

TITLE: INHALATION/ENDOTRACHEAL ADMINISTRATION OF ANTIINFECTIVES – ADULT PATIENTS

GUIDELINES:

Based on recommendations from the Subcommittee on Anti-Infective Use and the Formulary and Therapeutics Committee, these guidelines shall be used by prescribers and pharmacy personnel to aid in the prescribing and administering of anti-infectives via inhalation or endotracheal routes. It is important to note that the literature supporting this route of administration is limited. This route may be considered in the select patients listed or as advised by an Infectious Diseases or Pulmonary provider.

PURPOSE:

To aid in the prescribing and administering of anti-infectives that may be administered via inhalation or endotracheal routes in select patients requiring such therapies for prophylaxis or adjunctive and/or primary treatment of respiratory infections.

APPLICABILITY:

Prescribers, pharmacists, and nurses

PROCEDURE:

- I. Potential indications for aerosolized delivery of antimicrobial agents include:
 - A. Prophylaxis of pulmonary infections
 1. Patients with lung disease (e.g., chronic bronchiectasis),
 2. Lung transplantation patients immediately post-operatively per protocol (i.e., liposomal amphotericin B) or
 3. Lung transplant patients intolerant/refractory to systemic anti-fungal prophylaxis and isolation of fungus from lung/sputum specimens.
 - B. Treatment of pulmonary infections
 1. Patients with lung disease (e.g., chronic bronchiectasis),
 2. Patients intolerant to systemic therapy (e.g., acute/chronic renal failure),
 3. Patients requiring adjuvant therapy to increase parenchymal concentrations due to decreased susceptibility, identification of a multi-drug resistant organism, severity of disease, or lack of adequate drug distribution.
 - C. Cystic Fibrosis patients **not** receiving a single or double lung transplantation
 1. Prophylaxis: Tobramycin inhalation (TOBI®) 300 mg q12h for 30 days every other month
 2. Treatment: Tobramycin inhalation (TOBI®) 300 mg q12h
- II. Dosing recommendations for individual agents please see Tables I, II, III, and IV. Please note: Inhalation anti-infectives cannot be mixed with or administered at the same time as other inhalation medications. Inhalation products which are administered continuously (e.g., inhalation epoprostenol), are not appropriate candidates for inhalation anti-infective therapy.

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Sites: All Centers
Guideline: Medication Use Manual

Table I- Aerosolized Aminoglycosides (Adult adjuvant/primary treatment of pulmonary infections)

Aminoglycosides	Indications	Dose	Preparation (Pharmacy)	Comments
Gentamicin	<ul style="list-style-type: none"> Prophylaxis of patients undergoing a lung transplant per septic pathway protocol according to microbiological susceptibilities. 	80 mg nebulized/tracheal q12h	<ul style="list-style-type: none"> Utilize pediatric preservative-free solution for injection (20 mg/2 mL) Withdraw 8 mL total volume. 	<ul style="list-style-type: none"> May cause wheezing or bronchospasm; consider pretreatment with albuterol
Tobramycin	<ul style="list-style-type: none"> Treatment of patients requiring adjuvant therapy to increase parenchymal concentrations due to decreased susceptibility, identification of a multi-drug resistant organism, or severity of disease. 	80 mg nebulized/tracheal q12h	<ul style="list-style-type: none"> Utilizing the preservative free tobramycin 1.2 g powder for reconstitution add 30 mL of sterile water for injection providing a concentration of 40 mg/mL. Withdraw 2 mL for a total of 80 mg and QS with NS for 10 mL total volume. 	<ul style="list-style-type: none"> Systemic absorption possible; consider monitoring BUN and SCr in patients receiving long-term therapy and trough concentrations when systemic accumulation suspected
Amikacin		500 mg nebulized/tracheal q12h	<ul style="list-style-type: none"> Utilize solution for injection (500 mg/2 mL) QS with NS to 10 mL total volume. 	

