albuterol (al-byoo-ter-ole)

**Acute:** Ventolin, Symbicort, Proventil HFA, Proventil, Ado-Ben, Ventolin HFA, Ventolin Diskus, Ventolin Nebules, Volmax ER

**Classification**
Therapeutic: bronchodilators
Pharmacologic: adrenergics

**Pregnancy Category:** C

**Indications**
Used as a bronchodilator to control and prevent reversible airway obstruction caused by asthma or COPD. Inhal: Used as a quick-relief agent for acute bronchospasm and for prevention of exercise-induced bronchospasm. PO: Used as a long-term control agent in patients with chronic persistent bronchospasm.

**Action**
Binds to beta2-adrenergic receptors in airway smooth muscle, leading to activation of adenylyl cyclase and increased levels of cyclic-3',5'-adenosine monophosphate (cAMP). Increases in cAMP activate kinases, which inhibit the phosphorylation of myosin and decrease intracellular calcium. Decreased intracellular calcium relaxes smooth muscle airways. Relaxation of airway smooth muscle with subsequent bronchodilation. Relatively selective for beta2 (pulmonary) receptors.

**Therapeutic Effects:** Bronchodilation.

**Pharmacokinetics**
Absorption: Well absorbed after oral administration but rapidly undergoes extensive metabolism.

Distribution: Small amounts appear in breast milk.

Metabolism and Excretion: Extensively metabolized by the liver and other tissues.

Half-life: Oral 2.7–5 hr; Inhalation: 3.8 hr.

**TIME/ACTION PROFILE (bronchodilation)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PO</td>
<td>15–30 min</td>
<td>2–3 hr</td>
<td>4–6 hr or more</td>
</tr>
<tr>
<td>Inhal</td>
<td>5–15 min</td>
<td>20–30 min</td>
<td>12 hr</td>
</tr>
</tbody>
</table>

**Contraindications/Precautions**
Contraindicated in: Hypersensitivity to adrenergic amines.

Use Cautionally in: Cardiac disease; Hypertension; Hypothyroidism; Diabetes; Glaucoma; Seizure disorders; Excess inhaler use may lead to tolerance and paradoxical bronchospasm. OK, Lactation, Ped: Safety not established for pregnant women near term, breast-feeding women, and children <2 yr. Geri: Risk of adverse reactions; may require dose adjustment.

**Adverse Reactions/Side Effects**

**Interactions**

**Drug-Drug:** Concurrent use with other adrenergic agents will have adrenergic side effects. Use with MAO inhibitors may lead to hypertensive crisis. Beta blockers may negate therapeutic effect. May increase serum digoxin levels. Cardiovascular effects are potentiated in patients receiving tricyclic antidepressants. Risk of hypokalemia is increased in patients receiving potassium-losing diuretics. Hypokalemia enhances the risk of digoxin toxicity.

**Drug-Natural Products:** Use with caffeine-containing herbs (cola nut, guarana, tea, coffee) stimulates effect.

**Route/Dosage**

**PO (Adults and Children >12 yr):** 2–4 mg 3–4 times daily (not to exceed 32 mg/day) or 4–8 mg of extended-release tablets twice daily.

**PO (Geriatric Patients):** Initial dose should not exceed 2 mg 3–4 times daily, may be carefully increased (up to 32 mg/day).

**PO (Children 6–12 yr):** 2 mg 3–4 times daily, may be carefully increased (not to exceed 8 mg/day).

**PO (Children 4–6 yr):** 1 mg/kg 3 times daily (not to exceed 2 mg/3 times daily initially), may be carefully increased (not to exceed 8 mg/day).

**PO (Children 2–4 yr):** 0.5 mg/kg 3 times daily (not to exceed 1.5 mg/kg 3 times daily).

**Inhal (Adults and Children >12 yr):** Use nasal dose also includes — 2 inhalations q 4–6 hr or 2 inhalations 15 min before exercise (90 mcg/spray); some patients may require higher doses.
respond to 1 inhalation. NIH Guidelines for acute asthma exacerbation: Children—4–8 puffs q 20 min for 3 doses thn q 1–4 hr; adults—4–8 puffs q 20 min for 3 doses thn q 1–4 hr p.r.n.

