Evaluation of the Efficacy and Safety of Hospital-Administered Nitrous Oxide on Patients that were Referred for General Anesthesia and/or Sedation

Jae Hee Kim DMD, Ryan Rodef, DMD
NYU Langone Hospitals-Advanced Education in Pediatric Dentistry, Brooklyn, NY

NYU Langone Dental Postdoctoral Residency Programs

INTRODUCTION

Pediatric dental patients often present with behavioral challenges and dental anxiety that can hinder the completion of necessary dental treatment. In such cases, general anesthesia (GA) and sedation are frequently used to manage patient behavior and ensure procedural success. While effective, these methods carry inherent risks, increase healthcare costs, and place a significant burden on hospital systems. As pediatric dentists, it is essential to explore alternative, less invasive behavior management strategies to reduce dependency on advanced pharmacological interventions.

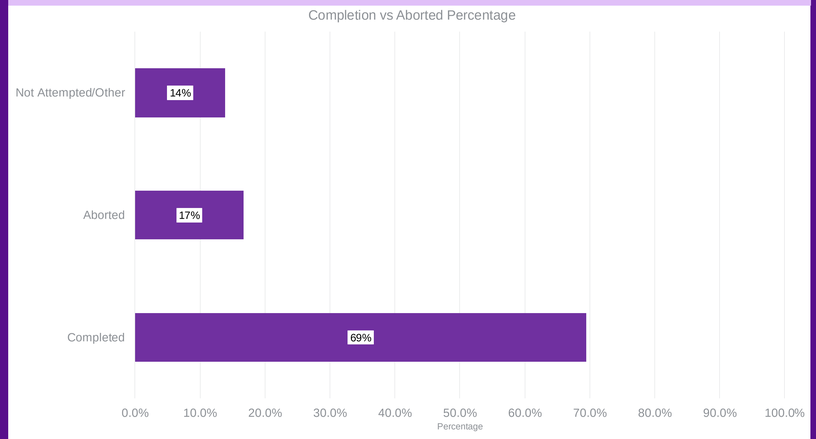
PURPOSE

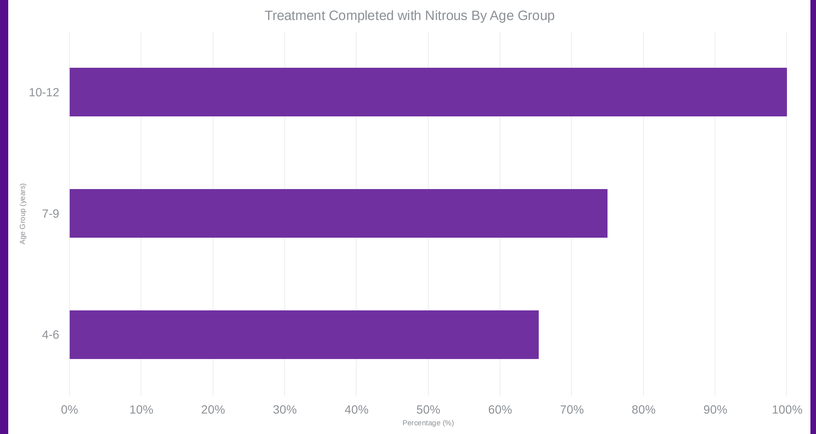
The purpose of this study is to evaluate the effectiveness of behavior management techniques combined with hospital-administered nitrous oxide in managing pediatric patients referred for sedation or general anesthesia. By analyzing outcomes for patients aged 4–12 who were initially referred by external providers to NYU Langone Brooklyn FHC for sedation or GA, this study seeks to determine whether a significant portion can instead be managed safely and effectively with less intensive interventions. The ultimate goal is to optimize patient care pathways, enhance safety, and reduce strain on sedation and GA resources.

