

# A Pediatric Home Ventilator Management Program Reduces Hospitalizations by 54%

Chris Landon, MD | Ray Gregg, BS, CRT, RPSGT | Zach Gantt, RRT, FAARC



## Rationale:

The prevalence of pediatric patients requiring home mechanical ventilation (HMV) in the United States has been increasing, with a crude incidence rate of approximately 2.4 per 100,000 children, marking a 37% rise over a 14-year period.<sup>1</sup> These patients often have complex medical conditions, including neuromuscular diseases, chronic lung diseases, and central nervous system disorders. Managing these patients at home presents significant challenges, necessitating coordinated care among healthcare providers, caregivers, and support services.<sup>2</sup> Programs have evaluated the impact of home ventilation with physician follow-up; however, few programs include respiratory therapist-directed home intervention focused on whole patient management.

## Purpose:

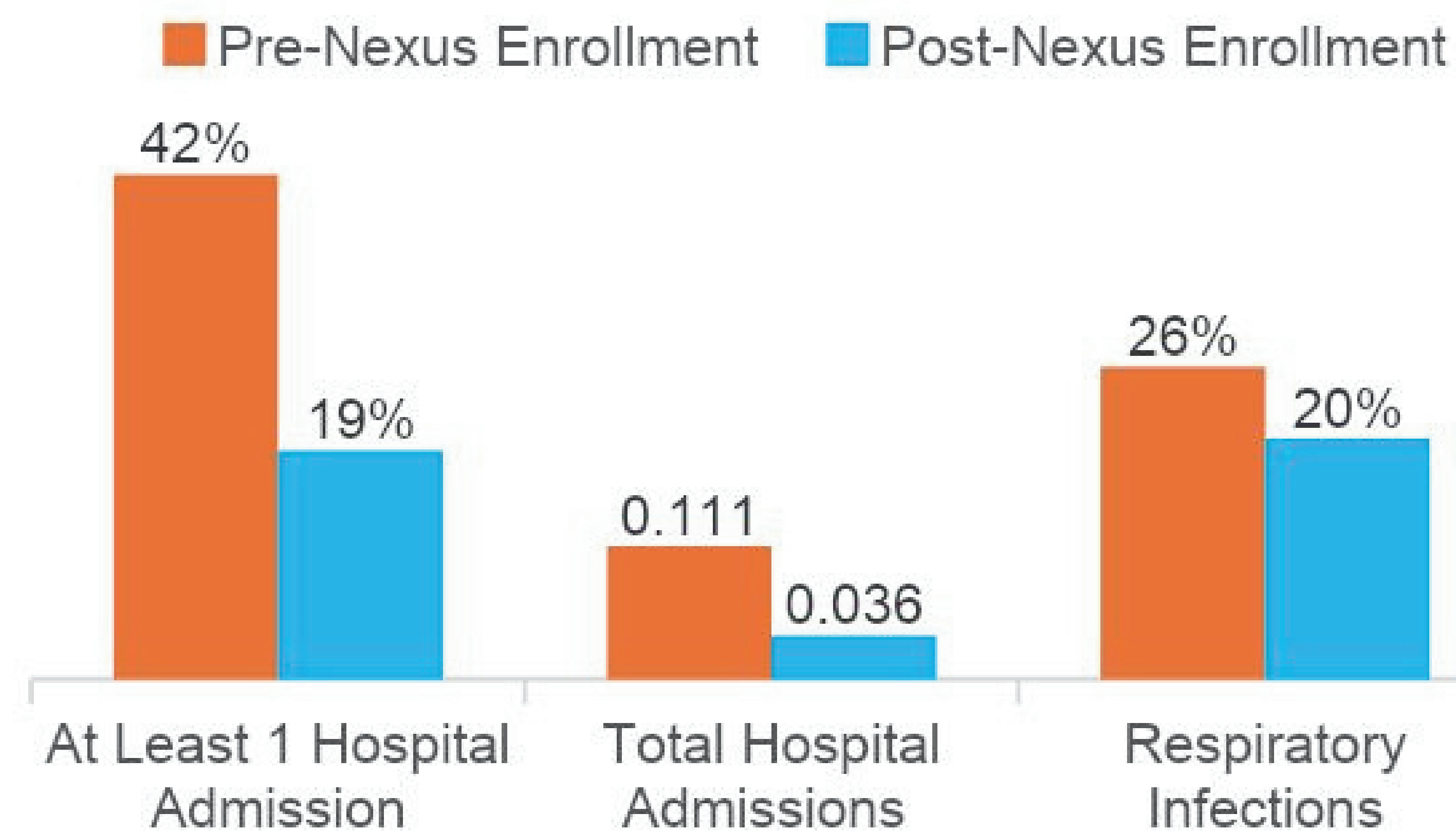
Evaluate impact of an AI-driven, software-based, ventilator outcomes management program (Nexus) on hospitalizations amongst home-based, pediatric patients managed on home mechanical ventilation (HMV) by durable medical equipment (DME) companies.

