Ying-Yang of Sleep

Shift Work in the Sleep Center
&
An Update on Home Sleep Testing

Alexander Villareal, MD
Medical Director – The Sleep Wellness Institute

Educational Objectives

- To describe the impairing effects of shift work disorder
- To identify behavioral strategies to better cope with shift work
- To learn about the benefits of home sleep testing
- To name the contraindications for an unattended home sleep testing

Disclosures

- I am a full time sleep physician and an employee of the Sleep Wellness Institute.
- I do not have any other financial conflicts of interest to report.

SHIFT WORK IN THE SLEEP CENTER

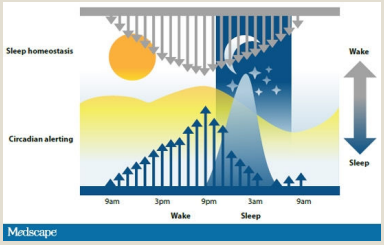
Alexander Villareal, MD
Medical Director – The Sleep Wellness Institute

Defining Sleep

- Species specific behavior characterized by a state of immobility with greatly reduced responsiveness.
- Distinguished from coma or anesthesia by its rapid reversibility.
- The timing and duration of sleep are species specific and determined by a circadian process and a homeostatic sleep pressure.

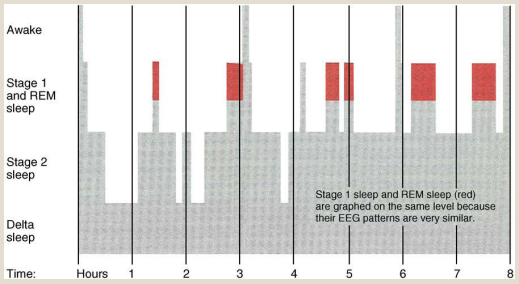
Siegel J. Nature 2005

Homeostatic and Circadian Processes: Two Process Model

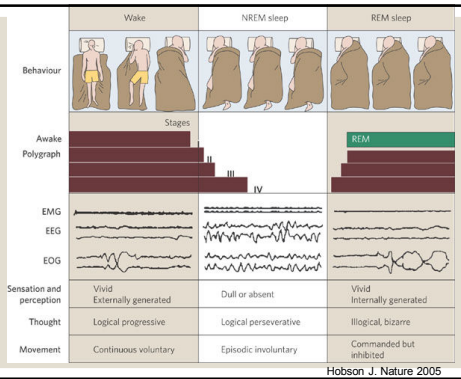


www.medscape.com

Sleep Hypnogram

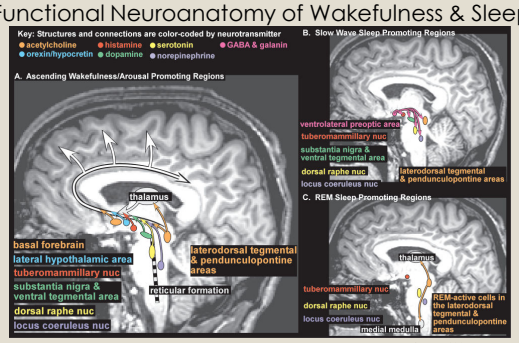


Swick T. Neurol Clin. 2005



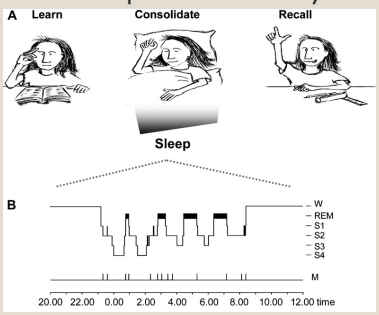
Hobson J. Nature 2005

Functional Neuroanatomy of Wakefulness & Sleep



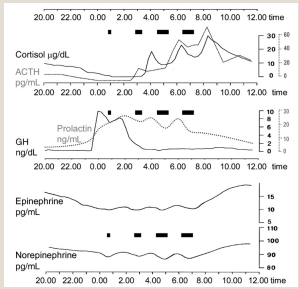
Taber K. 2006

Sleep & Memory



Born J. Sleep Med Clin. 2007

Sleep & Endocrine Function



Born J. Sleep Med Clin. 2007

Shift Work Disorder (SWD)

- Shift work = Non-standard work schedules
  - ***Permanent or intermittent night work – Sleep Technologists***
  - Early morning work
  - Rotating schedules
- Development of sleep disturbances
- Impairment of waking alertness and performance
- Individual differences in susceptibility to SWD (phase tolerance)
- 20% of U.S. workers are involved in some form of shift work
- Percentage of workers with SWD is unknown

