PEDIATRIC SLEEP OVERVIEW

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Objectives

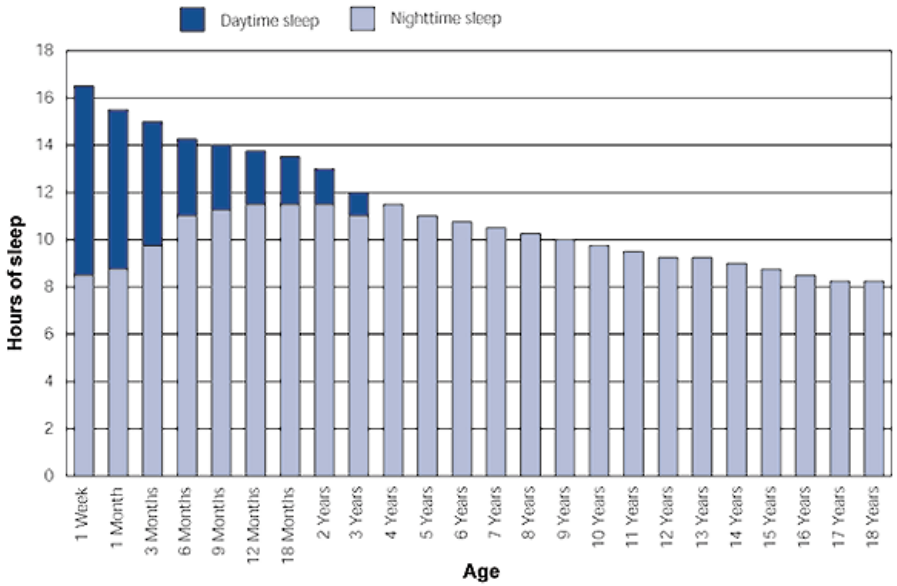
- Discuss sleep development in infants and children
- Identify and discuss pediatric sleep related breathing disorders and their treatments
- Discuss proper assessment process to identify pediatric sleep disorders
- Identify and discuss common symptoms and co-morbid conditions of pediatric sleep related disorders

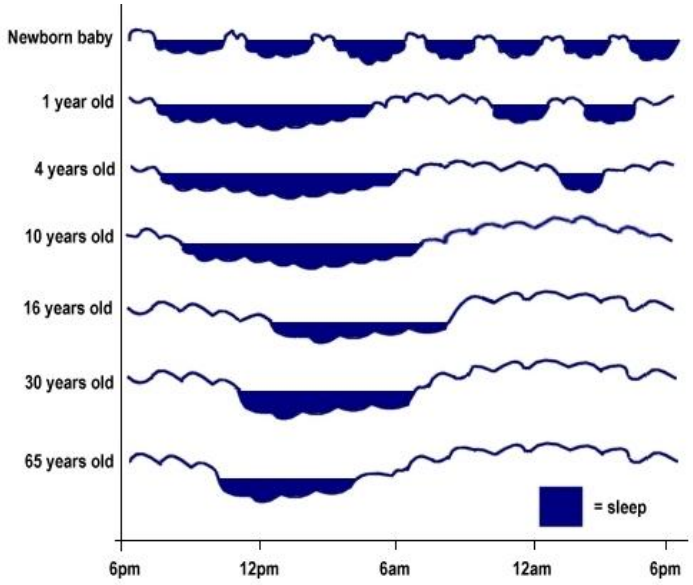
KIDS ARE DIFFERENT

Is there a need for a Pediatric Specific Sleep Program ?

- 1.2-7% estimated prevalence of sleep disordered breathing (Bixler, 2011)
  - A 2% estimate is ~ 1,500,000
- Insomnia is a frequent complaint
  - Pediatricians rarely address sleep problems
- Research indicates that children who are treated for a sleep problem do better in school
- Few pediatric oriented laboratories
- As the first line therapy, it is estimated that ~ 500,000 adenotonsillectomies (T&A) are performed each year specifically for OSA in children under 15 (Redline, et al., 2011) .

Normal Age Sleep Related Changes





Quick Review of Age Related Normals

TABLE.

General Range of Total Hours of Sleep in a 24-hour Period for Different Age Groups

Age Group	Amount of Sleep	Comments
Newborns	16 to 20 hours	Sleep periods are typically 1 to 4 hours in length interspersed with 1 to 2 hours of being awake. Amount of daytime sleep equals the amount of nighttime sleep.
Infants (0 to 1 year)	Sleep periods of 3 to 4 hrs for first 3 months	Day/night differentiation between 6 weeks and 3 months.
Infants (4 months)	14 to 15 hours	Sleep periods of 6 to 8 hours at 4 to 6 months..
Infants (6 months)	13 to 14 hours	Naps of 2 to 4 hours in duration at 2 different intervals. 70% to 80% sleep through the night at 9 months.
Toddlers (1 to 3 years)	12 hours	One nap of 1.5 to 3.5 hours in duration.
Preschoolers (3 to 6 years)	11 to 12 hours	Napping declines; most stop by 5 years.
Middle childhood (6 to 12 years)	10 to 11 hours	Low levels of daytime sleepiness.
Adolescence (> 12 years)	9 hours	Often irregular sleep schedule. After puberty, circadian phase delays with later bedtimes and later rise times.

Adapted from A Clinical Guide to Pediatric Sleep, Diagnosis and Management of Sleep Problems.[1]

Developmental Factors Newborns-6 months

- Sleep
  - NB Require 16-18 hours/day; polyphasic, ~equal between night and day; expectation that child awakens
  - ~6 Months 14-16 hours/day; sleep fairly consolidated into night; fewer daytime naps
  - More sensitive to light/dark cues
- Development
  - Primarily met by caregiver
- Communication
  - Crying
- Increased mobility

