

Decision Making for Children with Obstructive Sleep Apnea without Tonsillar Hypertrophy

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Abstract

Objective. Evidence-based medicine is the gold standard practice model for patient management. Our aim was to determine whether decisions made by pediatric subspecialists regarding management of obstructive sleep apnea in children without tonsillar hypertrophy adhered to this model or were based on clinical experiences.

Study Design. Single-institution prospective study.

Setting. Multidisciplinary upper airway center in an academic pediatric hospital.

Subjects and Methods. Twelve pediatric subspecialists representing 8 specialties participating in upper airway clinics and management conferences. Real-time decisions made in treatment conferences and upper airway clinics were collected. Physicians were queried regarding the basis of their decisions, and these decisions were then classified into 10 categories.

Results. Over 13 days (10 case conferences, 3 half-day clinics), 324 decisions were made for 58 patients (mean age = 8.9 ± 7.4 years, mean body mass index percentile = 75 ± 29); 34% (n = 108) of decisions were evidence based; 59% (n = 193) were nonevidence based; and 7% (n = 23) were based on parental preference. Providers were able to cite specific studies for <20% of these decisions. There was no significant increase in the proportion of evidence-based decisions made over time.

Conclusions. We deemed 34% of decisions regarding the management of obstructive sleep apnea in children without tonsillar hypertrophy to be evidence based and found that sharing the basis for decisions did not improve the percentage of evidence-based decisions over time. These findings reflect significant evidence gaps and highlight the need for a systematic literature evaluation to identify best practice in

managing this population. We recommend that these evidence gaps be further characterized and incorporated into an agenda for future research.

Keywords

evidence-based medicine, medical decision making, pediatric, obstructive sleep apnea, gaps in evidence

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Background

Evidence-based medicine has become the accepted paradigm for best medical practice. Although clinical experience and the development of clinical diagnostic acumen remain crucial to physician competency, this paradigm de-emphasizes intuition and unsystematic clinical experience and puts a high value on scientific evidence. Adopting this practice model requires

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Table 1. Categories Used to Classify Decisions in the Upper Airway Center for Children with Obstructive Sleep Apnea without Tonsillar Hypertrophy.

Category ^a	Interpretation of Classification
Nonevidence based	
Experience/anecdote	Decision based on physician's past experience, not based on research evidence
Arbitrary	Decision not based on past experience or evidence
Trained to do it	Decision based on prior training from residency or fellowship
First principles	Decision based on what is known to be true and is physiology based
For research	Decision based on curiosity or desire to learn something about the patient or disease, not based on research evidence
Avoid a lawsuit	Decision made for documentation without value to the patient, not based on research evidence
Evidence based	
Specific study	Decision based on a study that applies to the specific population and situation at hand
Limited study	Decision based on small case reports or series
General study	Decision based on knowledge of a general study that exists but does not pertain to the specific situation or population at hand and is extrapolated to apply to the clinical scenario
Parental preference	Decision based on parental input, not based on research evidence

^aCategories and subcategories are adapted from those used by Darst et al.³

additional skills on the part of the physician, including conducting efficient literature searches and critically evaluating the published literature to make sound clinical decisions.¹ A study examining the use of evidence-based medicine in clinical practice by Darst et al² reported that most of their decisions were nonevidence based. This article inspired us to evaluate the use of evidence-based medicine in our own practice.

The primary aim of the present study was to determine whether decisions made by pediatric subspecialists caring for children with obstructive sleep apnea (OSA) adhered to this practice model or were largely based on past clinical experiences. Our secondary aim was to ascertain if the actual process of examining decisions increased the number of evidence-based decisions made by these subspecialists. We hypothesized that the majority of decisions would not be evidence based and that evidence-based decisions would increase over the course of the study.

Methods

This study was carried out during consecutive Upper Airway Center case management conferences (weekly) in addition to 3 clinics (1 a month) at Cincinnati Children's Hospital Medical Center from March 19, 2014, to April 16, 2014, and May 14, 2014, to June 11, 2014. The Upper Airway Center is a multidisciplinary center; its patient population comprises (1) children with persistent or recurrent OSA after adenotonsillectomy, (2) children with OSA who are <2 years of age without tonsillar hypertrophy, and (3) children with OSA and complex medical comorbidities without tonsillar hypertrophy. This study included patients who were new to the clinic as well as those being seen for follow-up.

