Nebulizer versus inhaler with spacer for beta-agonist treatment in acute bronchospastic disease

Objective: To compare the efficacy of nebulized wet aerosol with metered-dose inhaler with a spacer (MDIS) in the management of acute bronchospasm. Methods: It was a retrospective study by reviewing the clinical records of patients with acute exacerbation (chief complaint of shortness of breath) of asthma or chronic obstructive pulmonary disease (COPD) presenting to the Accident and Emergency Department (AED) of Tuen Mun Hospital from 1st to 30th November 2002 and 2003 respectively. All patients received beta-agonist by nebulizer, in the year 2002 (pre-SARS period) while all patients received treatment by MDIS in the year 2003 (post-SARS period). Treatment outcome measures included admission rate, length of hospitalisation for those admitted and AED re-attendance within 7 days for those discharged from the AED. Results: Altogether 821 patients were recruited in this retrospective study, 522 belonged to the nebulizer group and 299 were of the MDIS group. The two groups had similar demographic characteristics. Concerning the admission rate (47% in the nebulizer group and 41% in the MDIS group; p=0.089) and re-attendance rate (7% in the nebulizer group and 6% in the MDIS group; p=0.607), the differences were not statistically significant. For the length of hospital stay, it was shorter in the nebulizer group than the MDIS group (3.65±SD 1.88 days vs 4.10±SD 1.94 days; p=0.035). However, the admission rate in the adult subgroup (61% in the nebulizer group and 47% in the MDIS group; p=0.002) was shown to be statistically significant. In multivariate analysis, usage of nebulizer, increase in respiratory rate and age were associated with a higher admission rate. Increase in SpO₂, absence of co-morbidity and asthma patients were associated with a lower admission rate. Increase in age, respiratory rate and usage of MDIS were associated with an increase in hospital stay. Asthma was associated with a decrease in AED re-attendance rate as compared to COPD. Conclusions: This retrospective study showed that both nebulizer and MDIS were effective for beta-agonist therapy in acute bronchospasm in AED with respect to hospital admission rate and AED re-attendance rate, but the length of hospital stay was slightly prolonged when using MDIS. (Hong Kong j.emerg.med. 2005;12:133-139)
Introduction

Acute exacerbation of asthma or chronic obstructive pulmonary disease (COPD) is a common complaint of those attending accident and emergency departments (AED). In the past, most doctors in Hong Kong hospitals employed nebulizer therapy for relieving the bronchospasm. However, in the year 2003, we learned that nebulizer drug therapy could spread the fatal coronavirus of the severe acute respiratory syndrome (SARS) to people nearby. It was time for us to think whether nebulizer was really necessary for treating bronchospastic patients and whether there was any equally effective and safe alternative treatment.

Metered-dose inhaler with a spacer (MDIS) is a well-known method of delivering bronchodilator and steroid medication to patients with bronchospastic disease. The lung deposition of beta2-agonist from a MDI varies between 5.7% and 23.8% of the dose expelled with each actuation.1 The lung deposition of a drug by using wet nebulizer is between 2.7% and 9.9%.2,3 When a spacer is added to a MDI, drug deposition in the lower airways increases with a corresponding 10-fold decrease in oropharyngeal deposition.4-6 The combination is particularly valuable in patients who have poor timing and cannot adequately coordinate inhalation from a MDI with the actuation of the device. Colacone and colleagues showed a relative potency of 6:1 in favour of MDIS to nebulizer in achieving equivalent bronchodilatation.7 Silkstone and colleagues found that five 100 mcg doses inhaled from a MDIS delivered more to the lungs and less to the systemic circulation than either the same doses from a MDI alone or five times the dose given via a jet nebulizer.8

In Tuen Mun Hospital (TMH), we changed our practice in delivering bronchodilator after the SARS attack in the year 2003. We put away all the nebulizer machines and replaced them by MDIS. We found that the hospital admission rate and patient response to treatment were similar after this change. As a result, a retrospective study was carried out to find out whether these two treatment modalities were equally effective in treating patients with acute bronchospasm.

Patients and methods

Our study was carried out in the Tuen Mun Hospital of Hong Kong. We reviewed all the AED records of...