



**County of Santa Clara**  
**Emergency Medical Services System**  
**ADMINISTRATIVE ORDER**

<b>Number:</b>	<b>AO 2023-001</b>
<b>Title:</b>	<b>Management of Albuterol Solution Shortage</b>
<b>Effective:</b>	<b>March 30, 2023</b>

**I. Declaration**

The Santa Clara County Emergency Medical Services Agency has determined that an unscheduled temporary policy modification **regarding management of an albuterol solution shortage** is required.

Consistent with *Santa Clara County Prehospital Care Policy 109: Policy Development and Implementation*, the EMS Director, or designee, may issue Administrative Orders when immediate changes are necessary.

**II. Statement of Change and Rationale**

Sterile generic drugs used in emergency conditions are often produced by one or only a few pharmaceutical companies. In February 2023 one of the manufacturers of albuterol solution ceased operations resulting in market pressure on the other manufacturers. Backorders and shortage of albuterol solution followed. This Administrative Order explains the procedures to be followed as the albuterol solution shortage evolves and for the introduction of levalbuterol solution or metered-dose inhalers (MDIs), and albuterol MDIs, both MDIs with valved holding chambers (spacers).

**III. Procedure**

The following changes will be implemented whenever an existing Santa Clara County EMS Agency protocol indicates the use of nebulized albuterol solution.

A. Albuterol Solution Conservation and the Addition of Levalbuterol

1. Reserve the use of albuterol solution or levalbuterol solution for the highest acuity patients. Nebulized albuterol or levalbuterol should be used when indicated for bronchoconstriction with:
  - i. BVM ventilation or respiratory support, or
  - ii. CPAP respiratory support, or
  - iii. Bronchospasm with:
    1. SpO<sub>2</sub> < 94% on supplemental oxygen
    2. ETCO<sub>2</sub> > 45 mmHg
    3. RR > 30/min
    4. Accessory muscle of respiration use
    5. Respiratory fatigue
    6. Paramedic discretion

7. Consider using one unit dose of albuterol or levalbuterol solution at a time, reassessing, then repeating the dose as needed
8. Dose:
  - a. Albuterol Solution:
    - i. 2.5mg/3ml
  - b. Levalbuterol solution:
    - i. 1.25mg/3ml
    - ii. 0.63mg/3ml x2

B. Albuterol or Levalbuterol Metered-Dose Inhalers with Spacers

1. The spacer provides a volume into which the MDI solid aerosol can be released, then inhaled by the patient over a few breaths. Unlike a MDI discharged directly into a patient's airway, there is no need to try to synchronize inspiration with actuation of the MDI. The spacer also allows multiple doses (puffs) of the MDI to be delivered sequentially. Giving a momentary cumulative dose greater than a single puff or two as is usually given when a patient uses a prescribed inhaler. Optimal use of the MDI with spacer requires coaching the patient to take tidal breaths through the spacer while the paramedic administers sequential puffs from the MDI, then continues to take tidal breaths to inhale the full dose of the administered albuterol or levalbuterol. The spacers are single-patient use. The pressurized canisters can be removed from the plastic actuators. The actuators can be disinfected and reassembled for multiple patients use. Nebulized albuterol or levalbuterol and albuterol or levalbuterol administered via an MDI with spacer are pharmacologically equivalent. However, patient acceptance of and cooperation with an MDI with spacer and patient acuity can determine the individualized decision for albuterol or levalbuterol delivery method. In higher acuity patients a mask nebulizer can be placed on the patient freeing EMS personnel for other tasks.
2. Use of an MDI with Spacer:
  - a. Use the patient's prescribed MDI with the addition of a spacer first
  - b. Shake MDI and assemble MDI and spacer with mouthpiece or mask
  - c. Coach the patient to take tidal breaths through the spacer
  - d. It may be helpful to have a parent or familiar caretaker hold a child and hold the mask of the spacer while the paramedic actuates the MDI
  - e. With the patient taking tidal breaths through the spacer, administer 6 puffs of albuterol or levalbuterol from the MDI
  - f. Continue a few tidal breaths after completions of MDI puffs
  - g. Dosing of albuterol or levalbuterol with an MDI with spacer can be repeated as needed; guided by patient's subjective relief of

dyspnea and clinical assessment of bronchospasm (e.g. every 3-5 min)

**III. Disinfection of the MDI Actuator**


- A. The spacer is a single-patient use device and ***should not*** be reused
- B. Remove the pressurized canister from the plastic actuator
- C. Wipe the actuator and actuator cap with disinfectant, covering all surfaces inside and outside, then allow surfaces to air dry
- D. Reassemble the MDI


**IV. Summary**

- A. 2.5 mg/3ml albuterol solution, or
- B. 1.25mg/3ml levalbuterol solution, or
- C. 0.63mg/3ml x2 levalbuterol solution, or
- D. 6 puffs albuterol MDI with spacer, or
- E. 6 puffs levalbuterol MDI with spacer
- F. Dosing of albuterol or levalbuterol with an MDI with spacer can be repeated as needed; guided by patient's subjective relief of dyspnea and clinical assessment of bronchospasm (e.g. every 3-5min)

**III. Execution**

Administrative Order # 2023-001 is in effect as of March 30, 2023. This Administrative Order will remain in effect for ninety (90) days and will expire on June 29, 2023.

DocuSigned by:  
  
F6386C200G4C464  
\_\_\_\_\_  
Ken Miller, MD, PhD  
EMS Medical Director

DocuSigned by:  
  
3B4CAB11C66447B...  
\_\_\_\_\_  
Jackie Lowther, RN, MSN, MBA  
EMS Agency Director

Please direct any questions to Ken Miller, MD, EMS Medical Director, by phone at 408.794.0615, or via email at [kenneth.miller@ems.sccgov.org](mailto:kenneth.miller@ems.sccgov.org)