Vriend, et al., 2011; Johnson and Mindel, 2011

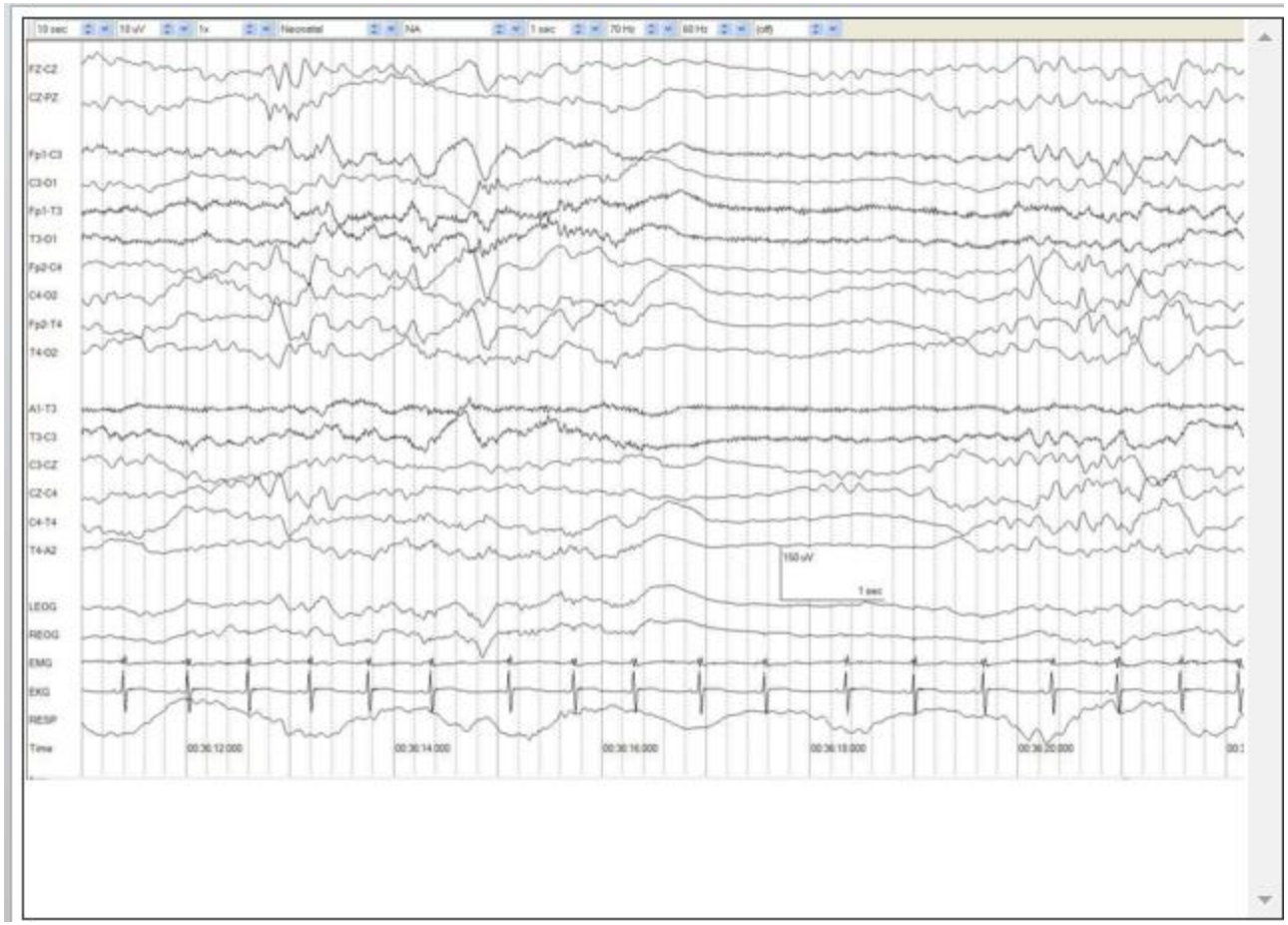
A 5-step process for EEG evaluation

- Knowledge of the postconceptional age and topography of the infant's head
- Identification of artifacts in the EEG
- Identification of sleep and wake states
- Feature extraction
- Classification of the record as normal or abnormal and the clinical correlation provided to the clinician

http://emedicine.medscape.com/article/1139599-overview#a3

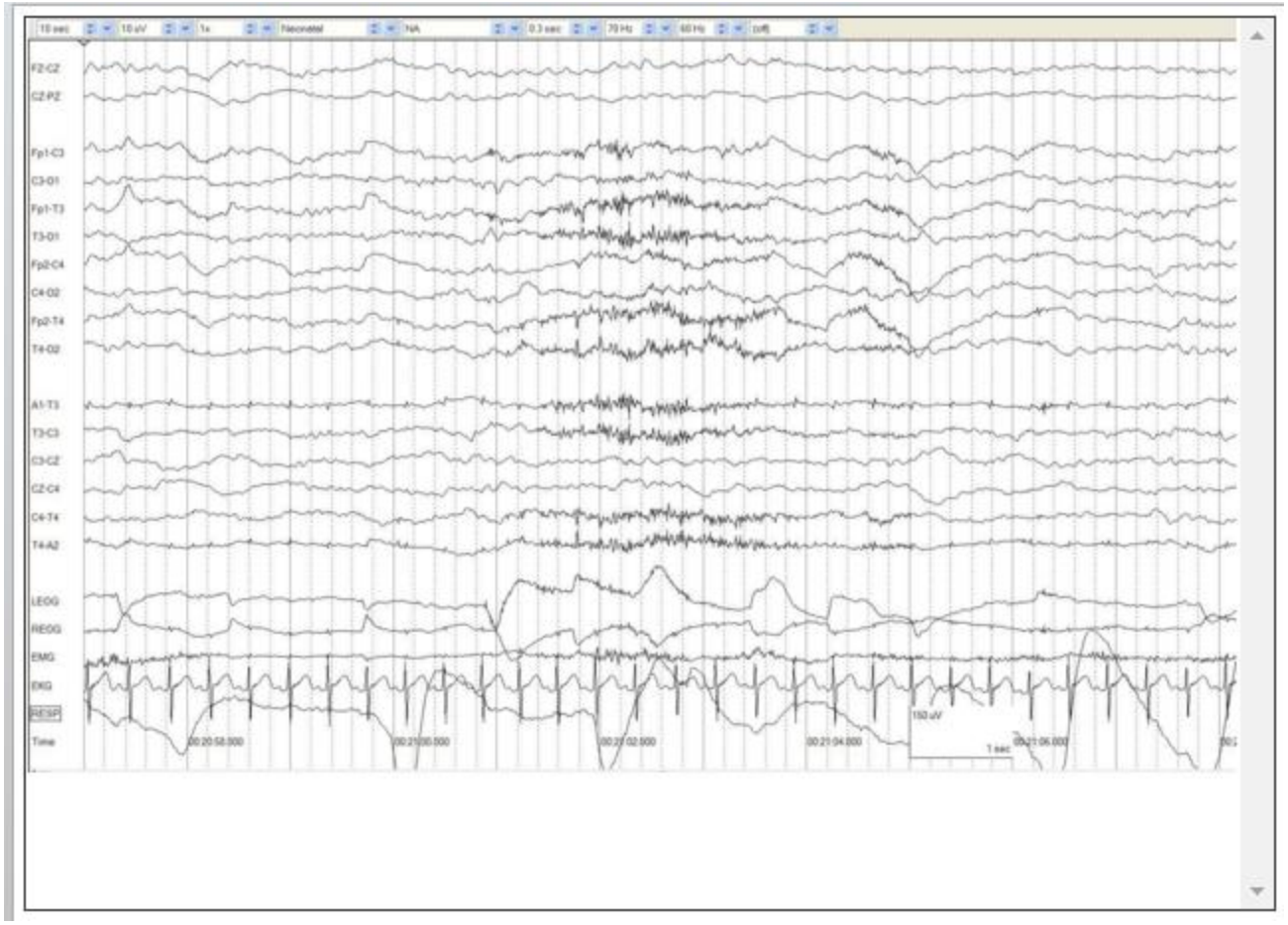
Normal Infant EEG Sleep Patterns

- Trace Alternant



Normal Infant EEG Sleep Patterns

- REM (Active Sleep)



Key Maturational Features

- TA ⟶ SWS ~ 44 weeks PCA
- K Complex ~ 6 months
- Sleep Spindles ~ 44 weeks rudimentary
  3 mos should be present
- Delta Brush Disappear at ~ 40-44 weeks

Older Infants/Toddlers

- 6-12 months/12-24 months
- TST slightly decreased ~13 hours per day
- 6-9 months, most are sleeping through the night
  - Night wakings are still common (50% waking at least once/week)
  - Night time bottles
- Naps continue, but are shorter
- Development
  - Develops attachment to caregiver---separation anxiety
  - May have learned to fall asleep with caregiver
- Communication
  - Increased mobility and verbalization
- ~20-30% develop BIC SOA

Vriend, et al., 2011; Johnson and Mindel, 2011

Early Childhood

- 2-6 Years
- Transition from crib to bed
- Sleep duration decreases
- Daytime napping decreases/eliminated (<10% 6 year old nap)
- 25-50% have sleep problems
- Increased mobility and language
- Development
  - Initiative and independence
  - Rewards/punishment

Vriend, et al., 2011; Johnson and Mindel, 2011

Middle Childhood

- 6-12 years
- Should be sleeping 9-10 hours per night
  - Highly energetic; EDS should be warning sign
  - Napping rare
  - Night Owl vs Lark emerge
- ~37% have a parent reported bedtime problem
- Development
  - Peer relationships more important
  - More technology usage
  - Possible increased social anxiety
  - Increasing social and school obligations