A research coordinator or program manager recorded all decisions in real time made by the pediatric subspecialists participating in the clinics and conferences. The participating

specialists did not change during the course of this study; however, the genetics specialist primarily attended case conferences and was infrequently present at clinic. All diagnosis, treatment, and follow-up decisions were included in our analysis. Decisions to not perform a test or procedure were also recorded. Residents did not participate in this study. There were no patients or decisions excluded from the study.

The basis for each decision was classified into 1 of 10 subcategories, enumerated in **Table 1**. These subcategories were then grouped into 3 broader categories, including decisions that were evidence based, nonevidence based, or based on parental preference. The basis of a decision was determined by self-report immediately after the decision was made by each clinician. Clinicians making evidence-based decisions were asked if the decision was based on a specific, limited, or general study; for specific or limited studies, the study author was also recorded. If the provider could not recall the author, the decision was classified as a general study. Although we carried out literature reviews on topics identified as lacking in evidence, these were not systematic reviews. Moreover, no decisions were reclassified after literature reviews were performed. After the completion of the study, we categorized decisions into subcategories of evaluation and management (**Table 2**).

In addition, we recorded the following patient characteristics: age, race, sex, body mass index, OSA disease severity, and comorbid conditions, including genetic syndromes. This study was approved by the institutional review board at Cincinnati Children's Hospital Medical Center.

Data Analysis

Descriptive statistics were carried out. Decisions were then evaluated to determine if evidence-based decisions increased over time. Years of experience since fellowship were

Table 2. Types of Decisions Made in an Upper Airway Center for Children with Obstructive Sleep Apnea without Tonsillar Hypertrophy.

Medications
Stimulant medication for ADHD
Montelukast
Fluticasone nose spray
Proton pump inhibitor
Need for evaluation of physical examination
Size of lingual tonsils
Size of adenoids
Tests
Brain MRI
Cine MRI
Cine CT
High-resolution CT
Polysomnography
Overnight pulse oximetry
Video swallow study
Surgery
Adenoidectomy
Flexible bronchoscopy
Genioglossal advancement
Partial midline glossectomy
Lingual tonsillectomy
Jaw surgery
Microlaryngoscopy and bronchoscopy
Sleep endoscopy
Supraglottoplasty
Tongue suspension
Tonsillectomy
Tracheostomy
No surgical intervention
Referrals
Bariatric surgery
Cardiology
Craniofacial clinic
Developmental and behavioral
Dental
Otolaryngology
Genetics
Nutrition
Plastic surgery
Sleep center
Speech, language pathology
Treatment modalities
BiPAP
CPAP
Desensitization
Oral appliance
Weight loss
Follow-up time frame and location

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; BiPAP, bilevel positive airway pressure; CPAP, continuous positive airway pressure; CT, computed tomography; MRI, magnetic resonance imaging.

calculated for each practitioner. Subgroup analysis by provider experience was also carried out.

Results

The pediatric subspecialty disciplines of participating physicians ($n = 12$) included developmental pediatrics, otolaryngology, oral surgery, pulmonology, plastic surgery, radiology, sleep medicine, and genetics. The average number of years since fellowship was 17.4 (range, 0-38 years), and the number of accrued years of experience among physicians was 209.

A total of 324 decisions were made over the course of 13 days (10 clinical case conferences and 3 half-day clinics). These decisions were primarily (80%) made by otolaryngologists and pulmonary sleep physicians (**Figure 1**). The decisions involved the management of 58 patients with a mean age of 8.9 ± 7.4 years and a mean body mass index of 23.5. The body mass index percentile for children between 2 and 18 years of age was 75 ± 29 ; 51 (88%) were white, 3 were black (5%), and 4 (7%) were classified as unknown or mixed race.

The types of decisions made in the Upper Airway Center case conferences and clinics are presented in **Figure 2**; the most frequently made decisions centered on follow-up time frame and location, the use and timing of polysomnography, the decision not to do surgery, neurosurgery referral, and performance of cine magnetic resonance imaging or computed tomography. The most common categories used to classify decisions were clinician experience (24.6%) and first principles (23.1%; **Figure 3**). The least cited categories used to classify decisions were arbitrary (ie, based on instinct; 2.5%) and avoidance of a lawsuit (0.6%). No decisions were made solely for research purposes. Overall, 34% of decisions were evidence based; 59% were nonevidence based; and 7% were based on parental preference.

