Providence Health Care	Department: Respiratory Services	Original Date: November 1990 Last Review/Revision: May 2007
PROCEDURE	Topic: Critical Care Delivery of Medication by MDI to the Ventilated Patient (Respiratory Therapy) Number: B-00-12-12010	Links Related to Topic: None

GENERAL INFORMATION:

In mechanically ventilated patients, delivery of bronchodilator therapy via metered dose inhaler (MDI) is cost-effective, convenient, and safe. When the technique is optimized, the efficiency of drug delivery is comparable to that in ambulatory patients.

Dry powder inhalers can not be used with mechanically ventilated patients because of the presence of humidity within the ventilator circuit.

EQUIPMENT:

MDl canister(s)
MDl adapter (ICU stock or in ventilator circuit)
2-alcohol swabs
Stethoscope
Gloves (and other personal protective equipment as required)
Suction equipment for endotracheal tube suctioning (refer to B-00-12-12017).

PROCEDURE:

1. Gather equipment and supplies.
2. Verify physician's order and explain the procedure to the patient.
3. Wash your hands. Put on gloves. If there is a chance of becoming exposed to any aerosolized particles from the ventilator circuit, gown, mask and goggles are also required. Follow all other infection control measures as required.
4. Suction the endotracheal tube to remove airway secretions.
5. Perform a pre-bronchodilator therapy assessment on the patient (auscultate the chest, observe ventilator waveforms, measure autoPEEP) and record on the Respiratory Therapy Flowsheet.
6. Use one alcohol swab to thoroughly wipe the tip of the MDI. Use a new alcohol swab to wipe the port of the MDI actuator.

7. Shake the MDI canister well to mix the medication with the propellant and warm to hand temperature.

8. Connect the MDI canister to the actuator, ensuring that the canister is vertical.

9. Remove heat-moisture exchanger (HME) from circuit (if present).

10. Actuate the MDI at the ***beginning*** of inspiration by pressing down on the canister.

    - There is no evidence to support alterations in ventilator settings when delivering bronchodilators via MDI.
    - If the patient is breathing spontaneously and is able to cooperate, instruct the patient to breath hold for 1-2 seconds after actuation of the MDI.

11. Wait at least 15 seconds between actuations. A maximum of 2 actuations may be administered without removing and re-shaking the canister.

12. With each actuation, observe the ventilator system to ensure medication is being delivered.

13. When the prescribed dose has been delivered, remove the MDI canister from the actuator and wipe the tip with a new alcohol swab. Return the canister to the bedside in the Respiratory basket.

14. Return the HME to the circuit (if applicable).

15. Remove personal protective equipment. Wash your hands.

16. Initial the Medication Administration Record (MAR) to indicate that the medication was given.

17. Assess the effectiveness of therapy (auscultate the chest, observe ventilator waveforms, assess autoPEEP) and record on the Respiratory Therapy Flowsheet. NOTE: therapeutic effectiveness should be evaluated after the onset of action for the bronchodilator administered.

18. MDI canisters used on mechanically ventilated patients are NOT recycled between patients. Discard all partially used canisters between patients.

REFERENCES:

1. Fink, JB, et al. *Reconciling in vitro and in vivo measurements of aerosol delivery from a metered-dose inhaler during mechanical ventilation and defining efficiency-enhancing factors.* Am J Respir Crit Care Med 1999; 159: 63-68.

2. Georgopoulos, D., et al. *Bronchodilator delivery with metered-dose inhaler during mechanical ventilation.* Crit Care 2000, 4: 227-234.

3. Rau, JL, et al. *Inhalation of single vs multiple metered-dose bronchodilator actuations from reservoir devices.* Chest 1996; 109: 969-74.

4. Dhand, R. *Inhalation therapy with metered-dose inhalers and dry powder inhalers in mechanically ventilated patients.* Resp Care 2005; 50: 1131-1345.