

## AARC Clinical Practice Guideline

### Bland Aerosol Administration—2003 Revision & Update

#### **BAA 1.0 PROCEDURE:**

Bland aerosol administration

#### **BAA 2.0 DESCRIPTION/DEFINITION:**

For purposes of this guideline, bland aerosol administration includes the delivery of sterile water or hypotonic, isotonic, or hypertonic saline in aerosol form.<sup>1</sup> Bland aerosol administration may or may not be accompanied by oxygen administration.

**2.1** The use of cool, bland aerosol therapy is primarily indicated for upper airway administration;<sup>1,2</sup> therefore, a mass median aerodynamic diameter (MMAD) 5 micron is desirable.

**2.2** The use of hypo- and hypertonic saline is primarily indicated for inducing sputum specimens; therefore, a MMAD of 1-5 microns is desirable.

**2.3** The use of heated bland aerosol is indicated primarily for minimizing humidity deficit when the upper airway has been bypassed;<sup>3</sup> therefore, a MMAD of 2-10 microns is desirable.

#### **BAA 3.0 SETTINGS:**

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

#### **BAA 4.0 INDICATIONS:**

**4.1** The presence of upper airway edema—cool bland aerosol<sup>1,2</sup>

**4.1.1** Laryngotracheobronchitis (LTB)<sup>1,2</sup>

**4.1.2** Subglottic edema<sup>1,2</sup>

**4.1.3** Post-extubation edema<sup>1,2</sup>

**4.1.4** Postoperative management of the upper airway

**4.2** The presence of a bypassed upper airway<sup>3</sup>

**4.3** The need for sputum specimens or mobilization of secretions<sup>3,4</sup>

#### **BAA 5.0 CONTRAINDICATIONS:**

**5.1** Bronchoconstriction<sup>1,3,5,6</sup>

**5.2** History of airway hyperresponsiveness<sup>1,2,5,6</sup>

#### **BAA 6.0 HAZARDS/COMPLICATIONS:**

**6.1** Wheezing or bronchospasm<sup>1,3,5,6</sup>

**6.2** Bronchoconstriction when artificial airway is employed<sup>7-11</sup>

**6.3** Infection<sup>12</sup>

**6.4** Overhydration<sup>12</sup>

**6.5** Patient discomfort

**6.6** Caregiver exposure to droplet nuclei of *Mycobacterium tuberculosis* or other airborne contagious microorganism produced as a consequence of coughing, particularly during sputum induction

**6.7** Edema of the airway wall<sup>13</sup>

**6.8** Edema associated with decreased compliance and gas exchange and with increased airway resistance

**6.9** Sputum induction by hypertonic saline inhalation can cause bronchoconstriction with patients who have COPD,<sup>14</sup> asthma, cystic fibrosis, or other pulmonary diseases.<sup>15</sup>

#### **BAA 7.0 LIMITATIONS OF METHOD:**

**7.1** The efficacy of intermittent or continuous use of bland aerosol as a means of reducing mucus has not been established.<sup>1-3</sup> Bland aerosol is not a substitute for systemic hydration.

**7.2** The physical properties of mucus are only minimally affected by the addition of water aerosol.<sup>16</sup>

**7.3** 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

**7.3.1** Difficulties in maintaining temperature at patient airway

**7.3.2** Possible irritation to the airway<sup>7-11</sup>

**7.3.3** Infection risk<sup>12</sup>

**BAA 8.0 ASSESSMENT OF NEED:**

**8.1** The presence of one or more of the following may be an indication for administration of sterile water or isotonic or hypotonic saline aerosol:

- 8.1.1** Stridor
- 8.1.2** Brassy, croup-like cough
- 8.1.3** Hoarseness following extubation
- 8.1.4** Diagnosis of LTB or croup
- 8.1.5** Clinical history suggesting upper airway irritation and increased work of breathing (eg, smoke inhalation)
- 8.1.6** Patient discomfort associated with airway instrumentation or insult
- 8.1.7** Bypassed upper airway

**8.2** The presence of the need for sputum induction (eg, for diagnosis of *Pneumocystis carinii* pneumonia,<sup>17-19</sup> tuberculosis) is an indication for administration of hypertonic saline aerosol.

**BAA 9.0 ASSESSMENT OF OUTCOME:**

**9.1** With administration of sterile water or hypotonic or isotonic saline, the desired outcome is the presence of one or more of the following:

- 9.1.1** Decreased work of breathing
- 9.1.2** Improved vital signs
- 9.1.3** Decreased stridor
- 9.1.4** Decreased dyspnea
- 9.1.5** Improved arterial blood gas values
- 9.1.6** Improved oxygen saturation as indicated by pulse oximetry ( $S_{pO_2}$ )

**9.2** With administration of hypertonic saline, the desired outcome is a sputum sample adequate for analysis.

**BAA 10.0 RESOURCES:**

**10.1** Equipment—Depending upon the specific application, components may include:

- 10.1.1** Aerosol generator
  - 10.1.1.1** Large-volume nebulizer
  - 10.1.1.2** Ultrasonic nebulizer
  - 10.1.1.3** Small-volume nebulizer
- 10.1.2** Heater or cooling device
- 10.1.3** Patient application device
  - 10.1.3.1** Mist tent
  - 10.1.3.2** Hood
  - 10.1.3.3** Mouthpiece
  - 10.1.3.4** Mask
  - 10.1.3.5** T-piece
  - 10.1.3.6** Face tent

