# Complete Summary

## GUIDELINE TITLE

Bland aerosol administration: 2003 revision and update.

## BIBLIOGRAPHIC SOURCE(S)

Kallstrom TJ. AARC clinical practice guideline. Bland aerosol administration--2003 revision & update. Respir Care 2003 May;48(5):529-33. [23 references] PubMed

## GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American Association for Respiratory Care (AARC). AARC clinical practice guideline. Bland aerosol administration. Respir Care 1993 Nov;38(11):1196-200.

## COMPLETE SUMMARY CONTENT

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## SCOPE

### DISEASE/CONDITION(S)

Pulmonary disease

### GUIDELINE CATEGORY

Evaluation
Management
Treatment

### CLINICAL SPECIALTY

Family Practice
Internal Medicine
Pulmonary Medicine

### INTENDED USERS

Respiratory Care Practitioners

### GUIDELINE OBJECTIVE(S)

- To improve the consistency and appropriateness of respiratory care and serve as a guide for education and research
- To provide clinical practice guidelines on bland aerosol administration

### TARGET POPULATION

- Individuals with the presence of upper airway edema (i.e., laryngotracheobronchitis [LTB]; subglottic edema; post-extubation edema)
- Patients in the postoperative period for management of the upper airway
- Patients with a bypassed upper airway
- Patients requiring laboratory evaluation of sputum specimens

### INTERVENTIONS AND PRACTICES CONSIDERED

Bland aerosol administration, which includes the delivery of sterile water or hypotonic, isotonic, or hypertonic saline in aerosol form

**Note**: Bland aerosol administration may or may not be accompanied by oxygen administration.

### MAJOR OUTCOMES CONSIDERED

- Effectiveness of bland aerosol administration for airway humidification
- Effects of bland aerosol on mucus production and mucus properties
- Complications of bland aerosol administration

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

### METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

### METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

### METHOD OF GUIDELINE VALIDATION

External Peer Review

### DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Consultants to the Working Group may review the initial draft of the guideline. After the Working Group completes its review, the draft is reviewed by the entire Steering Committee and then by a Review Panel (i.e., persons engaged in all facets of the delivery of respiratory care who have volunteered to review drafts of the Guidelines before publication).

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

#### Description/Definition

For purposes of the guideline, bland aerosol administration includes the delivery of sterile water or hypotonic, isotonic, or hypertonic saline in aerosol form. Bland aerosol administration may or may not be accompanied by oxygen administration.

- The use of cool, bland aerosol therapy is primarily indicated for upper airway administration; therefore, a mass median aerodynamic diameter (MMAD) $\geq$5 microns is desirable.
- The use of hypo- and hypertonic saline is primarily indicated for inducing sputum specimens; therefore, a MMAD of 1-5 microns is desirable.
- The use of heated bland aerosol is indicated primarily for minimizing humidity deficit when the upper airway has been bypassed; therefore, a MMAD of 2-10 microns is desirable.

**Settings**

Bland aerosol therapy can be administered in settings that include hospital, clinic, extended care facility, and home.

**Indications**

- The presence of upper airway edema--cool bland aerosol
    - Laryngotracheobronchitis (LTB)
    - Subglottic edema
    - Post-extubation edema
    - Postoperative management of the upper airway
- The presence of a bypassed upper airway
- The need for sputum specimens or mobilization of secretions

**Limitations of Method**

- The efficacy of intermittent or continuous use of bland aerosol as a means of reducing mucus has not been established. Bland aerosol is not a substitute for systemic hydration.
- The physical properties of mucus are only minimally affected by the addition of water aerosol.
- Bland aerosol for humidification when the upper airway has been bypassed is not as efficient or effective as are heated water humidifiers or adequately designed heat moisture exchangers (HME) because of the:
    - difficulties in maintaining temperature at patient airway
    - possible irritation to the airway
    - infection risk

**Assessment of Need**

- The presence of one or more of the following may be an indication for administration of sterile water or isotonic or hypotonic saline aerosol:
    - Stridor
    - Brassy, croup-like cough
    - Hoarseness following extubation
    - Diagnosis of LTB or croup

    - Clinical history suggesting upper airway irritation and increased work of breathing (e.g., smoke inhalation)
    - Patient discomfort associated with airway instrumentation or insult
    - Bypassed upper airway
- The presence of the need for sputum induction (e.g., for diagnosis of *Pneumocystis carinii* pneumonia or tuberculosis) is an indication for administration of hypertonic saline aerosol.

