.org).

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