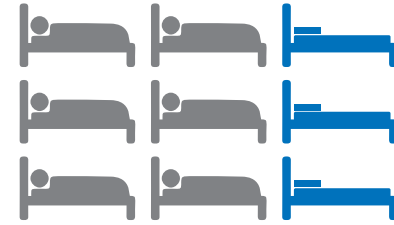




37 minute reduction
in ED median
length of stay



32% reduction in ED
admission rates



30% higher discharge
rates with
Aerogen Ultra



75% reduction in total
albuterol dose

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AEROSOL DOSE MATTERS IN THE EMERGENCY DEPARTMENT: A COMPARISON OF IMPACT OF BRONCHODILATOR ADMINISTRATION WITH TWO NEBULIZER SYSTEMS

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1 Introduction

Clinical outcome studies comparing aerosol devices in patients in respiratory distress in the Emergency Department (ED) are limited. The vibrating mesh nebulizer (VMN) with adapter (Aerogen Ultra, Aerogen Ltd., Ireland) provides > 4-fold drug delivery to lungs compared to jet nebulizer (JN). Aim of the study was to determine whether the improved lung delivery of bronchodilators would have an effect on admission rates, ED discharge rates and total albuterol dose in patients receiving aerosol treatments in the ED.



Figure 1. Details of the Device Used

2 Methods

The Aerogen Ultra was implemented for 30 days during the evaluation period for all patients receiving inhaled bronchodilator therapy.

- » All age groups were treated
- » The time period was prospectively identified. A report was built from available EMR data.
- » A retrospective data extraction was performed from the CERNER EMR comparing all ED patients receiving aerosol bronchodilator treatments with the standard of practice JN (September 2015) to an equivalent period after implementation of the Aerogen Ultra (October 2015).
- » A total of 1576 patient encounters were reviewed (854 JN and 722 VMN).

3 Results

Patient data was extracted from Sept (854 JN) and Oct (722 VMN). In Oct treated population experienced a reduction in admissions from the ED of 33%, associated with a 29% increase in discharges to home compared to Sept., Patients receiving bronchodilators with the VMN with adapter were 1.5 times more likely to be discharged than the JN group (OR=1.5, p < .001), respectively). The JN group was 1.7 times more likely to be admitted than the VMN group (OR=1.77, p < .001). The VMN group used less total drug (p < .05) with a 75% reduction of maximum albuterol dose administered (20 mg to 5 mg).

Admission rates

When compared to the Jet neb group, admission rates are 32% lower with VMN

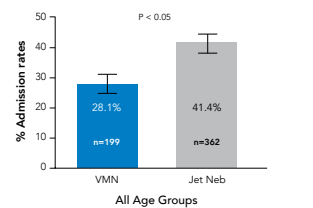


Figure 2. Admission Rates

Discharge rates

When compared to the Jet neb group, discharges are 30% higher with VMN

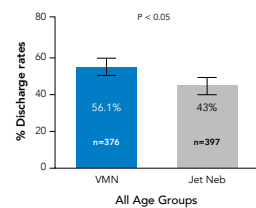


Figure 3. Discharge Rates

Length of Stay Reduced by 13%

37 minute median reduction in LOS per patient with the VMN vs. Jet neb

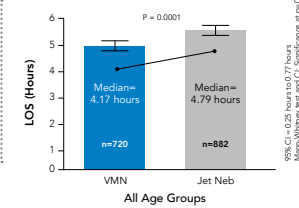


Figure 4. Length of Stay

LOS CI = 0.35 hours for 95% CI. P-Value: Mean VMN LOS less than CI. Significance at p<0.0001

Vibrating Mesh Nebulizer

Jet Neb

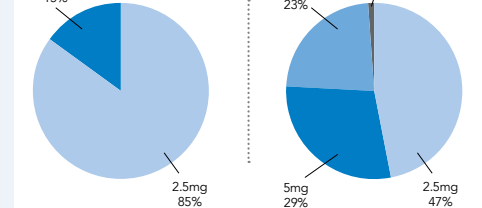


Figure 5. Albuterol Dose, lower with VMN, p<0.001

Demographics of the Groups

	Group	
	JN (N=879)	VMN (N=715)
Gender (%)		
Female	51.8	54.0
Male	48.2	46.0
Age (Mean (SD))	42.23 (25.75)	36.86 (25.04)
Pre Heart Rate (Mean (SD))	86.58 (24.03)	100.37 (25.60)
Pre Respiratory Rate (Mean (SD))	19.25 (6.30)	22.88 (6.51)
Post Heart Rate (Mean (SD))	86.58 (24.03)	109.17 (29.89)
Post Respiratory Rate (Mean (SD))	18.76 (5.87)	22.23 (5.72)

Table 1. Demographics of the groups

Frequencies and Percentages for Patient Disposition by Intervention Group Stratified by Age

	Group							
	JN (N=879)				VMN (N=715)			
	n	%	95% CI		n	%	95% CI	
Ages 0 to 2 years								
Admit - ER	7	14.9	4.3	25.5	6	13.0	2.9	23.2
Discharge	35	74.5	61.5	87.4	34	73.9	60.7	87.1
OBS - ER	5	10.6	1.5	19.8	6	13.0	2.9	23.2
Ages 3 to 18 years								
Admit - ER	20	12.7	7.4	17.9	20	12.1	7.1	17.2
Discharge	121	76.6	69.9	83.3	136	82.4	76.6	88.3
OBS - ER	17	10.8	5.9	15.6	9	5.5	2.0	9.0
Ages 19 to 50 years								
Admit - ER	86	29.7	24.4	34.9	50	19.8	14.8	24.7
Discharge	164	56.6	50.8	62.3	162	64.0	58.1	70.0
OBS - ER	40	13.8	9.8	17.8	41	16.2	11.6	20.8
Ages 51 or more years								
Admit - ER	248	65.6	60.8	70.4	122	50.2	43.9	56.5
Discharge	56	14.8	11.2	18.4	65	26.7	21.1	32.4
OBS - ER	74	19.6	15.6	23.6	56	23.0	17.7	28.4

Table 2. Frequencies and Percentages by Age

4 Conclusions

The VMN with adapter was associated with fewer admissions to the hospital from the ED with a substantial reduction in maximum albuterol dose required than the JN. The device type was a strong predictor of discharge, disposition and total amount of drug, regardless of age or diagnosis. Randomized controlled studies are needed to corroborate these findings.

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