

Sleep Disorders in Children & Adolescents

A Brief Introduction



HI - I'm JT

Listen to my Story

- I am age 43 and have sleep apnea
 - I have snored since high school and have been a mouth breather most of my life
 - I was always tired in school and could not concentrate
 - I had trouble holding onto a job
 - Now I understand the effects of apnea
- "What would my life be like if someone recognized all of this when I was younger"



Clinical Practice Guideline: Diagnosis & Management of Childhood OSAS

- All Children Should be Screened for Snoring
- Differentiate between Snoring & OSA
- T & A is First Line Treatment
- Sleep History Screening should be part of routine health care visit

American Academy of Pediatrics, 2002



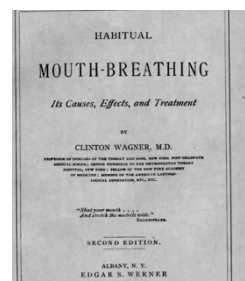
Clinton Wagner, MD

Published in 1884

"Habitual Mouth Breathing
*Its Causes, Effects, and
Treatment*"

"Shut your mouth . . . And
stretch the nostrils wide."

Shakespeare



Published in 1889

"On Some causes of Backwardness
And Stupidity in Children:
And the Relief of These Symptoms in Some
Instances by Naso-Pharyngeal Sacrificion"

Author: Wm. Hill, BSc
Annual Meeting of the British Medical Assoc.
BMJ Sept 28, 1889 p711-712



In 1892

- William Osler documented sleep and daytime performance of children with sleep-related upper airway obstruction
- "child is very stupid looking"
- "at night the child's sleep is greatly disturbed, the respirations are loud and snoring, and there are prolonged pauses, followed by deep noisy inspirations"
- "influence on mental development is striking"
- "impossible to fix the attention for long at a time"



Prevalence of Sleep Disorders in Children and Adolescents

- 25% Have some type of sleep problem
- Can range from 25 to 50%
- Snoring: 3 – 12% range
20% occasional – 10% habitual
- 1 – 3% have OSA
- 12 to 33% are “poor sleepers”

Importance Related to Pediatric Sleep Medicine

Research articles on Pediatric OSA has increased 1226% in the last 20 years

CLINICAL FINDINGS

- Primary: Adenotonsillar Hypertrophy
- Secondary:
 - Mouth Breather
 - Allergies
 - Headaches
 - GERD
 - Nasal Airway Obstruction
 - Allergic Shiners
 - Tooth Wear

TABLE 1. Manifestations of adenotonsillar hyperplasia with airway obstruction

Item	Percent of patients ^a
Sleep-related	
Snoring	98
Breath holding	70
Fatigue during day	31
Night cough	25
Daytime	
Mouth breathing	75
Slow eating	60
Dry mouth	42
Trouble swallowing	37

^aBased on parental responses to questionnaire for 100 patients scheduled for adenotonsillectomy for airway obstruction⁶.

Evidence Based Association of Pediatric OSA

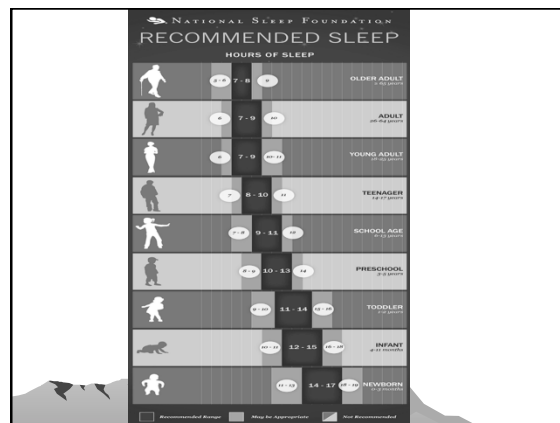
- Poor School Performance
- Enuresis
- Failure to Thrive
- Learning Disabilities
- Obesity
- ADD / Hyperactivity