## Methods

5,003 home-based pediatric patients managed from January 2018 – February 2025 using a goal-based, AI-driven, outcomes software [Nexus, Encore Healthcare, Tennessee], administered by respiratory therapists (RT) via in-home and telerespiratory visits. Patients were enrolled via prescriptions for home ventilation. Enrollees were managed by US-based DMEs, with the Nexus platform being the only commonality. Assessments populated individualized plans of care with risk/acuity-based schedules of visits and goals. The AI-driven software guided the RT in identifying and then working with the patient's physician to resolve issues in the following core areas: respiratory medication management, symptom progression, ADL status/changes, and self-management ability. Enrollees received over 194,000 assessments and AI analytics processed over 7.7 million datapoints. Enrollees' months on service averaged 17.5 months, with >2,000 active patients averaging over 26 months. 12-month hospital admissions' history was self-reported without claims confirmation and post-onboarding admission was confirmed by RT via patient interviews. Two methods were used to understand hospitalization reductions; first, those with at least 1 hospital admission without totaling all events; second, total hospital admissions calculated as a rate per patient per month.

## Nexus Program Graphics

### Nexus Program Summary: Hospitalization & Respiratory Infection Outcomes



### Hospital Admissions



### Nexus Physician Report: Individualized Patient Reporting

**encore TELERESPIRATORY**

Name: John NMD Young Adult ALS | DOB: 12/01/2000 | Member ID: 123456

General Dx: Neuromuscular (NMD) | Nexus Onboarded: 07/01/2024 | Program: Nexus Standard Ventilator

Primary DX: ALS (Lou Gehrig) | Rx Expiration: 11/01/2025 | Next RT Visit: 02/19/2025

Adv Directive: Patient does wish to be resuscitated | Last Encounter: 11/21/2024 | Branch: Clinic 123 [Encore Training account]

Patient Motivational Goal: Be able to participate in social activities

Days in Nexus Program: 254

Primary Care Physician: John Smith | Referral Physician: Peter Moss | Specialist: Peter Moss | Next Scheduled Phys Follow Up: 02/03/2025

Days Since Last Admit: 284

HOSPITAL ADMISSIONS HISTORY		POST ONBOARDED HOSPITALIZATIONS	
Admissions in Past Year	2	Hospital Admissions	0
Reason for Visit	Neurological	Reason for Visit	N/A
Last Admission Date	06/01/2024	Date of Last Admission	N/A
Prior Resp Infections	2	Resp Infections Since Onboarded	0

**NEUROMUSCULAR CLINICAL ASSESSMENT RESULTS**

**SIGNS & SYMPTOMS EVALUATION FROM PREVIOUS VISIT**

Change in Shortness of Breath: Yes, Same level of symptoms  
 Activity or Mobility Change: Yes, Less symptoms than before  
 Increased O2 Usage: N/A  
 Morning Headache: Yes, Less symptoms than before  
 Cognitive Change: No change  
 Cognitive Status Additional Comment: N/A  
 Daytime Fatigue: Yes, Less symptoms than before