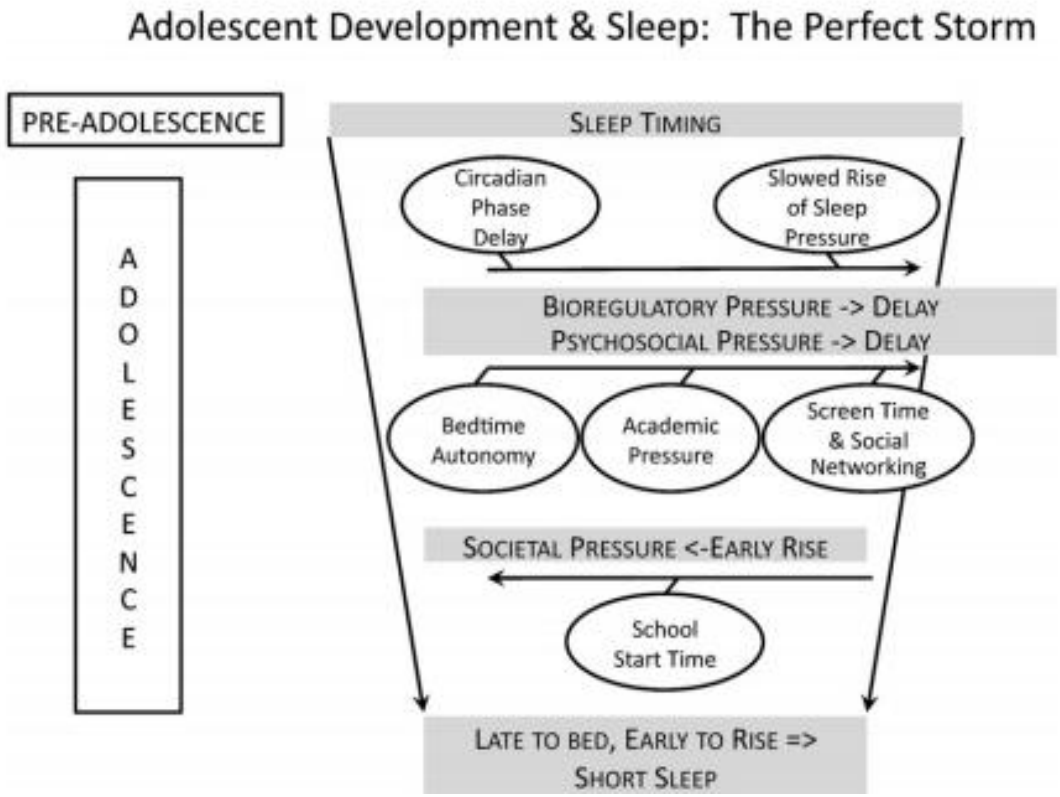
Vriend, et al., 2011; Johnson and Mindel, 2011

Adolescence

- 12-18 years
- ~ 2 hour bedtime delay
  - Social factors
    - Electronics; work; friends and school activities
  - Biological
- Typically have insufficient sleep during the week; make up for this on weekend
- Increased use of caffeine or energy drinks
- Development
  - Decreased parental influence
  - Moodiness and conflicts-- autonomy

Vriend, et al., 2011; Johnson and Mindel, 2011

Adolescent Sleep Timing



Carskaden (2011) Pediatr Clin N Am 58 637–647
doi:10.1016/j.pcl.2011.03.003

Common Problem

- 30% of children have a sleep disorder; higher in children with special needs

- Autism
- ADHD
- Parasomnias
- Trachs
- Mobility – e.g. Cerebral palsy, weight problems
- Down Syndrome
- Abuse – consider Munchausen by proxy syndrome (MBPS)

Special Needs Children

- Difficulty staying asleep and frequent night awakenings
- Trouble falling asleep
- Medical issues may include pain from disease, lung and/or cardiac disease with trouble breathing/fatigue, neuromuscular disorders contributing to sleep-related breathing problems
- 80% have a sleep problem
  - James E. Jan, et al. Sleep Hygiene for Children with Neurodevelopmental Disabilities. *Pediatrics* 2008;122 (6): 1343-50.

Behavioral Insomnia of Childhood

- Three types (International Classification)
- BIC sleep-onset association type (BIC-SOA)
- BIC limit-setting type (BIC-LST)
- BIC combined type

- Psychophysiological
  - Adolescent

Risk Factors-General

- Parental presence during sleep onset
- Intentional co-sleeping
- Feeding child to sleep
- Insecure parents/parenting styles
- Maternal depression

- Biologic-environmental-culture

BIC-SOA

- Presentation
  - Frequent and/or prolonged night wakings
  - Diagnosis usually made after 6 months
  - Requires caregiver intervention or assistance to fall asleep
  - Inability to self-soothe
- Diagnostic Criteria
  - Prolonged sleep onset that requires a particular condition
  - Demanding sleep onset conditions
  - Significant delay of sleep in the absence of the conditions
  - Caregiver intervention is required

Owens and Mindell, 2011; Pediatric Clinics of North America

Concept of Self-Soothing

- Developed over the first 12 weeks of life
- An infant's ability to regulate states of arousal; for example, calming from crying to quiet wakefulness without parental assistance (Burnham et al., 2005)
- May be associated with temperament/characteristics (Wientraub et al., 2012)
- Parental perception of the baby i.e. fussy, hyperactive, hypoactive etc.…

BIC LST

- Typically pre-school age and older
- Non-compliant bedtime behaviors
- Trouble initiating or maintaining sleep
  - Mismatch with circadian influences
- Stalling or refusing to go to sleep at bedtime
  - Bedtime fears; imagination; anxiety
  - Increased autonomy
- Lack of parental control
  - Do not set limits
  - Permissive
  - Conflicting parenting styles

Owens & Mindell, 2011

BIC-Combined

- Bedtime resistance
- Frequent and problematic night time wakings

- Require the presence of a negative sleep association to fall and return to sleep

Psychophysiological

- Prevalence ~ 11%; 35% up to a couple of times per month
- Combination of learned sleep-preventing behaviors
- Heightened physiologic arousal
- Excessive worry about sleep
- Worry about impact of daytime functioning

- Predisposing Factors
  - Genetic, medical or psychiatric issues, acute stress and social (caffeine, poor sleep habits, technology)

Medical Conditions

- Asthma
- Diabetes
- Sickle Cell Anemia
- Cancer
- Juvenile Rheumatoid Arthritis

Medical Conditions

- Increased pain
- Anxiety
- Breathing

Psychiatric Disorders

- ADHD

- Autism Spectrum Disorder (AAP)
- 1/110 children fulfill DSM IV criteria
- Sleep disturbances 53-78%
- Multifactorial
- Prone to more severe comorbid behavioral disturbances
- Medications

- Anxiety/mood Disorders

ASD and Insomnia

- Recommendations for a practice pathway (American Academy of Pediatrics)
  - All children with ASD should be screened for sleep disorders and should include any other medical problems
  - The need for therapeutic intervention should be determined
  - Interventions should begin with parental education in the use of behavioral techniques as first line
  - Pharmacologic intervention may be indicated
  - Follow-up after ANY intervention to evaluate effectiveness and tolerability of the intervention

2012

PEDIATRICS®
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Diagnosis and Management of Childhood Obstructive Sleep Apnea Syndrome

Carole L. Marcus, Lee Jay Brooks, Kari A. Draper, David Gozal, Ann Carol Halbower, Jacqueline Jones, Michael S. Schechter, Stephen Howard Sheldon, Karen Spruyt, Sally Davidson Ward, Christopher Lehmann and Richard N. Shiffman

Pediatrics; originally published online August 27, 2012;
DOI: 10.1542/peds.2012-1671

Supercedes 2002

Assessment Tools

- **B-Bedtime Problems**
- **E-Excessive Daytime Sleepiness**
- **A-Awakenings during the night**
- **R-Regularity and duration of Sleep**
- **S-Snoring**

- **Questions and responses are age related**
- **Questions may be parentally based or child-directed**

ATS Link to Sleep Related Questionnaires

Sleep and Respiratory Neurobiology

- Awards
- Mission Statement
- Officers and Committees
- News
- Mentoring Program
- Funding Opportunites
- Journal Club
- Sleep Education
- Sleep Fragments
- Patient Educational Materials
- **Sleep Related Questionnaires**
- Facebook
- Twitter
- Assembly Donations

Members

Assemblies and Sections

Chapters

Committees

Membership

Sleep Related Questionnaires

SRN web-education committee members identified commonly used and validated questionnaires that are relevant to research and clinical practice of both adult and pediatric Sleep Medicine. A brief description of each questionnaire is presented, as well as their original and related references. Given licensing requirements, it is recommended that the readers directly contact the specified authors for permission to use these questionnaires.

Reliability: Reliability in questionnaire studies relates to the ability of the questionnaire to produce the same results if tested multiple times.

- Test-retest correlations at two time points (≥0.7 are considered reasonable evidence of reliability (Nunnally JC. Psychometric theory. New York: McGraw-Hill1978)
- Internal consistency: Cronbach alpha is a statistic used to measure the extent to which different items measure the same construct (Cronbach 1984). A statistic ≥0.7 is considered reasonable evidence of reliability (Nunnally JC. Psychometric theory. New York: McGraw-Hill1978).