**Resources**

- Equipment--depending upon the specific application, components may include:
    - Aerosol generator
        - Large volume nebulizer
        - Ultrasonic nebulizer
        - Small volume nebulizer
    - Heater or cooling device
    - Patient application device
        - Mist tent
        - Hood
        - Mouthpiece
        - Mask
        - T-piece
        - Face tent
        - Tracheostomy collar
    - Corrugated aerosol tubing and water trap
    - Tissues and emesis basin or container for collecting or disposing of expectorated sputum
    - Gloves, goggles, gown, and mask
    - Suction device and catheters
    - Oxygen analyzer
    - Device for filtering exhaled gas during sputum induction, with scavenger or filter system
    - Thermometer
- Personnel:
    - Level I caregiver--may be the provider of service after Level II personnel have established need for a specific device by patient assessment and the first administration has been completed. Level I personnel must demonstrate:
        - Proper preparation, measurement, and mixing of solution
        - Proper technique for administration of solution to be aerosolized
        - Proper use of equipment
        - Effective cleaning of equipment
        - Appropriate disposal of wastes
        - Ability to encourage effective breathing patterns and coughing techniques
        - Ability to modify techniques in response to adverse reactions as instructed and to appropriately communicate with physician, detailing the severity of symptoms
        - Compliance with Standard Precautions and proper infection control procedures

- Level II personnel--will supervise Level I personnel. Level II personnel are responsible for initial assessments and care of the unstable patient, and must demonstrate knowledge and skill related to:
    - Indications and limitations for aerosol devices and associated equipment
    - Proper use, maintenance, and cleaning of equipment, including filter and scavenging systems
    - Risks inherent to the aerosolized solution and specific devices
    - Procedures for safely disposing of hazardous wastes
    - Breathing patterns and coughing techniques
    - Modification of technique in response to adverse reactions
    - Modification of flowrates and temperature as prescribed, in response to severity of symptoms
    - Assessment of patient condition and response to therapy
    - Auscultation, inspection, and monitoring of vital signs
    - Determination of peak expiratory flowrate, spirometry, and ventilatory mechanics
    - Recognition and response to adverse reactions and complications of procedure
    - Understanding and compliance with Standard Precautions
    - Proper disposition of medical waste

**Monitoring**

The extent of patient monitoring should be determined on the basis of the stability and severity of the patient's condition:

- Patient subjective response--pain, discomfort, dyspnea, restlessness
- Heart rate and rhythm, blood pressure
- Respiratory rate, pattern, mechanics, accessory muscle use
- Sputum production quantity, color, consistency
- Skin color
- Breath sounds
- Pulse oximetry (if hypoxemia is suspected)
- Spirometry equipment (if concern of adverse reaction)

**Frequency**

- Critical care or emergency room settings that require continuous administration of bland aerosol necessitate close monitoring:
    - Short duration: 4-8 hours following extubation
    - Subglottic edema: until clinical evidence of edema has subsided
    - Long duration: artificial airways
    - Re-evaluation every 8 hours or with change in clinical condition
- Acute care patients should be evaluated for response to therapy of continuous administration of bland cool aerosol for LTB and re-evaluated at least every 48-72 hours or with change in clinical response.
- Home care patients should be re-evaluated periodically for response to therapy or with change in status.
- Sputum induction should be performed as often as necessary to yield appropriate specimen for desired examination (e.g., each morning for 3 days for acid-fast bacillus).