Morgenthaler. Sleep. 2007

Chronic Insomnia

- Sleep disturbance > 30 days:
  1. Difficulty in initiating sleep
  2. Difficulty in maintaining sleep
  3. Waking up too early
- Adequate opportunity and circumstances for sleep
- Daytime disturbances

Schutte-Rodin et al. JCSM. 2008

Sleepiness

- Propensity to fall asleep
  - i.e.: sleep deprivation, narcolepsy, obstructive sleep apnea, shift work, drugs
- Objective ≠ Subjective
- Objective measurement
  - Multiple Sleep Latency Test (MSLT)
- Subjective measurement
  - Epworth, Stanford scales

Shen. Sleep Med Rev. 2006

Fatigue

- Overwhelming sustained sense of exhaustion and decreased capacity for physical and mental work
- Classification
  - Acute vs. chronic
  - Physiological vs. psychological
  - Central vs. peripheral
- Treatment of choice is non-pharmacological

Shen. Sleep Med Rev. 2006

Alertness

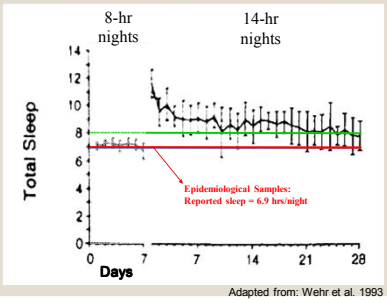
- Capacity to stay awake
- Objective ≠ Subjective
- Objective measurement
  - Maintenance of wakefulness test 40 minute protocol (MWT-40)

Littner. Sleep. 2005

Determinants of Impaired Performance

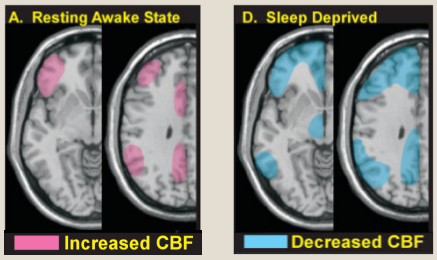
- Sleep Deprivation
- Circadian Phase
- Time on Task

Homeostatic Quantification of Sleep Need



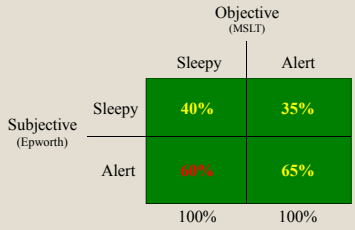
Adapted from: Wehr et al. 1993

Effects of Sleep Deprivation on the Brain



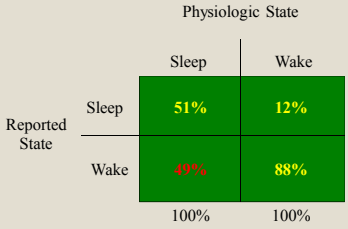
Taber K, Hurley R. 2006

Subjective-Objective Discrepancy



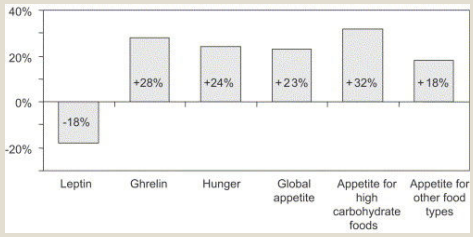
Howard et al., 2002

Detection of "Microsleeps"



Howard et al., 2002

Metabolic Changes: 4 Hours of Sleep



Spiegel K et al. Ann Intern Med 2004

Partial Sleep Loss: Metabolic Consequences

- ↓Leptin
- ↑Ghrelin
- ↑Cortisol
- ↑Growth Hormone
- ↑Catecholamines
- ↑Insulin secretion (resistance)

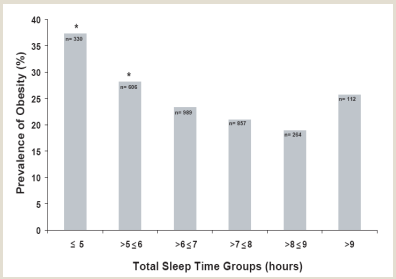
Knutson KL. Sleep Med Clin. 2007

Partial Sleep Loss: Metabolic Consequences

- Altered glucose metabolism.
- Increased appetite.
- Unhealthy food choices.
- More time to eat.
- Reduced energy expenditure?
- Reduced physical activity?