Childhood Obesity

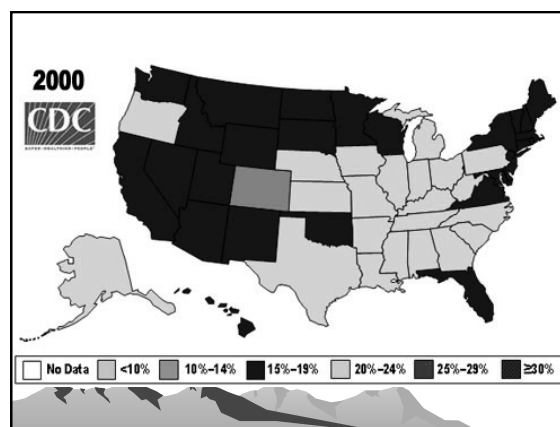
- Insufficient Sleep encourages weight gain
- Sleep Deprivation alters hormones involved associated with appetite control and metabolism
- Children who slept less than 9 hours a night were 3 times as likely to be obese as compared to longer sleepers

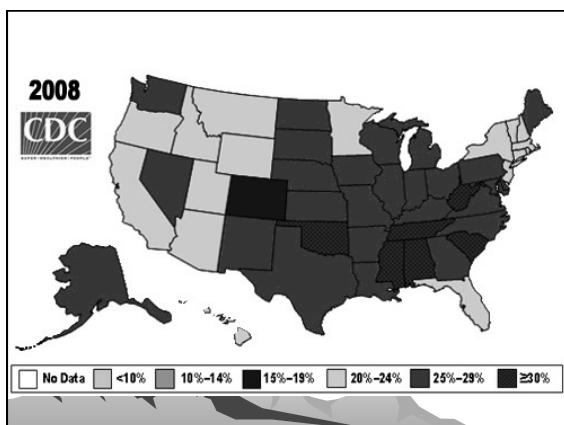
Obesity in Children

- Shorter Sleep Duration Increases the Risk for being overweight from age 9 to 12
- In 6th Graders – For every hour of sleep over 9 hours – 20% less likely to be overweight



Super Sized Kids





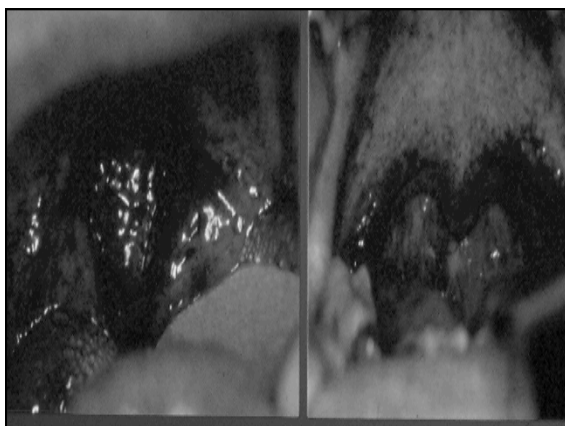
A Child By Definition

Psychotic Dwarf
With A
Favorable Prognosis

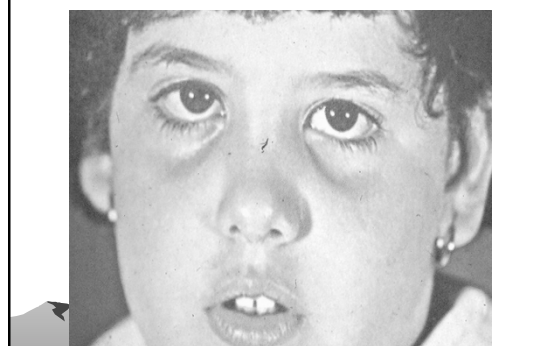
Etiology of SDB

- Adenotonsillar Hypertrophy
- Craniofacial / Dental arch abnormalities
- Obesity

Pediatric Sleep Apnea



Adenoidal Faces

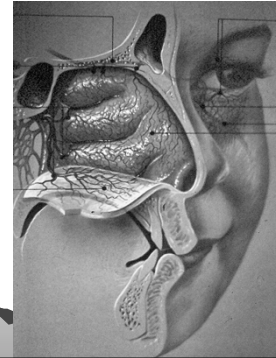


Adenoidal Faces

- Long History of Mouth breathing
- Open Mouth Posture
- Nose that Appears Flattened
- Nostrils are Small & Poorly Developed
- Short Upper Lip
- Pouting Lower Lip
- Vacant Facial Expression