**10.1.3.7** Tracheostomy collar

**10.1.4** Corrugated aerosol tubing and water trap

**10.1.5** Tissues and emesis basin or container for collecting or disposing of expectorated sputum

**10.1.6** Gloves, goggles, gown, and mask

**10.1.7** Suction device and catheters

**10.1.8** Oxygen analyzer

**10.1.9** Device for filtering exhaled gas during sputum induction, with scavenger or filter system

**10.1.10** Thermometer

**10.2** Resources—Personnel

**10.2.1** 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:

**10.2.1.1** Proper preparation, measurement, and mixing of solution

**10.2.1.2** Proper technique for administration of solution to be aerosolized

**10.2.1.3** Proper use of equipment

**10.2.1.4** Effective cleaning of equipment

**10.2.1.5** Appropriate disposal of wastes

**10.2.1.6** Ability to encourage effective breathing patterns and coughing techniques

**10.2.1.7** Ability to modify techniques in response to adverse reactions as instructed and to appropriately communicate with physician, detailing the severity of symptoms

**10.2.1.8** Compliance with Standard Precautions and proper infection control procedures

**10.2.2** Level II personnel supervise Level I personnel, are responsible for initial assessments and care of the unstable patient, and must demonstrate knowledge and skill related to:

**10.2.2.1** Indications and limitations for aerosol devices and associated equipment

**10.2.2.2** Proper use, maintenance, and cleaning of equipment, including filter and scavenging systems

**10.2.2.3** Risks inherent to the

aerosolized solution and specific devices

**10.2.2.4** Procedures for safely disposing of hazardous wastes

**10.2.2.5** Breathing patterns and coughing techniques

**10.2.2.6** Modification of technique in response to adverse reactions

**10.2.2.7** Modification of flowrates and temperature as prescribed, in response to severity of symptoms

**10.2.2.8** Assessment of patient condition and response to therapy

**10.2.2.9** Auscultation, inspection, and monitoring of vital signs

**10.2.2.10** Determination of peak expiratory flowrate, spirometry, and ventilatory mechanics

**10.2.2.11** Recognition and response to adverse reactions and complications of procedure

**10.2.2.12** Understanding of and compliance with Standard Precautions

**10.2.2.13** Proper disposition of medical waste

### **BAA 11.0 MONITORING:**

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

**11.1** Patient subjective response—pain, discomfort, dyspnea, restlessness

**11.2** Heart rate and rhythm, blood pressure

**11.3** Respiratory rate, pattern, mechanics, accessory muscle use

**11.4** Sputum production: quantity, color, consistency

**11.5** Skin color

**11.6** Breath sounds

**11.7** Pulse oximetry

**11.8** Spirometry equipment (if concern of adverse reaction)

### **BAA 12.0 FREQUENCY:**

**12.1** Critical care or emergency room settings that require continuous administration of bland aerosol necessitate close monitoring.

**12.1.1** Short duration: 4-8 hours following extubation

**12.1.2** Subglottic edema: until clinical ev-

idence of edema has subsided

**12.1.3** Long duration: artificial airways

**12.1.4** Re-evaluation every 8 hours or with change in clinical condition

**12.2** 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.

**12.3** Home care patients should be re-evaluated periodically for response to therapy or with change in status.

**12.4** Sputum induction should be performed as often as necessary to yield appropriate specimen for desired examination (eg, each morning for 3 days for acid-fast bacillus).

### **BAA 13.0 INFECTION CONTROL:**

**13.1** Standard Precautions for body fluid isolation are to be implemented.<sup>20</sup>

**13.2** Centers for Disease Control and Prevention recommendations for control of exposure to tuberculosis and droplet nuclei are to be implemented when patient is known or suspected to be immunosuppressed, is known to have tuberculosis, or has other risk factors for the disease.<sup>21</sup>

**13.2.1** To reduce aerosol contamination of room air

**13.2.1.1** Enclose and contain aerosol administration.

**13.2.1.2** Filter aerosols that bypass or are exhaled by patient.

**13.2.1.3** When aerosol release to the atmosphere cannot be routed through a filter:

**13.2.1.3.1** Use filtered scavenger systems to remove aerosols that cannot be contained.

**13.2.1.3.2** Provide local exhaust ventilation to remove aerosols that are released into room air.

**13.2.1.3.3** Provide frequent air exchange to dilute concentration of aerosol in room.

**13.2.1.3.4** Allow exchange of gas in the room to eliminate 99% of aerosol before next patient enters or receives treatment in that area.

**13.2.1.3.5** 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.

**13.2.2** Filters, nebulizers, and other contaminated disposable components of the aerosol delivery system should be treated as hazardous waste.

**13.2.3** Personal protection devices should be used to reduce exposure when engineering alternatives are not adequate or in place.<sup>21</sup>

**13.2.3.1** Use properly fitted respirator with adequate filtration when flow exhaust cannot control removal of aerosols.

**13.2.3.2** Goggles, gloves, masks, and gowns should be used to serve as splatter shields and to reduce exposure to body substances.

**13.2.4** Personnel should safely dispose of hazardous wastes.

**13.2.5** Personnel who are at high risk for adverse effects from exposure should be given alternative assignments.

**13.3** Nebulizers should not be reused between patients without disinfection.

**13.4** 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.<sup>22,23</sup>

**13.5** Solutions should be handled aseptically.

**13.6** Solutions from multidose sources must be handled aseptically and discarded after 24 hours.

*Revised by Thomas J Kallstrom RRT, FAARC, Fairview Hospital, Cleveland, Ohio, and approved by the 2003 CPG Steering Committee*

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