Validity: Validity refers to whether the questionnaire measures what it intends to measure. Validity is assessed by examining correlations with other measures of the same construct.

In addition, a previously developed ATS website provides information about quality of life and functional status instruments used in the assessment of patients with pulmonary disease or critical illness.

http://qol.thoracic.org/sections/instruments/index.html

Adult Questionaires

Pediatric Questionaires

Sleep habits - Infants

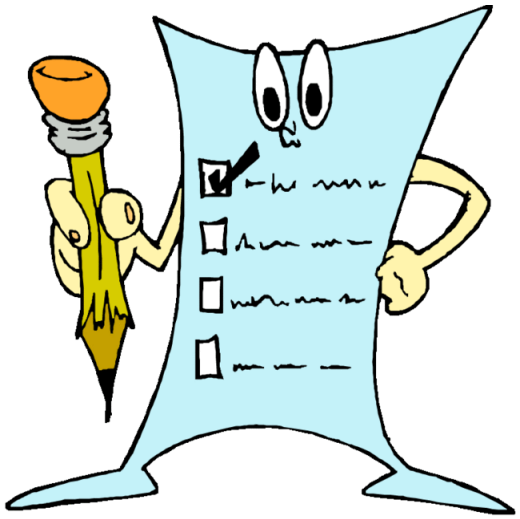
Sleep habits - age > 1 year

Daytime Sleepiness

- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3088759/

Pediatric Sleep Questionnaires as Diagnostic or Epidemiological Tools: A Review of Currently Available Instruments

Karen Spruyt, Ph.D. and David Gozal, M.D.



OSA Diagnosis and Therapy

- Diagnostics
  - Full in lab PSG
  - At home testing (not recommended by AASM)
- Therapy
  - Adenoids/tonsillectomy
  - CPAP
    - Due to growth, likely will require constant follow up
  - Oral appliances
  - Mandibular distraction osteogenesis

Diagnostics

OSA-AAP

- Disorder of breathing during sleep characterized by prolonged partial and/or complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns (see table 2, slide 10)
- Prevalence estimated 1.2-5.7%
- Daytime sleepiness may occur, but is uncommon in young children
- Neurobehavioral
- Obesity defined as BMI>95%

(some) Risk factors may be different

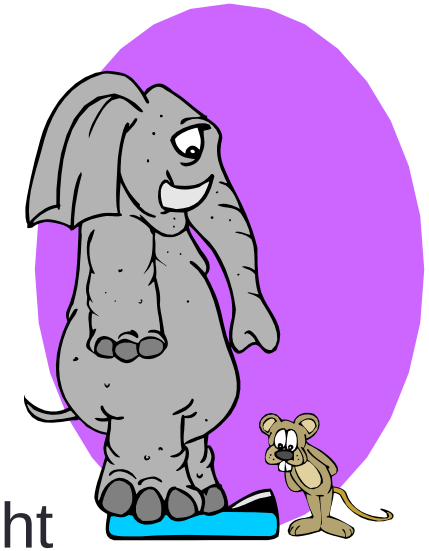
- Neighborhood (Brouillette,2010)
- Nasal abnormalities (chronic sinusitis,/rhinitis (Bixler,2009)
- Obesity
  - Risk 4-5 fold; for every one increment in BMI, the risk of OSA increases by 12% (Dayyat, 2009)
  - Adenotonsillar size was smaller than in non-obese children thus the findings demonstrate that obesity contributes to OSA more than adenotonsillar size (Dayyat, 2009)
- “Crowded” upper airway

Hypertrophic tonsils may NOT be the main contributing factor for OSA

(Dayyat 2009, Bixler, 2009)

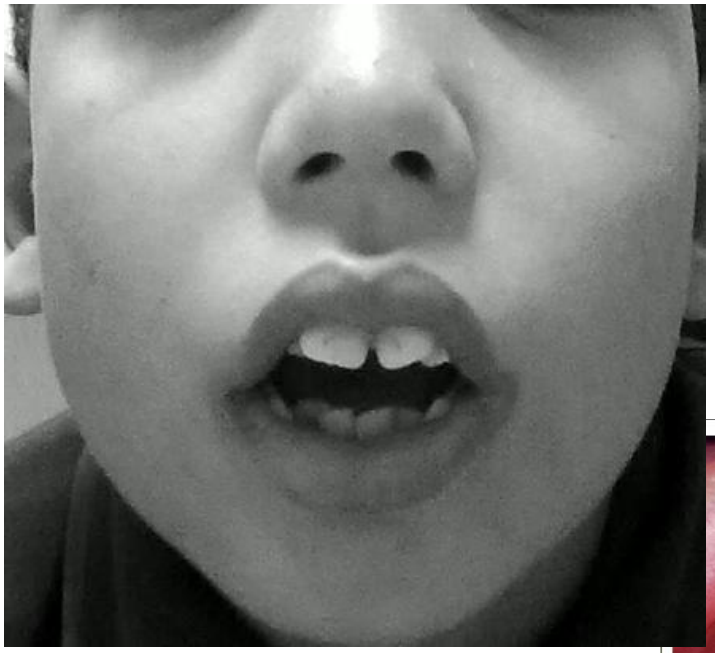
OSA and Obesity Implications

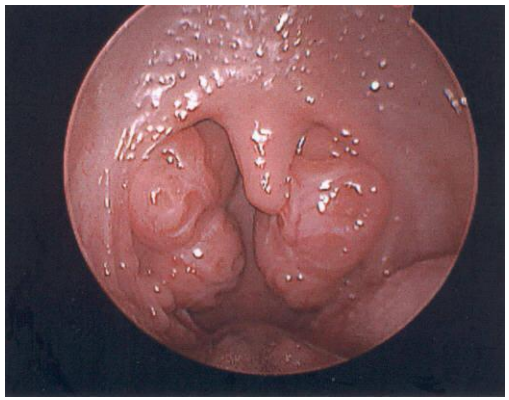
- Rise in obesity = ⇧ OSA (1.3-4.6 fold)
- Issues
  - Asthma
  - Low Self-Esteem
  - Poor impulse control
  - Hypertension
  - Insulin resistance
- Sleep disturbances may lead to overweight