Naso-Respiratory Function and Craniofacial Growth 1979
Center for Human Growth and Development Univ of Michigan

Nasal Turbinates / Venous Stasis



The Allergic Shiner



Development Findings Orthodontic Findings

- Narrow Maxilla / Mandible
- Dental Crowding
- Tongue Thrust - Tongue Scalloping
- Malocclusion
- Deep Bite
- Cephalometric Findings
- Tooth Wear

Sleep Studies in Children

- 1 Apnea per Hour
- ↑ Sleep Latency
- ↓ N3 Sleep
- ↑ Movements (RLS / PLMDs)
ADHD related to RLS

Sleep Studies for Children and Adolescents

- Diagnosis of Sleep Apnea: Recognition of 2 occluded respiratory events in small children define an obstructive apnea
- AHI of 1 or more is adequate to make a diagnosis:
 - AHI 1 – 4 Mild OSA
 - AHI 5 -10 Moderate OSA
 - AHI > 10 Severe OSA

Management of SRBD in Children

- Customize Treatment
- Always Consider Growth & Development
- Amount of Sleep in Hours



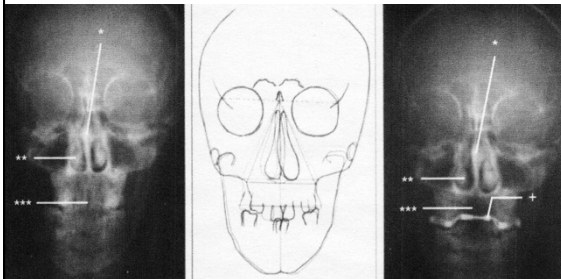
Palatal Expansion

Found to be very Helpful: Improves breathing, width of the nasal passages (nasal valve)

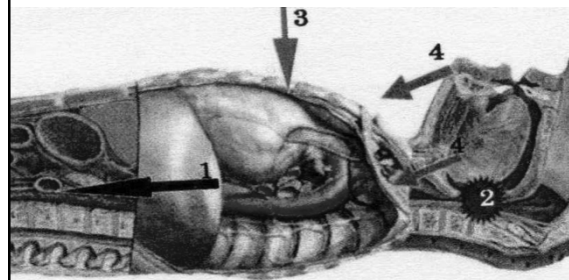
SLEEP 2004;27(4):761-6
SLEEP 1998;21(8):831-835



Outcome of RPE



Inspiratory Pressure Pulls Mandible & Tongue Back



Pectus Excavatum (hollowed chest)



Screening for Sleep Disorders BEARS

- B bedtime
- E excessive daytime sleepiness
- A awakenings
- R regularity and duration of sleep
- S snoring



Pediatric Sleep Questionnaire

Pediatric Sleep Questionnaire

Name: _____ Age: _____ Gender: Male Female

While Sleeping Does Your Child:

- ☐ Snore more than half the time ☐ Have heavy or Loud Breathing
☐ Always Snore ☐ Have trouble breathing or Struggle to Breathe
☐ Snore Loudly
☐ Have you ever seen your child stop breathing during the night?

Does Your Child...?

- ☐ Tend to Breathe through the Mouth during the day
☐ Have a Dry Mouth on waking up in the morning
☐ Occasionally Wet the bed
☐ Grind their Teeth while sleeping ☐ Are there bite problems or crowded teeth
☐ Wake up Unrefreshed in the morning
☐ Have a problem with Sleepiness during the day
☐ Has a teacher or other individual commented that your child appears Sleepy during the day
☐ Is it Hard to Wake your child in the morning
☐ Does your child wake up with Headaches in the morning
☐ Did your child stop Growing at a normal rate at any time since birth
☐ Is your child Overweight What is their weight _____ pounds & height _____
☐ Does your child complain of Restless/Achy legs when asleep or in bed
☐ Do your child's arms and legs "twitch" during sleep
☐ Does your child have frequent Nightmares (more than one per week) that may disturb him/her during the day

