OBJECTIVE:

Speed of nebulized drug delivery is important to optimize costs in acute care and maximize compliance to therapy in the home. This study’s objective is to measure and compare the speed of nebulized drug delivery in the respirable range of four nebulizers.

METHOD:

We measured drug delivery rate and treatment time of the new LC Sprint reusable nebulizer (Pari Respiratory Equipment, Midlothian, VA), the LC Star reusable nebulizer (Pari), the Vixone (Westmed, Englewood, CO) and the 8900 (Salter Labs, Arvin, CA) nebulizers using cascade impaction. (See Figure One) Fill volume was 3.0 mL for albuterol (salbutamol); 2.5 mL for ipratropium bromide and 2.0 mL for cromolyn sodium and sampling flow was 28 lpm. Three tests were performed for each nebulizer and each drug. Treatments were considered complete after no visual aerosol was noted for more than 1 second. ANOVA with post hoc Fisher’s LSD was performed to determine statistically significant differences with an alpha value less than 0.05.

RESULTS:

Treatment times were shortest using the Pari LC Sprint reusable nebulizer with all medications. Westmed Vixone had the longest treatment times. Treatment times under the conditions tested are subject to the type of nebulizer. The Pari LC Star and Pari LC Sprint are both breath-enhanced nebulizers which would benefit from a constant inspiratory flow versus a simulated breathing pattern. Breath-enhanced nebulizers accelerate nebulization during inspiration which shorten treatment times without affecting drug delivery. Treatment times using the Westmed Vixone and Salter 8900 would not be affected by inspiratory flow or breathing pattern as they are conventional nebulizers.

Respiratory drug delivery rate is the product of total output rate of the nebulizer and the respiratory fraction of the aerosol. Respiratory fraction is the percent of particles between 0.1 and 5.0 um. Therefore, larger RDDRs indicates more drug delivery to the mid or lower airways per minute. RDDR was highest with Pari LC Sprint and lowest with Salter 8900 for all medications.

CONCLUSIONS:

» The Pari LC Sprint reusable nebulizer can deliver more drug per minute and shorten treatment times compared with other breath enhanced and conventional nebulizers.

» This may provide cost savings with therapist in the acute care settings and increase compliance in non-acute settings.

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