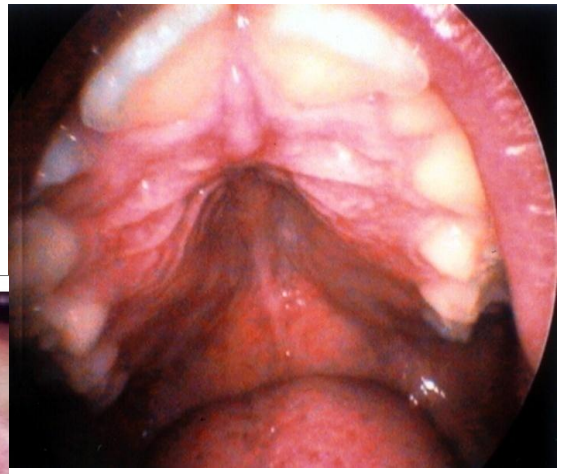


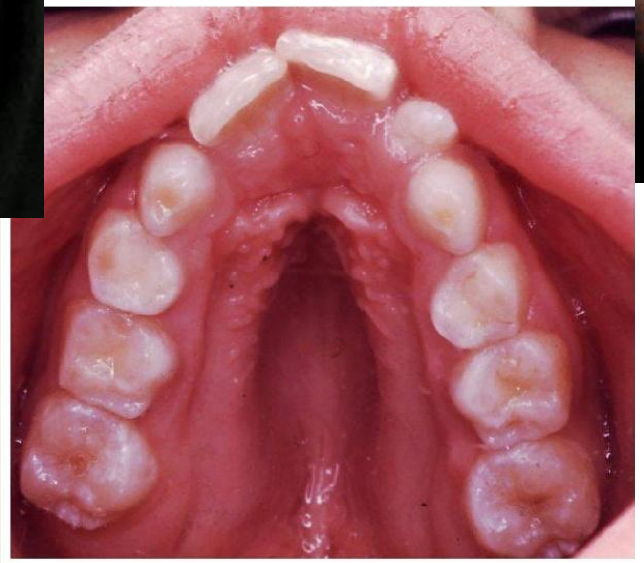
Landis & Redline, 2007

If you can't breath while you are awake……

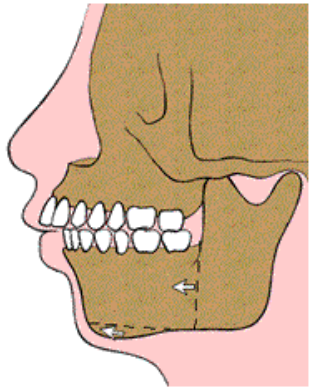




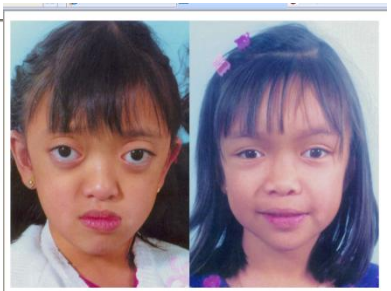




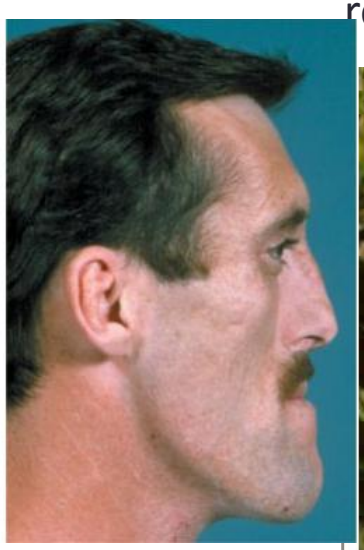
Facial features, Midface Hypoplasia and Syndromes



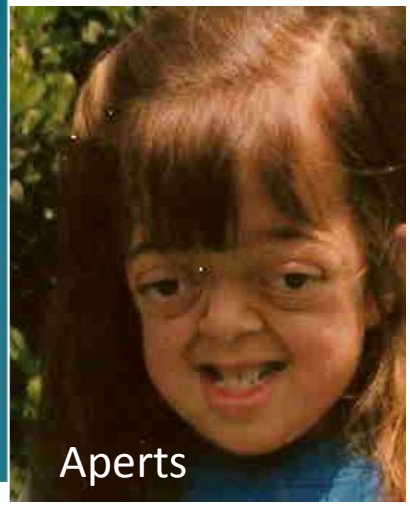
retrognathia



Treacher Collins



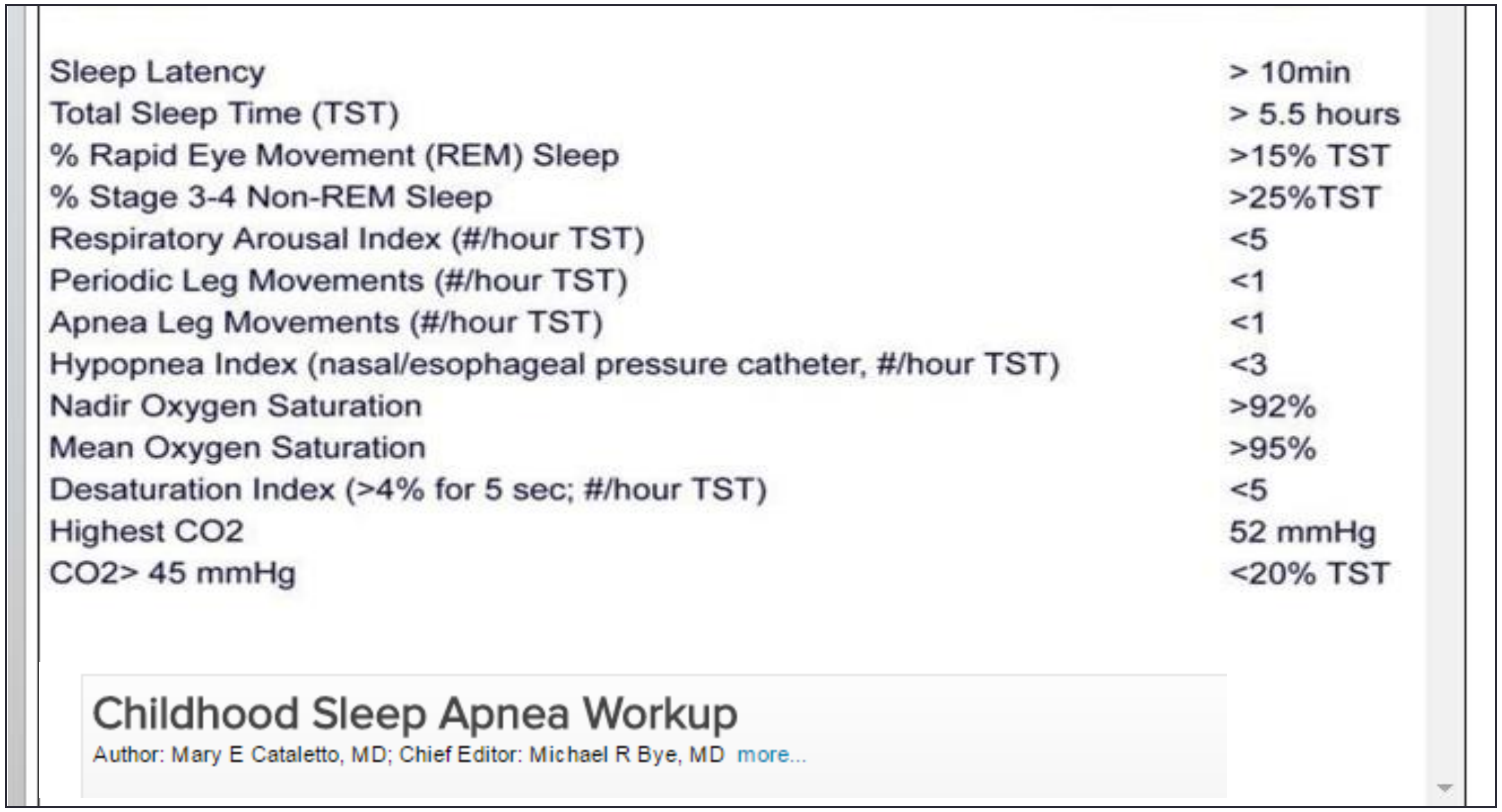
Acromegaly



Pierre Robin

Micrognathia

PSG Values



Sleep Latency	> 10min
Total Sleep Time (TST)	> 5.5 hours
% Rapid Eye Movement (REM) Sleep	>15% TST
% Stage 3-4 Non-REM Sleep	>25%TST
Respiratory Arousal Index (#/hour TST)	<5
Periodic Leg Movements (#/hour TST)	<1
Apnea Leg Movements (#/hour TST)	<1
Hypopnea Index (nasal/esophageal pressure catheter, #/hour TST)	<3
Nadir Oxygen Saturation	>92%
Mean Oxygen Saturation	>95%
Desaturation Index (>4% for 5 sec; #/hour TST)	<5
Highest CO2	52 mmHg
CO2> 45 mmHg	<20% TST