There was no significant change in the percentage of specific evidence-based decisions made over time, with 12% of such decisions made in the first 108 decisions, 19% in the second 108 decisions, and 22% in the last 108 decisions ($P = .10$). There was also no significant increase in the overall proportion of evidence-based decisions (specific + limited + general studies) made over time. Similarly, there was no significant difference in the percentage of evidence-based decisions made by physicians with <15 years of experience versus those with >15 years of experience (40% vs 29%; $P = .14$).

Discussion

As hypothesized, the majority of decisions regarding the management of patients having pediatric OSA without tonsillar hypertrophy were nonevidence based. Specifically, practitioners in our multidisciplinary center were able to cite evidence 34% of the time and specific studies <20% of the time. Our findings did not, however, support our secondary hypothesis, as there was no significant increase in evidence-based decisions over time. We also found that practitioners with >15 years of practice more frequently

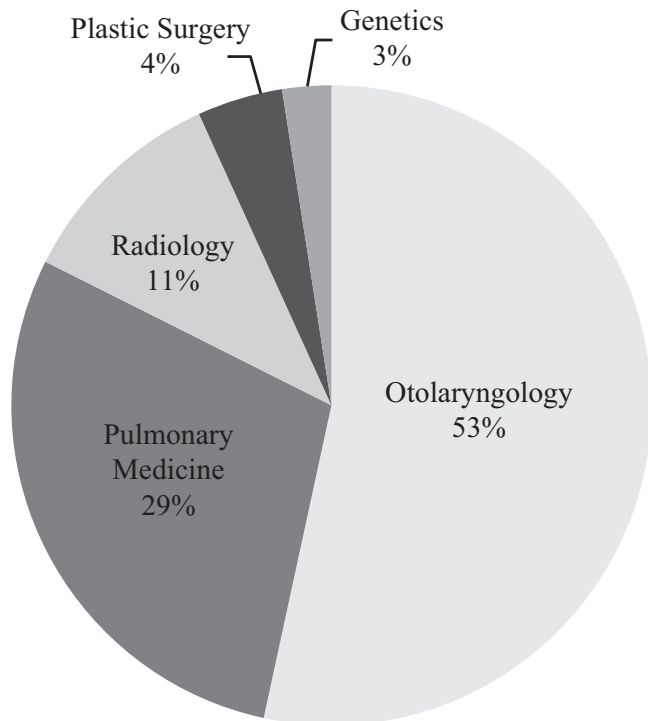


Figure 1. Number of decisions made by pediatric subspecialists in an upper airway center for children with obstructive sleep apnea without tonsillar hypertrophy.

based their decisions on “experience,” as compared with their junior colleagues.

Although the concept of basing clinical care on analytic evidence is not new, the term *evidence-based medicine* was not popularized until the early 1990s. Eddy introduced this term at a population-based level, suggesting that medical policy should be “consistent with and supported by [experimental] evidence.”³ In the late 1990s, Sackett extended this concept, advocating “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”¹ Nevertheless, clinicians often find little or no available evidence to guide many of their treatment and management decisions.

A number of single-specialty studies have investigated the use of evidence-based decision making in clinical practice. Darst et al² prospectively evaluated decisions made by 10 clinicians in a pediatric cardiology clinic. They reported that decisions were most commonly based on experience (ie, anecdotal evidence), arbitrary factors (ie, instinct), and previous training, with only 20% identified as evidence based. These authors also reported that the senior faculty attributed more decisions to experience than their junior faculty. Ellis et al⁴ retrospectively evaluated the management of inpatients on the general medical service at a university-affiliated hospital. They reported that management was based on evidence from a randomized controlled trial 53% of the time and based on convincing nonexperimental evidence in an additional 29% of the time. In a retrospective study of 101 outpatient general medicine practice

Top Ten Decisions	Percentage
Followup time frame and location	44%
Polysomnography	14%
No Surgical Intervention	5%
Neurosurgery Referral	4%
CINE MRI / CINE CT	4%
Video Swallow Study	2%
Developmental and Behavioral Referral	2%
Human Genetics Referral	2%
Sleep Endoscopy	2%
Jaw Surgery	2%

Figure 2. The frequency of decisions made by type in an upper airway center for children with obstructive sleep apnea without tonsillar hypertrophy. CT, computed tomography; MRI, magnetic resonance imaging.