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Table II- Aerosolized Colistimethate Sodium (Colistin®)-Adult Cystic Fibrosis Prophylaxis or Adjunctive Treatment

Indications	Dose	Preparation (Nurse/ Respiratory Therapy)	Comments
<ul style="list-style-type: none"> Prophylaxis of patients with lung disease (e.g., cystic fibrosis, chronic bronchiectasis) who are intolerant or resistant to tobramycin. Treatment of patients requiring adjuvant therapy to increase parenchymal concentrations due to decreased susceptibility, identification of a multi-drug resistant organism, or severity of disease. 	75 - 150 mg nebulized/ tracheal q12h	<ul style="list-style-type: none"> Vials for reconstitution will be dispensed by Pharmacy Utilize the powder for injection, as sodium, lyophilized: 150 mg Nurse or Respiratory Therapist: Reconstitute 150 mg vial with 4 mL of normal saline. Swirl gently. Withdraw 2 mL (75 mg dose) or 4 mL (150 mg dose) discard remainder. Administer via nebulizer immediately. For intubated patients place medication in a T-piece at the mid-inspiratory circuit. 	<ul style="list-style-type: none"> Administer solution promptly following preparation to decrease possibility of high concentrations of colistin from forming which may lead to potentially life-threatening lung toxicity. Use a new vial for each dose.

Table III- Aerosolized Lipid Amphotericin B (Abelcet®) – Adult Lung Transplant Patients per Protocol

Indication	Dose	Preparation (Pharmacy)	Comments
<ul style="list-style-type: none"> Prophylaxis immediately post lung transplant or lung transplant patients intolerant/refractory to systemic anti-fungal prophylaxis and had isolation of fungus from lung/sputum specimens. 	<p><u>Intubated patients:</u> Lipid Amphotericin 100 mg x 4 doses then 100 mg qweek (Tuesday or Friday)</p> <p><u>Extubated patients:</u> 50 mg nebulized daily for 4 days then 50 mg nebulized qweek (Tuesday or Friday)</p>	<ul style="list-style-type: none"> 100 mg dose: Withdraw 20 mL lipid amphotericin B (5 mg/mL) into an oral syringe. 50 mg dose: Withdraw 10 mL lipid amphotericin B (5 mg/mL) into an oral syringe. Administer via nebulizer over 15 minutes. Larger doses may require 2 separate administrations. 	<ul style="list-style-type: none"> Patients may experience bronchospasms, monitor patients for adverse events.

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Table IV- Aerosolized Pentamidine [e.g., Adult *Pneumocystis jiroveci* pneumonia (PCP) Prophylaxis]

Indication	Dose	Preparation (Nurse/ Respiratory Therapy)	Comments
<ul style="list-style-type: none"> Prophylaxis of PCP in immunosuppressed patients with a contraindication, adverse event, or intolerance to other prophylaxis therapies. 	300 mg nebulized once per month	<ul style="list-style-type: none"> Powder for injection or nebulization will be dispensed from Pharmacy. Utilize the Powder for nebulization or injection if the nebulization product is unavailable. 	<ul style="list-style-type: none"> Please reference Department of Nursing Procedure Manual PROC 459 – Aerosolized Pentamidine Administration Procedure

REFERENCES:

1. Le J, Dodds Ashley E, Neuhauser MM, et al. Consensus summary of aerosolized antimicrobial agents: application of guideline criteria. Insights from the Society of Infectious Diseases Pharmacists. *Pharmacotherapy* 2010; 30:562-584.
2. Klustersky J, Geuning C, Mouawad E, et al. Endotracheal gentamicin in bronchial infections in patients with tracheostomy. *Chest* 1972; 61: 117-120.
3. Czosnowski QA, Wood GC, Magnotti JL, et al. Adjunctive aerosolized antibiotics for treatment of ventilator-associated pneumonia. *Pharmacotherapy* 2009; 29: 1054-1060.

RESPONSIBILITY:

Joint Subcommittee on Anti-Infective Use

GUIDELINE DATES:

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