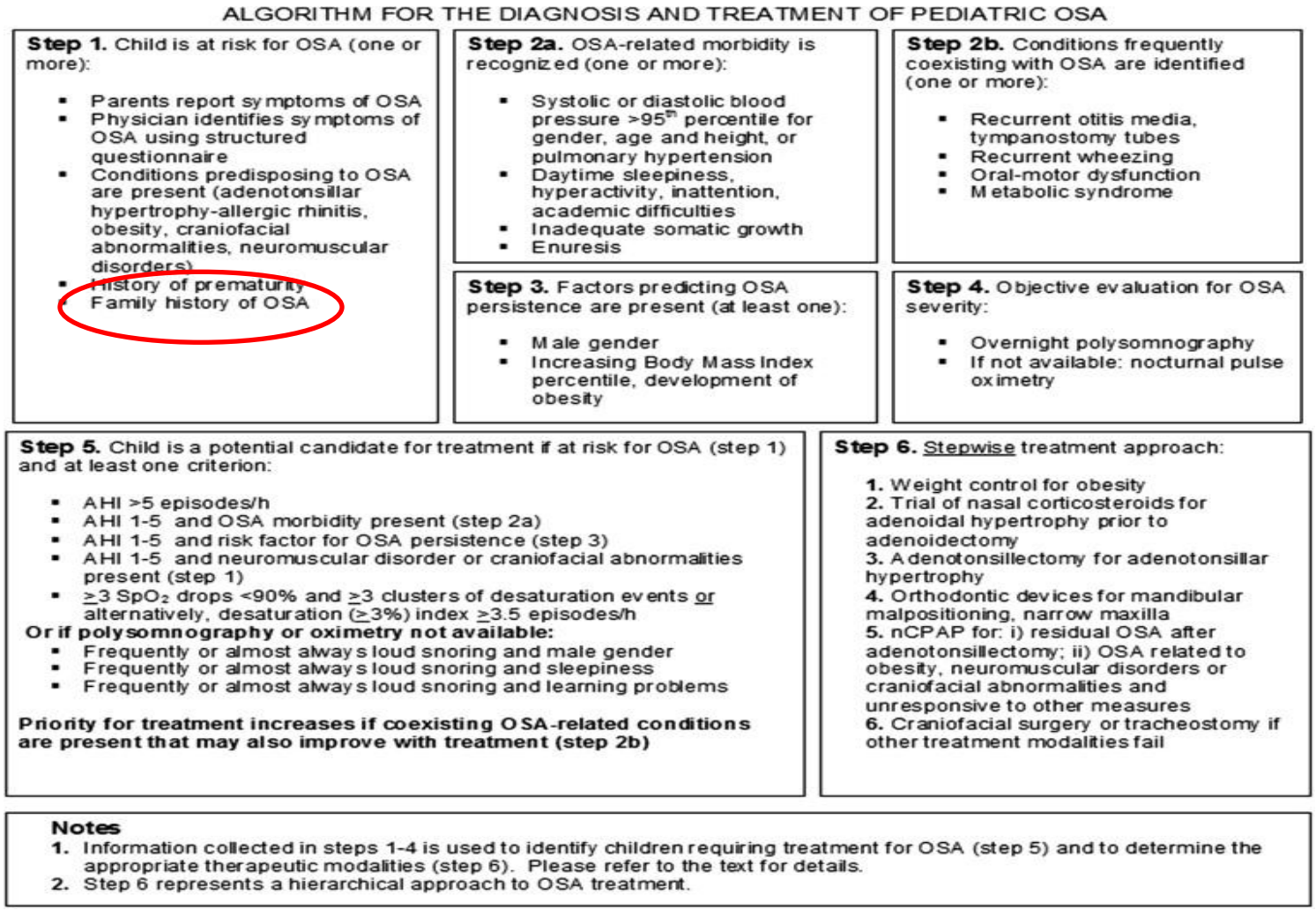
http://emedicine.medscape.com/article/1004104-workup

Pediatric OSA Values

OSA Severity	Index	SpO2 Nadir	Peak ETCO2	EtCO2 % of TST
Mild	1-4	86-91	>53	10-24
Mod	5-10	76-85	>60	25-49
Severe	>10	≤ 75	>65	≥ 50

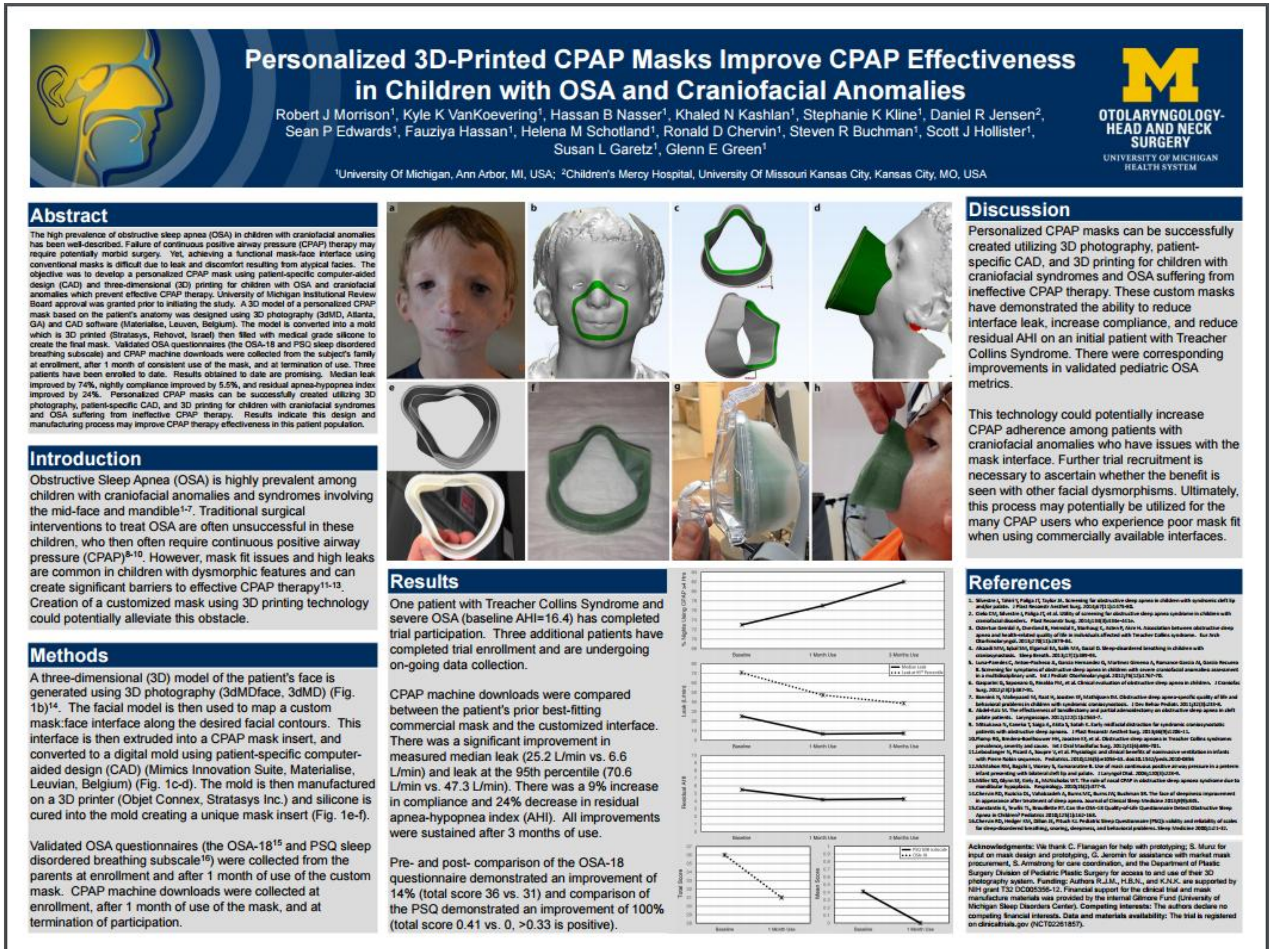
Adapted from Marcus et al. Principles and Practices Pediatric Sleep , 2005

Algorithm for the diagnosis and treatment of pediatric OSA: A proposal of two pediatric sleep centers (Kaditisa, Kheirandish-Gozal &Gozal, Sleep Medicine, 2012)



CPAP and Kids, although overall adherence is still low

New Technology



Personalized 3D-Printed CPAP Masks Improve CPAP Effectiveness in Children with OSA and Craniofacial Anomalies

Robert J Morrison[1], Kyle K VanKoevering[1], Hassan B Nasser[1], Khaled N Kashlan[1], Stephanie K Kline[1], Daniel R Jensen[2], Sean P Edwards[1], Fauziya Hassan[1], Helena M Schotland[1], Ronald D Chervin[1], Steven R Buchman[1], Scott J Hollister[1], Susan L Garetz[1], Glenn E Green[1]

[1]University Of Michigan, Ann Arbor, MI, USA; [2]Children's Mercy Hospital, University Of Missouri Kansas City, Kansas City, MO, USA