H0H

Inhal (Adults and Children >12 yr): NIH Guidelines for acute asthma exacerbation via nebulization or IPPB—2.5–5 mg q 20 min for 3 doses thn q 1–4 hr prn; Continuous nebulization—10–15 mg/hr.

H0H

Inhal (Children 2–12 yr): NIH Guidelines for acute asthma exacerbation via nebulization or IPPB—0.15 mg/kg (minimum dose 2.5 mg) q 20 min for 3 doses thn q 1–4 hr prn or 1.25 mg 3–4 times daily for children 10–15 kg or 2.5 mg 3–4 times daily for children >15 kg; Continuous nebulization—0.5–1.5 mg/hr.

H0H

Inhal (Neonates): 1.25 mg/dose q 8h rv i a nebulization or 1–2 puffs via MDI into the ventilation circuit.

NURSING IMPLICATIONS

Assessment

- Assess lung sounds, pulse, and BP before administration and during peak of medication. Note amount, color, and character of sputum produced.
- Monitor pulmonary function tests before initiating therapy and periodically during therapy.
- Observe for paradoxical bronchospasm (wheezing). If condition occurs, withhold medication and notify health care professional immediately.
- Lab Test Considerations: May cause transient decrease in serum potassium concentrations with nebulization or higher-than-recommended doses.

Potential Nursing Diagnoses

- Ineffective airway clearance (Indications)

Implementation

- PO: Administer oral medication with meals to minimize gastric irritation.
- Extended-release tablets should be swallowed whole; do not break, crush, or chew.
- Inhal: Shake inhaler well, and allow at least 1 min between inhalations of aerosol medication. Prime the inhaler before first use by releasing 4 test sprays into the air away from the face. Prime for use before children <8 yr of age.
- For nebulization or IPPB, use 0.9%, 0.45%, or 2-mg/mL solutions; dilutions are not required before administration. The 5 mg/mL (0.9%) solution must be diluted with 1–2.5 mL of 0.9% NaCl for inhalation. Diluted solutions are stable for 24 hr at room temperature or 48 hr if refrigerated.
- For nebulization, compressed air or oxygen flow should be 6–10 L/min; a single treatment of 3 mL lasts about 10 min.
- IPPB usually lasts 5–20 min.

Patient/Family Teaching

- Instruct patient to take albuterol as directed. If not on a scheduled dosing regimen, take missed dose as soon as remembered, but do not exceed regular intervals. Do not double doses or increase the dose or frequency of doses. Cautions patient not to exceed recommended dose; may cause adverse effects, paradoxical bronchospasm (more likely with first dose from new canister), or loss of effectiveness of medication.
- Instruct patient to contact health care professional immediately if shortness of breath is not relieved by medication or is accompanied by dyspnea, diaphoresis, tachypnea, or chest pain.
- Instruct patient to prime unit with 4 sprays before using and to discard canister after 200 sprays. Actuators should not be exchanged among products.
- Inform patient that these products contain hydrofluoralkane (HFA) and the propellant and are described as non-CFC or CFC-free (contain no chlorofluorocarbons).
- Instruct patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult health care professional before taking any Rx or OTC medications or alcohol beverages concurrently with this therapy. Cautions patient also to avoid smoking and other respiratory irritants.
- Inform patient that these products contain hydrofluoralkane (HFA) and the propellant and are described as non-CFC or CFC-free (contain no chlorofluorocarbons).
- Instruct patient to notify health care professional if there is no response to the usual dose or if contents of one canister are used in less than 2 wk. Asthma and treatment regimen should be re-evaluated and corticosteroids should be considered. Need for increased use to treat symptoms continued...
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albuterol

indicates decrease in asthma control and need to reevaluate patient’s therapy.

● Pedi: Caution adolescents and their parents about overuse of inhalers, which can cause heart damage and life-threatening arrhythmias.

Evaluation/Desired Outcomes

● Preventive or relief of bronchospasm

Why was this drug prescribed for your patient?