

Impact of Inhaled Tobramycin on Healthcare Utilization and Morbidity in Non-Cystic Fibrosis Pediatric Tracheostomy Dependent Patients with *Pseudomonas* Infections

Authors: *Nada Alabdulkarim,¹ Kaitlyn Kuntzman,¹ Raja Balusu,¹ Jonathan Schroeder,² Jessica Lundeen,³ Maria A. Arroyo¹

1. Pediatric Pulmonary Department, Children's National Hospital, Washington, D.C., USA
2. Pediatric Pulmonary Department, Brooke Army Medical Center, Fort Sam Houston, Texas, USA
3. Department of Pharmacy Services, Children's National Hospital, Washington, D.C., USA

*Correspondence to nadalkarim.89@gmail.com

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INTRODUCTION

Pediatric patients who are tracheostomy dependent face an increased risk of respiratory infections due to bacterial colonization by *Pseudomonas aeruginosa*.^{1,2} Inhaled antibiotics, such as tobramycin, were developed as targeted treatments to reduce both the infection rates, and the need for systemic antibiotics. However, there is limited research on their use in children who are tracheostomy-dependent, particularly regarding their impact on healthcare utilization and optimal dosing.^{3,4}

METHODS

The authors conducted a retrospective cohort study at Children's National Hospital in Washington, D.C., including patients who are tracheostomy-dependent aged 0–21 years, from January 1, 2003–June 30, 2023. Patients with cystic fibrosis, bronchiectasis, or primary ciliary dyskinesia were excluded. The primary outcome measured emergency department visits, regular floor admissions, ICU admissions, and systemic antibiotic use 6 months before and after initiating inhaled tobramycin. The secondary outcome assessed changes in *Pseudomonas aeruginosa* positivity rates.

RESULTS

A total of 42 children were included, with a median age of 2 years; 64.3% were male. Neurologic disorders (45.2%) and bronchopulmonary dysplasia (26.2%) were the most common reasons for tracheostomy. Inhaled tobramycin therapy was associated with reduced regular admissions ($p=0.04$), ICU admissions ($p=0.006$), and systemic antibiotic use ($p=0.05$). *Pseudomonas aeruginosa* positivity decreased from 40.5% to 30.9% post-treatment ($p=0.001$; Table 1).

CONCLUSION

This study, the largest involving children with tracheostomies who do not have cystic fibrosis, demonstrates that inhaled tobramycin significantly reduces hospitalizations, ICU admissions, and antibiotic use. Although 40% of patients received doses between 160–300 mg every other month, dose variability did not significantly impact clinical outcomes.

Table 1: Comparison of healthcare utilization before and after inhaled tobramycin therapy.

Variable	Before using inhaled tobramycin	After using inhaled tobramycin	p value
	N excluding missing data Mean (SD)	N excluding missing data Mean (SD)	
Number of respiratory ED visits	42, 0.67 (1.05)	42, 0.45 (0.80)	0.26
Number of respiratory regular floor admissions	42, 0.57 (1.21)	42, 0.26 (0.59)	0.04
Number of ICU admissions	42, 1.64 (1.34)	42, 0.98 (1.05)	0.006
Number of required systemic antibiotics	40, 2.23 (1.61)	40, 1.55 (1.48)	0.05

ED: emergency department.

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