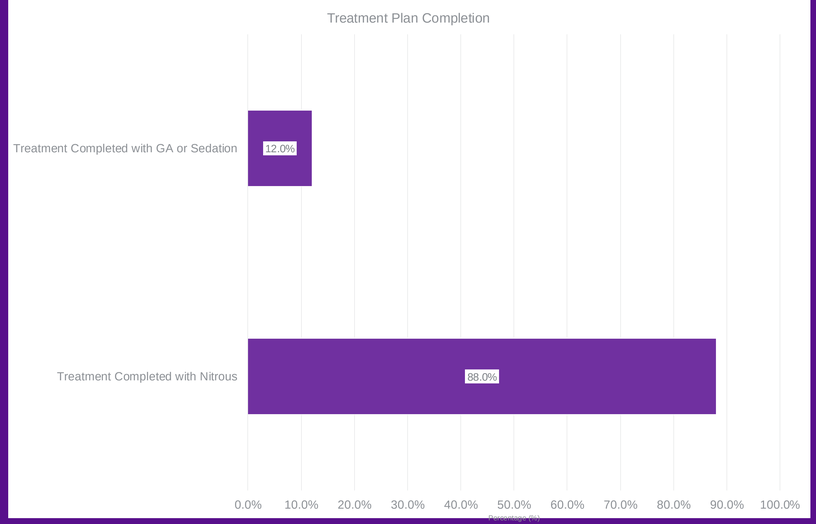
METHOD

A retrospective chart review was conducted at the NYU Langone Brooklyn Family Health Center (FHC) Pediatric Dental Department. The study period included all patient visits from **May 1, 2024, to July 31, 2024**. Pediatric patients aged **4 to 12 years** who were **referred from external dental providers** specifically for oral conscious sedation or general anesthesia were included. The patients must have returned following the initial consultation for treatment visit or anesthesia consultation. Exclusion criteria included patients with special health care needs and patients below the age of 4 or above the age of 12.
Each patient chart was reviewed to determine their reasons for referral, behavioral presentation at the visits, and Feasibility of chairside treatment using behavior management techniques and hospital-administered nitrous oxide
Patients were placed into three age groups: **4–6**, **7–9**, and **10–12 years**. Treatment outcomes that were recorded were whether treatment was successfully completed or aborted with nitrous oxide and behavior management and how the patient's full treatment plan was completed either with nitrous oxide or general anesthesia/sedation.

Figures







RESULTS

A retrospective chart review identified 49 patient records that met the initial inclusion criteria. Upon further evaluation, 13 charts were excluded based on predefined exclusion criteria, resulting in a final sample of 36 patients who met the study criteria between May and July 2024.Of the 37 patients referred by external providers to the NYU Langone Family Health Center for general anesthesia and/or sedation, 25 were successfully treated chairside using behavior management and inhaled nitrous oxide. Treatment with nitrous oxide was aborted in 6 patients due to safety concerns, and 5 patients were not treated chairside due to uncooperative behavior during examination and treatment plans deemed unsuitable for nitrous oxide use by the attending pediatric dentist. In total, 69% of referred patients were successfully managed chairside for dental restorative treatment with behavior guidance and nitrous oxide in a hospital-based setting.
When stratified by age group, completion rates increased with age: 65% in patients aged 4–6 years, 75% in the 7–9-year-old group, and 100% among those aged 10–12 years.
Among patients who completed their initial visit with nitrous oxide, 88% continued and/or completed their treatment plan chairside with nitrous oxide. The remaining 12% required either oral conscious sedation or general anesthesia to complete care.

CONCLUSIONS

The findings of this study demonstrate that hospital-administered nitrous oxide, in conjunction with behavior management techniques, is a **highly effective alternative first step** to more advanced pharmacologic interventions for pediatric patients referred for sedation or general anesthesia. Treatment success rates were observed to increase among the age groups, however we conclude that attempting restorative treatment with nitrous in the 4-6 year age group regardless of presumed dental anxiety or cooperativity is highly valuable tool.
These results highlight the potential to significantly reduce reliance on oral conscious sedation and general anesthesia—especially in older children—by utilizing nitrous oxide as a first-line management tool. Implementing this approach can decrease exposure to the risks associated with deeper sedation, lessen financial and logistical burdens on families, and free up critical hospital resources and reduce waste. Additionally, it provides justification for the use more advanced behavior management techniques in the cases that warrant it.
Ultimately, we hope that this data can help support a safer, more efficient, and patient-centered model of pediatric dental care at NYU Langone Pediatric Dental Residencies and eventually for all pediatric dentists.

REFERENCES

American Academy of Pediatric Dentistry. "Use of Nitrous Oxide for Pediatric Dental Patients." *The Reference Manual of Pediatric Dentistry*, 2024, pp. 394–401

Coté, Charles J., et al. "Guidelines for Monitoring and Management of Pediatric Patients Before, During, and After Sedation for Diagnostic and Therapeutic Procedures." *Pediatrics*, vol. 143, no. 6, 2019, p. e20191000