**ENERGY | ADL | SLEEP**

Is the Patient Aware of Energy Conservation Skills: Yes  
 ADL Capabilities: Patient is unable to perform ADLs  
 Sleep Hours per Night: > 6 hrs/night  
 Quality of Sleep: Restful sleep  
 Observed Apneas by Caregiver/other: No  
 Caregiver Observed Patient Snoring: No snoring  
 Sleep Study in Med History: No

**ALSFRS TOTAL SCORE BY DOMAIN [LOWER SCORE INDICATES DECLINE IN HEALTH]**

Domain	Initial Score	Current Score
Bulbar Speech	~10	~10
Fine Motor	~10	~10
Gross Motor	~10	~10
Respiratory	~10	~10

**MOST RECENT ALSFRS ANSWERS [CURRENT]**

<b>Bulbar Speech</b> Intelligible with repeating	<b>Fine Motor Handwriting</b> Not all words are legible	<b>Gross Motor Turning in Bed</b> Can turn alone or adjust sheets, but with great difficulty	<b>Respiratory Dyspnea</b> Occurs with one or more of the following: eating, bathing, dressing (ADL)
<b>Bulbar Salivation</b> Moderately excessive saliva - may have minimal drooling	<b>Fine Motor Cutting Food</b> Can cut most foods, although clumsy and slow. Some help needed	<b>Gross Motor Walking</b> Non-ambulatory functional movement only	<b>Respiratory Orthopnea</b> Needs extra pillows in order to sleep (more than two)
<b>Bulbar Swallowing</b> Dietary consistency changes	<b>Fine Motor Dressing and Hygiene</b> Intermittent assistance or substitute methods	<b>Gross Motor Climbing Stairs</b> Needs assistance	<b>Respiratory Insufficiency</b> Invasive mechanical ventilation by intubation or tracheostomy

## Results

Patient self-reported hospital admissions post-onboarding were measured at 12 months and compared to admission history for prior 12 months. Enrollees reporting at least one hospitalization in the 12-months prior to enrollment experienced 54% fewer admissions post-enrollment and 23% fewer respiratory infections. Calculated as a per patient per month rate, enrolled patients experienced 68% fewer admissions vs. their 12-month prior history. In total, patients experienced 2,522 fewer hospitalizations while enrolled in the program vs. the prior year. Using an average readmission cost of \$73,000 for a pediatric ventilator patient, the program has resulted in an estimated total US healthcare cost savings of over \$184 million.<sup>3</sup>

## Conclusion

Home-based, pediatric ventilator management programs led by respiratory therapists using AI-driven software with plan of care goals, can have a significant impact on pediatric admissions, quality of care metrics, and overall cost of care. An AI-powered platform offers home therapists a uniform, systematic tool to ensure consistent outcomes' improvement across large populations.

## Disclosures

**Dr. Landon** serves as Adjunct Sr. Medical Advisor for Encore Healthcare, a respiratory population health software developer and clinical outcomes provider  
**Ray Gregg** – CRT, RPSGT is the VP of Clinical Sales for Adapt Health  
**Zach Gantt** – RRT, FAARC is the Founder & CEO of Encore Healthcare

## References

- [1] Oskoui M, Ben-Shalom R, Kirton A, et al. Incidence and Mortality of Children Receiving Home Mechanical Ventilation in Ontario, Canada. *Pediatrics*. 2023;151(4):e2022059898.
- [2] Edwards JD, Houtrow AJ, Vasilevskis EE, et al. Pediatric Patients with Home Mechanical Ventilation: Characteristics and Healthcare Utilization. *Pediatrics*. 2020;145(6):e20193745.
- [3] Rogerson C, Beardsley A, Cristea A, et al. Health Care Resource Utilization for Children Requiring Prolonged Mechanical Ventilation via Tracheostomy. *Respir Care*. 2020; Aug;65(8)