OTOLARYNGOLOGY-HEAD AND NECK SURGERY
UNIVERSITY OF MICHIGAN HEALTH SYSTEM

Abstract

The high prevalence of obstructive sleep apnea (OSA) in children with craniofacial anomalies has been well-described. Failure of continuous positive airway pressure (CPAP) therapy may require potentially morbid surgery. Yet, achieving a functional mask-face interface using conventional masks is difficult due to leak and discomfort resulting from atypical facies. The objective was to develop a personalized CPAP mask using patient-specific computer-aided design (CAD) and three-dimensional (3D) printing for children with OSA and craniofacial anomalies which prevent effective CPAP therapy. University of Michigan Institutional Review Board approval was granted prior to initiating the study. A 3D model of a personalized CPAP mask based on the patient's anatomy was designed using 3D photography (3dMD, Atlanta, GA) and CAD software (Materialise, Leuven, Belgium). The model is converted into a mold which is 3D printed (Stratasys, Rehovot, Israel) then filled with medical grade silicone to create the final mask. Validated OSA questionnaires (the OSA-18 and PSQ sleep disordered breathing subscale) and CPAP machine downloads were collected from the subject's family at enrollment, after 1 month of consistent use of the mask, and at termination of use. Three patients have been enrolled to date. Results obtained to date are promising. Median leak improved by 74%, nightly compliance improved by 5.5%, and residual apnea-hypopnea index improved by 24%. Personalized CPAP masks can be successfully created utilizing 3D photography, patient-specific CAD, and 3D printing for children with craniofacial syndromes and OSA suffering from ineffective CPAP therapy. Results indicate this design and manufacturing process may improve CPAP therapy effectiveness in this patient population.

Introduction

Obstructive Sleep Apnea (OSA) is highly prevalent among children with craniofacial anomalies and syndromes involving the mid-face and mandible[1-7]. Traditional surgical interventions to treat OSA are often unsuccessful in these children, who then often require continuous positive airway pressure (CPAP)[8-10]. However, mask fit issues and high leaks are common in children with dysmorphic features and can create significant barriers to effective CPAP therapy[11-13]. Creation of a customized mask using 3D printing technology could potentially alleviate this obstacle.

Methods

A three-dimensional (3D) model of the patient's face is generated using 3D photography (3dMDface, 3dMD) (Fig. 1b)[14]. The facial model is then used to map a custom mask:face interface along the desired facial contours. This interface is then extruded into a CPAP mask insert, and converted to a digital mold using patient-specific computer-aided design (CAD) (Mimics Innovation Suite, Materialise, Leuvian, Belgium) (Fig. 1c-d). The mold is then manufactured on a 3D printer (Objet Connex, Stratasys Inc.) and silicone is cured into the mold creating a unique mask insert (Fig. 1e-f).

Validated OSA questionnaires (the OSA-18[15] and PSQ sleep disordered breathing subscale[16]) were collected from the parents at enrollment and after 1 month of use of the custom mask. CPAP machine downloads were collected at enrollment, after 1 month of use of the mask, and at termination of participation.

Results

One patient with Treacher Collins Syndrome and severe OSA (baseline AHI=16.4) has completed trial participation. Three additional patients have completed trial enrollment and are undergoing on-going data collection.

CPAP machine downloads were compared between the patient's prior best-fitting commercial mask and the customized interface. There was a significant improvement in measured median leak (25.2 L/min vs. 6.6 L/min) and leak at the 95th percentile (70.6 L/min vs. 47.3 L/min). There was a 9% increase in compliance and 24% decrease in residual apnea-hypopnea index (AHI). All improvements were sustained after 3 months of use.

Pre- and post- comparison of the OSA-18 questionnaire demonstrated an improvement of 14% (total score 36 vs. 31) and comparison of the PSQ demonstrated an improvement of 100% (total score 0.41 vs. 0, >0.33 is positive).

Discussion

Personalized CPAP masks can be successfully created utilizing 3D photography, patient-specific CAD, and 3D printing for children with craniofacial syndromes and OSA suffering from ineffective CPAP therapy. These custom masks have demonstrated the ability to reduce interface leak, increase compliance, and reduce residual AHI on an initial patient with Treacher Collins Syndrome. There were corresponding improvements in validated pediatric OSA metrics.

This technology could potentially increase CPAP adherence among patients with craniofacial anomalies who have issues with the mask interface. Further trial recruitment is necessary to ascertain whether the benefit is seen with other facial dysmorphisms. Ultimately, this process may potentially be utilized for the many CPAP users who experience poor mask fit when using commercially available interfaces.

References

Acknowledgments: We thank C. Flanagan for help with prototyping; S. Munz for input on mask design and prototyping, G. Jeromin for assistance with market mask procurement, S. Armstrong for care coordination, and the Department of Plastic Surgery Division of Pediatric Plastic Surgery for access to and use of their 3D photography system. **Funding:** Authors R.J.M., H.B.N., and K.N.K. are supported by NIH grant T32 DC005356-12. Financial support for the clinical trial and mask manufacture materials was provided by the internal Gilmore Fund (University of Michigan Sleep Disorders Center). **Competing interests:** The authors declare no competing financial interests. **Data and materials availability:** The trial is registered on clinicaltrials.gov (NCT02261857).

About the tonsils and adenoids

- Studies have demonstrated that the airway is smaller in children with OSA compared to controls.
- The adenoid and tonsils are larger and the airway is most restricted where the adenoid and tonsils overlap
- T&A is the first-line treatment for pediatric OSA
- Both tonsillectomy and adenoidectomy should be performed if the objective of the operation is to decrease airway obstruction in OSA.
- There is convincing evidence that T&A improves OSA in children. There is also convincing evidence that the treatment of OSA may not end with T&A.

OSA after removal of tonsils and adenoids

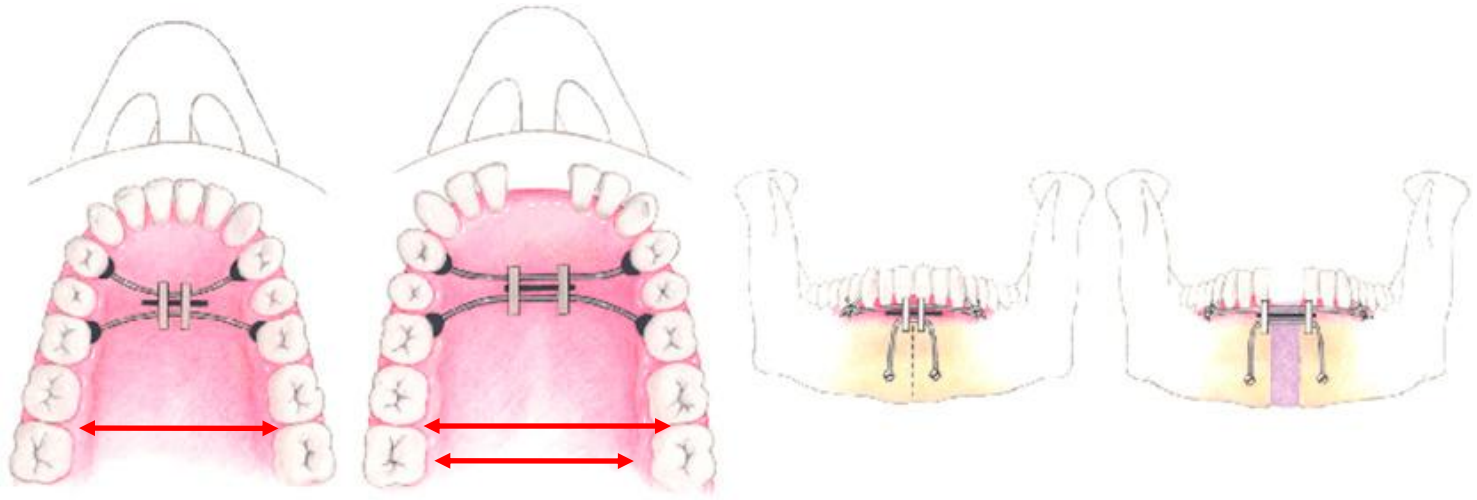
- 75 % of children post surgery have residual sleep apnea (Gozal, 2006 Pediatrics)
  - Some may need to go on CPAP
- Long term follow-up is required to ensure that this has not occurred.
- Post op complication risk factors
  - <3 years
  - Severe OSA
  - Cardiac complications
  - FTT
  - Obesity
  - Prematurity
  - Recent URI
  - Cranial facial abnormalities
  - Neuromuscular Disorders