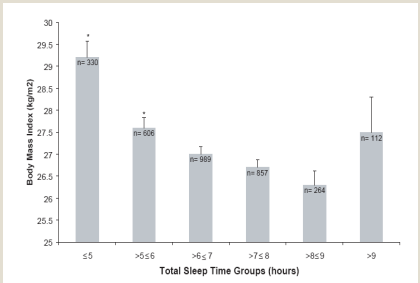
Knutson KL. Sleep Med Clin. 2007

Sleep Duration & Obesity



Singh et al. JCSM 2005

Sleep Duration & BMI



Singh et al. JCSM 2005

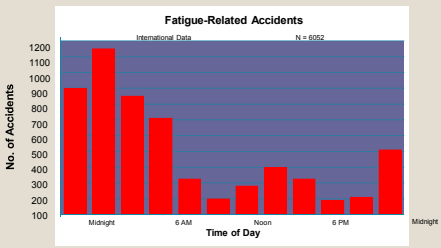
Starting as a Sleep Technologist

… A Few Years Later

Performance Errors

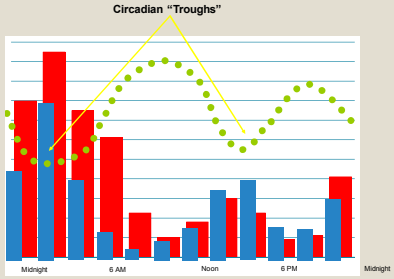
Mitler MM, et al. Sleep. 1988.

Vehicle Accident Data

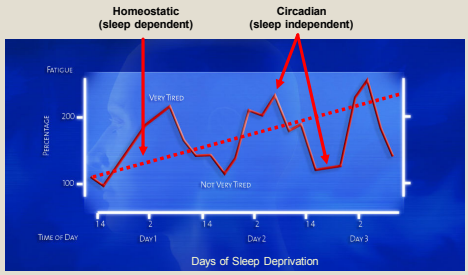


Mitler MM, et al. Sleep. 1988.

Schematic of Accidents, Errors, and Body Temperature Rhythm

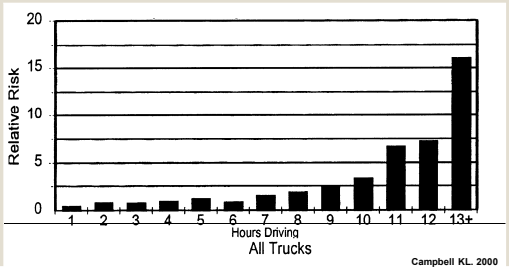


Two Processes Combine to Determine Sleep Propensity and the Duration of Sleep



Courtesy of Christopher Drake PhD

Relative Risk of Fatigue Crash
By Hours Driving, TIFA 1991-1996



Campbell KL. 2000

The Main Problem

- Working full time at night
- Enjoying / working day hours
  - Chores / errands
  - Caring for children / sick family
  - Second job
  - Leisure activities
- Putting sleep last

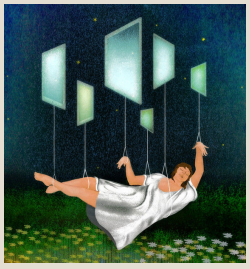
Evaluation

- Clinical interview and physical exam
  - Predominant insomnia symptoms
  - Predominant hypersomnolence → sleep deprivation?
- Sleep logs
- Actigraphy
- Polysomnography is NOT routinely indicated
- Ancillary laboratory / imaging testing is NOT indicated

Morgenthaler. Sleep. 2007

Management

- Patient centered (individual circumstances)
- Behavioral measures
- Pharmacological



Behavioral Management

- Obtaining an **adequate** amount of **total sleep time**
  - If you sleep > 1 hour during your days off then you are partially sleep deprived
- **Napping before** or during **the shift**
- **Avoid alcohol, drugs, tobacco**
- Keep **sleep environment dark, quiet and cool**
- Keeping a regular schedule
- Timed light exposure with / without diurnal dark googles
  - 2350 – 12000 lux
  - Might exacerbate diurnal insomnia

Morgenthaler. Sleep. 2007

Pharmacological Management

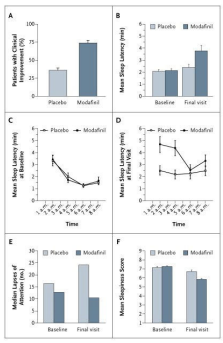
- Melatonin (weak effect, effects voided by light, quality standard problems)
- **Short acting hypnotics**
  - Helpful to prolong total sleep time in those with diurnal insomnia
  - Indications, contraindications, interactions, potential benefits & adverse effects
- Stimulants
  - **Modafinil** (FDA approved)
  - **Armodafinil** (FDA approved)
  - **Caffeine** – with caution during the second half of the shift