Symptoms in Children with SRBD

Night Time

Snoring
 Bruxism
 Awakenings
 Mouth Breathing
 Nightmares

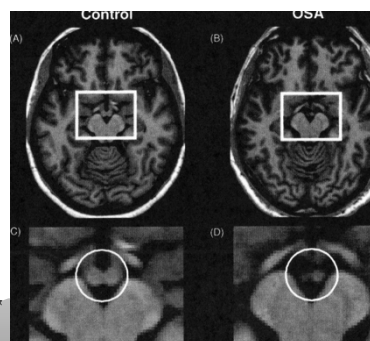
Day-Time

Neurocognitive Impairment
 ADHD or ADD Symptoms
 Hyperactivity
 Behavioral Issues (Irritable)
 Tired / Poor School Performance

Learning Disabilities

- Decreased GPA Related to:
 - RLS
 - Daytime Sleepiness
 - Snoring
 - Hard to wake in the morning
 - Fall asleep in class
 (first 3 periods the worst)

Learning and Memory



OSA Associated With Verbal Memory Deficits

- OSA impacts verbal memory
- OSA does not impact visual memory
- Not impacted by reduced attention

Am J Resp Crit Care Med
 Pub ahead of print March 18, 2010

Sleep Apnea and Learning in Children

- Children who snore twice as likely to have learning problems

CHEST July 2009

Clinical Manifestation of Sleep-Disordered Breathing Children & Adolescents

From An
Abstract at APSS 2007

Associated Problem	Pre-School (n=41)	Pre-Adolescent (n= 91)	Adolescent (n=51)
Daytime Fatigue	30%	50%	71.1%
EDS	38.7%	59.2%	80.4%
Sleep-onset Insomnia	40%	21.6%	48.1%
Nocturnal sleep Disruption	85.3%	69.5%	70.6%
Sleep Terror	51.5%	28%	19.1%
Nightmare	12.5%	19.7%	21.3%
Sleep Walking	9.4%	24%	12.8%
Enuresis	40.7%	31.9%	20.5%
Sleep Bruxism	50%	49.3%	23.9%
ADHD	13.8%	29.4%	40.9%
Morning Headache	9.7%	12%	19.1%
Delayed Sleep Phase Syndrome	0%	4.1%	30.6%
Mean AHI	16.4 ± 16.8	10.3 ± 13.3	16.2 ± 22.9
Mean RDI	16.6 ± 15.7	11.1 ± 12.2	16.3 ± 21.8

Sleep Disorders and ADHD

Prevalence Increased 3 Fold
between 1970 and 2000

1970 - 1.7%

2000 - 5-10%

Sleep 2004 27(2):188-189

1 in 10 of US kids have ADHD

- 2/3 are on medication
- Increase of 22% since 2003
- 5.4 million Kids have ADHD

From CDC publication Morbidity and
Mortality - Weekly Report

Sleep and ADHD Meta-Analysis

- Children more impaired compared to controls
- Total sample: 722 children
 - higher bedtime resistance
 - more sleep onset difficulties
 - SDB
 - hard to wake up
 - daytime sleepiness

J Am Acad of Child & Adolescent Psychiatry 2009

Sleep-Disordered Breathing in Children Linked to Elevated BP

- BP elevated by 10 to 15 mm Hg during sleep and daytime as well
- Children with OSA greater than controls

Pediatrics on-line - June 27, 2011

Alarming Increase in Hypertension in US Children

- Study from 1997 to 2006
- Hospitalization for ↑
- Related to secondary causes – Obesity
- Progresses into adult hypertension – end result is end organ damage

Hypertension online June 18, 2012



The Future

- Treat Snoring - Prevent OSA?
- Urine Test for OSA in Kids: based on different protein ratios (color-based test)
- ID more kids at risk - prevent other health issues
- Need to recognize Craniofacial abnormalities that contribute to OSA



The Progression of Generations

- Silent Generation was before 1946
 - Baby Boomers is 1946 to 1959
 - Generation X is from 1960 and 1979
 - Generation Y is from 1980 to now
- So what is generation Y?