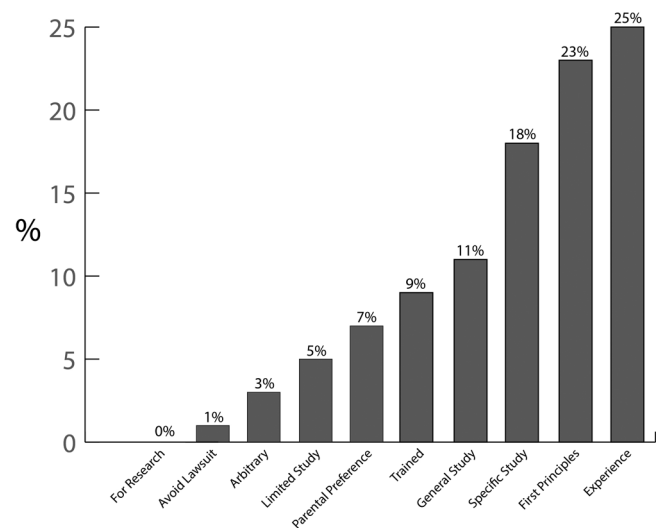


Figure 3. Number of decisions made by category in an upper airway center for children with obstructive sleep apnea without tonsillar hypertrophy.

decisions, Gill et al⁵ reported that 31% of interventions were based on randomized controlled trials while another 50% were based on convincing nonexperimental evidence. Kenny et al⁶ evaluated pediatric surgical inpatient interventions, finding that 11% of decisions were based on randomized controlled trials, while 66% were based on convincing nonexperimental evidence.

In contrast to the above-mentioned single-specialty studies, our study reflects the multidisciplinary practice of clinicians focused on the care of children with a single-disease entity. As well, unlike these previous studies, we evaluated

the full breadth of management decisions, including interventions as well as decisions not to perform interventions, referrals to other specialties, and follow-up—decisions for which there are often limited or no data. As with the study reported by Darst et al,² we conducted a prospective study evaluating real-time decision making. In our study, the relatively high proportion of nonevidence-based decisions may be due to the fact that our providers were not familiar with all of the current evidence. To explore this theory further, we examined whether there was an improvement in the proportion of evidence-based decisions over time and found no significant change over the course of the study. In light of this, we thought it more likely that our findings suggest that gaps in evidence may preclude adherence to the standard of evidence-based medicine. Indeed, data are sparse regarding the management of children with OSA without tonsillar hypertrophy.

Our reported findings must be interpreted with several limitations in mind. The data reflect a single-institution experience over a 2-month time frame, thus limiting generalizability and making it less likely that there would be an increase in evidenced-based decisions over time. In addition, almost all children had comorbidities, which also affects generalizability. As well, because we required practitioners to recall a specific, limited, or general study, we may have underestimated the number of evidence-based decisions. Last, we did not review the studies cited as evidence based by reporting clinicians, nor did we carry out a systematic review of the literature to verify that evidence did not exist when none was cited. Thus, some of these decisions may have been miscategorized.

Conclusions

We found that 34% of decisions pertaining to the management of children with OSA without tonsillar hypertrophy were evidence based and that <20% were based on specific studies. The process of joint decision making and sharing the basis for our decisions did not improve the percentage of evidence-based decisions over the course of the study. These findings reflect significant gaps in evidence and highlight the need for a systematic evaluation of the literature to identify best practice in the management of this population. We recommend that the gaps in evidence be identified and that a research agenda be developed to serve as a basis for future studies.

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Author Contributions

Stacey L. Ishman, conception design, acquisition of data, analysis, draft manuscript, revisions final approval; **Alice Tang**, conception design, acquisition of data, analysis, draft manuscript, revisions, final approval; **Aliza P. Cohen**, interpretation of data, draft manuscript, revisions, final approval; **Haithem Elhadi Babiker**, acquisition of data, draft manuscript, revisions, final approval; **Barbara Chini**, acquisition of data, draft manuscript, revisions, final approval; **Zarmina Ehsan**, acquisition of data, draft manuscript, revisions, final approval; **Robert J. Fleck**, acquisition of data, draft manuscript, revisions, final approval; **Christopher Gordon**, acquisition of data, draft manuscript, revisions, final approval; **Gary L. McPhail**, acquisition of data, draft manuscript, revisions, final approval; **Brian Pan**, acquisition of data, draft manuscript, revisions, final approval; **Howard M. Saal**, acquisition of data, draft manuscript, revisions, final approval; **Sally R. Shott**, acquisition of data, draft manuscript, revisions, final approval; **Raouf S. Amin**, acquisition of data, draft manuscript, revisions, final approval.

Disclosures

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