Morgenthaler. Sleep. 2007

Modafinil in SWD

- Shift workers are very sleepy
- Modafinil improvement of sleepiness was statistically significant
- Was this improvement **clinically significant?**
  - Mean SOL improved from **2.1 minutes** at baseline to **3.8 minutes** with **MSLT**

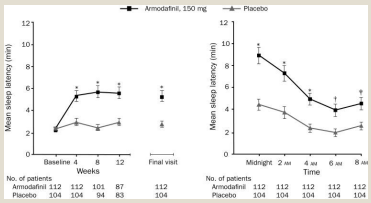
- Czeisler et al. NEJM. 2005



Armodafinil was Not Much Better

- MSLT mean SOL improved
  - 2.3 (1.6) minutes at baseline
  - 5.3 (5.0) with armodafinil
- Is this clinically significant?

- Czeisler et al. Mayo Clin Proc. 2009



Summary

- Chronic sleep deprivation and working off "normal" circadian times are impairing
- Obtaining as close as possible to 8 hours of sleep in a 24 hour period
  - One single block or supplementing with a nap before work
- Avoid drugs, alcohol, tobacco
- Keep sleep environment dark, quiet and cool
- Short acting hypnotics may be helpful if diurnal insomnia is present
- Stimulants with caution. They do not replace insufficient sleep time
- Routine is the best friend of your sleep

An Update on Home Sleep Testing

ALEXANDER VILLAREAL, MD
MEDICAL DIRECTOR OF THE SLEEP WELLNESS INSTITUTE

What is polysomnography and how is it classified?

Polysomnography

- Simultaneous recordings of multiple physiologic signals during sleep, including:
  - Electroencephalogram (central, occipital, frontal)
  - Electromyogram (chin, tibialis)
  - Electrooculogram (right, left)
  - Electrocardiogram
  - Snoring microphone
  - Nasal/Oral Airflow (thermistor, pressure)
  - Thoracic Effort
  - Abdominal Effort
  - SaO2
  - Body Position / video

Kushida. Sleep. 2005

Brief History of Polysomnography

1937 – Davis, Loomis, Harvey, Hobart - different stages of sleep were reflected in changes of the EEG

1953 – Asereinsky & Kleitman -Identification of Rapid Eye Movements during Sleep

1957 – Dement & Kleitman - Relationship between eye movements, body motility, and dreaming

1968 – Rechtschaffen and Kales (R&K) - standard sleep scoring technique

2007 – American Academy of Sleep Medicine - *Manual for the Scoring of Sleep and Associated Events*

2013 – American Academy of Sleep Medicine - *Manual for the Scoring of Sleep and Associated Events. Version 2.2*

Classification

Type 1 – In sleep center, attended, overnight polysomnogram

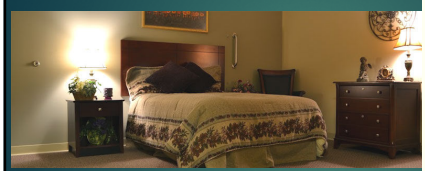
Type 2 – Record same variables as type 1, unattended

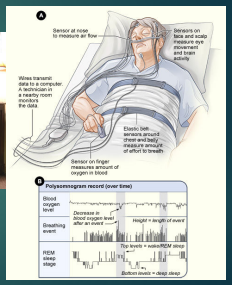
Type 3 – Evaluate four physiologic parameters – not sleep
- respiratory movement and airflow
- heart rate
- arterial oxygen saturations
- (snoring), (position)

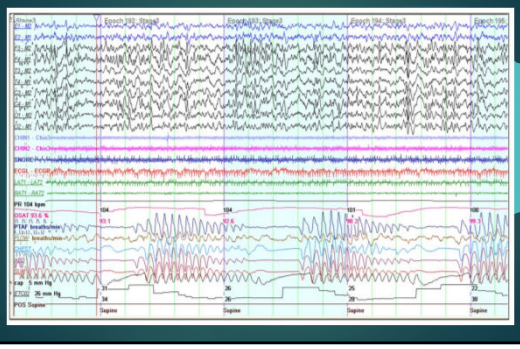
Type 4 – evaluate one or two parameters (saturation and airflow)

ASDA Standards of Practice. Sleep 17:372-7, 1994

In Lab Polysomnogram (type 1)







Unattended Home Sleep Study (HST) Type III

- Abbreviated physiological variables
  - Nasal/Oral Airflow (thermistor, pressure)
  - Thoracic / