



Use of Aerosolized Medications

HKTS and ACCP (HK & Macau Chapter)

Aerosolized medications are delivered through either an inhaler device (with and without spacer) or a nebulizer. Common aerosols given in clinical setting include salbutamol and ipratropium for airway diseases. As the use of nebulizer was associated with a major outbreak of severe acute respiratory syndrome (SARS) in Hong Kong in March 2003¹, recommendations on the use of aerosols are needed for infection control purpose to prevent similar outbreaks.

There are data to suggest that aerosols like salbutamol, given via metered dose inhaler (MDI) and spacer for asthmatic attacks in the emergency department, have the same efficacy as given via a nebulizer. Some studies have even suggested that using MDI with spacer can result in quicker improvement in lung function and less side effects like tachycardia in children.²⁻⁵ Thus the use of bronchodilators via a nebulizer is not essential for most cases of acute bronchospasm. Use of other inhaler devices does not generate huge amount of aerosols as compared to the use a jet nebulizer and may help prevent infectious diseases that are transmitted by airborne or droplet route.

These are the recommendations for the use of aerosol medications to prevent spread of infectious diseases such as SARS.

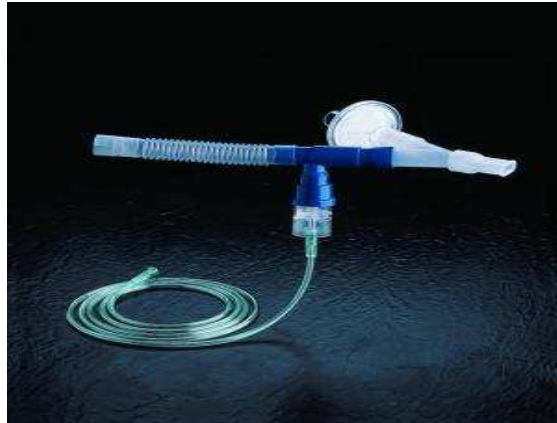
1. Avoid the use of nebulizer if possible.

- a. This is especially true for patients with fever or CXR abnormalities.
- b. Use alternatives like meter-dose inhaler with a spacer (volumatic or aerochamber) or breath actuated devices like dry powder inhalers.
- c. In case the patient is in-cooperative or too breathless to take medication via devices described in (b), an aerochamber with a face mask can be used to deliver the medication to the patient.
- d. Other alternatives for bronchodilation include oral beta-2 agonist, intravenous beta-2 agonist, theophyllines (oral or intravenous) and use of corticosteroid in appropriate settings.

2. On rare occasions that a nebulizer is deemed necessary to deliver an aerosolized medication (eg status asthmaticus), the following measures are recommended:⁶

- a. A room with negative pressure ventilation with 6 to 12 cycles of air-exchanges per hour.
- b. Only one patient is allowed in the room to avoid cross infection.
- c. Health care workers (HCW) preferably should not enter the room when the nebulizer is in function.
- d. The room should be cleaned and disinfected thoroughly after nebulization using 1,000 ppm sodium hypochlorite and the room should be left vacant for at least 1 hr before use by other patients.
- e. Staff undertaking the cleaning have a suitable level of PPE e.g. N95 mask, waterproof gown, gloves, eye protection.
- f. Consider using nebulizer with a viral filter to decrease the risk of spread of infection. Examples:
 - i. Use the Respigard mouthpiece system. It has a one-way valve for inspiration and a filter for expired gases. However, to be effective, the

patient must be co-operative enough to breathe through the mouthpiece. Swallowing of saliva intermittently is needed to avoid pooling of saliva inside the mouth.



ii. Use the "Salter Labs" system. The same principle as "Respigard" system except the filter is closer to the mouth piece.



iii. For those who cannot hold the mouthpiece inside the mouth, e.g. the elderly or those confused, consider using a mask like "High-Ox" made by Sensormedics. This mask gives a complete seal.



The oxygen reservoir is removed and the nebulizer is attached to the same hole. There is a filter for expired air.

- iv. Another alternative for patients who cannot hold the mouthpiece is to use a ResMed mask, originally designed for use with Bi-PAP. The mask offers a complete seal. Expired air passes through an added filter as shown.



References

1. Lee N, Hui DS, Wu A, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. *N Engl J Med* 2003; 348:1986-94.
2. Newman KB, Milne S, Hamilton C, Hall K. A comparison of albuterol administered by metered-dose inhaler and spacer with albuterol by nebulizer in adults presenting to an urban emergency department with acute asthma. *Chest* 2002; 121:1036-41.
3. Rubilar L, Castro-Rodriguez JA, Girardi G. Randomized trial of salbutamol via metered-dose inhaler with spacer versus nebulizer for acute wheezing in children less than 2 years of age. *Pediatr Pulmonol* 2000; 29:264-9.
4. Leversha AM, Campanella SG, Aickin RP, Asher MI. Costs and effectiveness of spacer versus nebulizer in young children with moderate and severe acute asthma. *J Pediatr* 2000; 136:497-502.
5. Raimondi AC, Schottlender J, Lombardi D, Molfino NA. Treatment of acute severe asthma with inhaled albuterol delivered via jet nebulizer, metered dose inhaler with spacer, or dry powder. *Chest* 1997; 112:24-8.
6. CDC interim domestic infection control precautions for aerosol-generating procedures on patients with SARS. Updated 23 Sept 2003. Available at <http://www.cdc.gov/ncidod/sars/pdf/aerosolinfectioncontrol-sars.pdf> (accessed Sept 25 2003).

The information and opinions expressed in these guidelines are provided to the best of our knowledge and understanding at the time of drafting (January 2004), and must be cross-referred to the most updated literature upon application.