**Infection Control**

- Standard Precautions for body fluid isolation are to be implemented.
- Centers for Disease Control and Prevention recommendations for control of exposure to tuberculosis and droplet nuclei are to be implemented when the patient is known or suspected to be immunosuppressed, is known to have tuberculosis or has other risk factors for the disease.
    - To reduce aerosol contamination of room air:
        - Enclose and contain aerosol administration.
        - Filter aerosols that bypass or are exhaled by patient.
        - When aerosol release to the atmosphere cannot be routed through a filter:
            - Use filtered scavenger systems to remove aerosols that cannot be contained.
            - Provide local exhaust ventilation to remove aerosols that are released into room air.
            - Provide frequent air exchange to dilute concentration of aerosol in room.
            - Allow exchange of gas in the room to eliminate 99% of aerosol before the next patient enters or receives treatment in that area.
            - Provide booths or stalls for sputum induction in areas in which multiple patients are treated. Booths or stalls should be designed to provide adequate airflow to draw aerosol and droplet nuclei from the patient and into an appropriate filtration system with exhaust directed to an appropriate outside vent. Booths should be adequately cleaned between patients.
        - Filters, nebulizers, and other contaminated disposable components of the aerosol delivery system should be treated as hazardous waste.
        - Personal protection devices should be used to reduce exposure when engineering alternatives are not adequate or in place.
            - Use properly fitted respirator with adequate filtration when flow exhaust cannot control removal of aerosols.
            - Goggles, gloves, masks, and gowns should be used to serve as splatter shields and to reduce exposure to body substances.
        - Personnel should safely dispose of hazardous wastes.
        - Personnel who are at high risk for adverse effects from exposure should be offered an opportunity for alternative assignments.
    - Nebulizers should not be reused between patients without disinfection.
    - Nebulizers should be sterilized, changed, or cleaned, according to institutional infection control policy or at conclusion of a procedure that is not to be repeated.
    - Solutions should be handled aseptically.
    - Solutions from multidose sources must be handled aseptically and discarded after 24 hours.

**CLINICAL ALGORITHM(S)**

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated. The guideline is developed from a thorough review of the literature, surveys of current practice, and the expertise of the members of the Working Group.

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Appropriate clinical utilization of bland aerosol administration
- Desired patient outcomes with administration of water or hypotonic or isotonic saline, including decreased work of breathing; improved vital signs; decreased stridor; decreased dyspnea; improved arterial blood gas values; improved oxygen saturation as indicated by pulse oximetry ($S_{pO2}$).
- With the administration of hypertonic saline, successful attainment of adequate sputum sample for analysis

### POTENTIAL HARMS

- Wheezing or bronchospasm
- Bronchoconstriction when artificial airway is employed
- Infection
- Overhydration
- Patient discomfort
- Caregiver exposure to droplet nuclei of *Mycobacterium tuberculosis* or other airborne contagion produced as a consequence of coughing, particularly during sputum induction
- Edema of the airway wall
- Edema associated with decreased compliance and gas exchange and with increased airway resistance
- Sputum induction by hypertonic saline inhalation can cause bronchoconstriction in patients who have chronic obstructive pulmonary disease (COPD), asthma, cystic fibrosis, or other pulmonary diseases.

## CONTRAINDICATIONS

### CONTRAINDICATIONS

Contraindications to bland aerosol administration:

- Bronchoconstriction

- History of airway hyperresponsiveness

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

#### Outcome Assessment

- With administration of water or hypotonic or isotonic saline, the desired outcome is the presence of one or more of the following:
    - Decreased work of breathing
    - Improved vital signs
    - Decreased stridor
    - Decreased dyspnea
    - Improved arterial blood gas values
    - Improved oxygen saturation as indicated by pulse oximetry ($S_{pO2}$)
- With administration of hypertonic saline, the desired outcome is a sputum sample adequate for analysis.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better
Living with Illness

### IOM DOMAIN

Effectiveness
Safety

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Kallstrom TJ. AARC clinical practice guideline. Bland aerosol administration--2003 revision & update. Respir Care 2003 May;48(5):529-33. [23 references] PubMed

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

1993 Dec (revised 2003)

## GUIDELINE DEVELOPER(S)

American Association for Respiratory Care - Professional Association

## SOURCE(S) OF FUNDING

American Association for Respiratory Care (AARC)

## GUIDELINE COMMITTEE

Aerosol Therapy Guidelines Committee

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

## GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: American Association for Respiratory Care (AARC). AARC clinical practice guideline. Bland aerosol administration. Respir Care 1993 Nov;38(11):1196-200.

## GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American Association for Respiratory Care (AARC) Web site.

Print copies: Available from the American Association for Respiratory Care (AARC), CPG Desk, 11030 Ables Ln, Dallas, TX 75229-4593; Web site: www.aarc.org.

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

None available

## NGC STATUS

This summary was completed by ECRI on November 30, 1998. The information was verified by the guideline developer on December 15, 1998. This summary was updated by ECRI on August 20, 2003.

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