Marcus et al (2005) P&P Ped Sleep

Pre/Post T&A

- Giordani et al. (2012)
  - Pre and post adenotonsillectomy, comprehensive 1 year follow-up neurophsychological exams were conducted
  - After AT, improvements were noted in PSG, sleepiness, and parental reports of behavior
  - Cognitive outcomes were mixed
    - Measure of delayed recall, academic measures, short-term attention/working memory and executive function improved
    - Verbal abstraction ability, arithmetic calculations, visual and verbal learning, verbal delayed recall, sustained attention and other measures showed a decline
- AT will not necessarily resolve or improve all behavioral and neurocognitive abilities; ongoing assessment is needed and expectations changed

Rapid Distraction Osteogensis



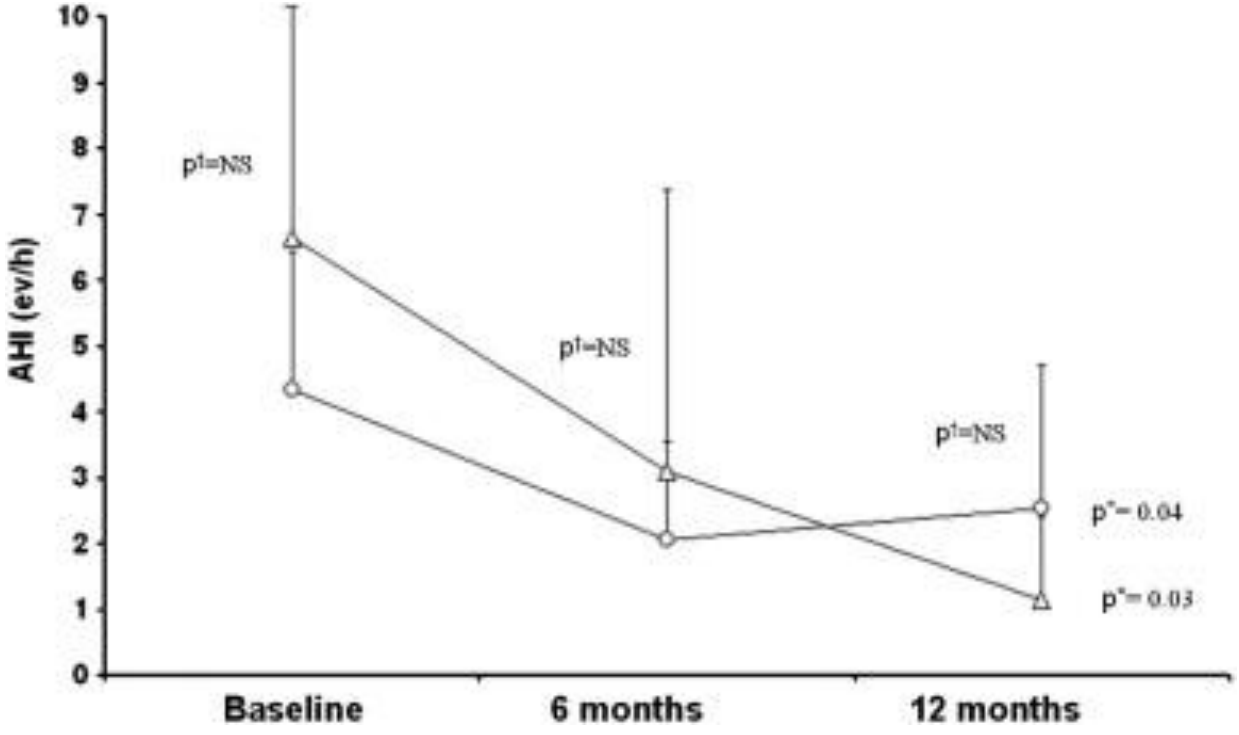
Won et al. (2008) Proc Am Thorac Soc

What is it? Does it work?

- This technique aims to expand the hard palate laterally, raise the soft palate, and widen the nasal passage
- Rapid maxillary distraction requires an orthodontic device anchored to two upper molars on each side of the jaw
- Daily pressure is applied causing each half of the maxilla to grow apart.
- Bone grows into the spaces bordering the midline cartilage

Rapid maxillary expansion in children with obstructive sleep apnea syndrome: 12-month follow-up (Villa, et al, 2007)

- n=16; mean age 6.6 ± 2.0; 9 males



Screening for Sleep Disorders in Pediatric Primary Care Are We There Yet?

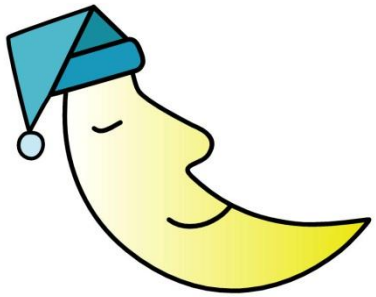
- OBJECTIVES:
- Obstructive sleep apnea (OSA) and habitual snoring are highly prevalent childhood conditions and have been associated with a large array of negative health outcomes. Although guidelines were published by the American Academy of Pediatrics (AAP) a decade ago recommending routine screening of sleep-disordered breathing (SDB) in primary care settings, it remains unclear to what extent such guidelines have been implemented and resulted in effective SDB screening. The aim of this study was to determine if AAP guidelines are adhered to in pediatric primary care.
- STUDY DESIGN:
- In all, 1032 electronic charts of children 4 to 17 years old presenting for well-child visits to 17 pediatricians between January 1 and December 31, 2010, were manually reviewed. Abstracted data included demographic variables and documentation of snoring as well as other sleep-related complaints.
- RESULTS:
- The mean age was 8.5 ± 3.9 years (mean ± standard deviation), 49.9% were male, and 79.7% were Hispanic; 24.4% (n = 252) were screened for snoring. Of the children screened for sleep-related issues, 34.1% (n = 86) snored, but the majority of them (61.6%, n = 53) received no further evaluation. In the present sample, 0.5% (n = 5) had a diagnosis of OSA.
- CONCLUSIONS:
- The low prevalence of OSA may be explained by the relatively low frequency of sleep-related problem screening by pediatricians and thus the inordinately low adherence to the AAP guidelines. Modification and transition to electronic medical records as well as expanded efforts to educate health care providers and caregivers may improve detection and timely treatment of children at risk for SDB.

Erichsen, et al. Clin Pediatr. 2012 doi: 10.1177/000992281246454; PMID: 23203980 [PubMed - indexed for MEDLINE]

The Pediatrician and Sleep

- ~ 2 Hours sleep training in medical school/residency
- Essentially no change over the past 30 years
- Limited knowledge about sleep
  - Pediatricians do not feel confident in diagnosing or treatment sleep problems
  - 96% believe it is important and part of their plan of care but only 18 % actually asked (Mindell, 2013)
- 3.7% in a large, EMR based review had sleep diagnosis
  - Significant that prevalence is higher in epidemiological studies
  - Long term significance to the child
- ONLY 5% of patients with a diagnosis of a sleep related problem were given sleep related treatment recommendations

Meltzer, et al., 2014 JCSM



Parents don't seek assistance; practitioners don't ask Sleep Issues go UNTREATED……

Parents may not know how much sleep their children need

BY MADELINE KENNEDY

A young fan takes a nap during the women's handball Preliminaries Group A match between Russia and Britain at the Copper Box venue during the London 2012 Olympic Games July 30, 2012.
REUTERS/MARKO DJURICA

Reuters Health - Many parents have only a poor understanding of how much sleep their children need, a New Zealand study found.

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The happiest places on earth

Candidates' families on the campaign trail

Summary

- A clinical GAP exists
  - Pediatrician knowledge (including diagnosis and appropriate therapy)
  - Parental reports focus on the daytime behavioral problems; not necessarily sleep problems
- Childhood insomnia is a very common phenomena
  - It is more common and more difficult to treat in kids with medical and/or psychiatric disorders
- OSA is also common and under recognized and treated
  - A multi-specialty approach with dentists may be warranted
- Special needs and children with co-morbidity have high levels of sleep disruption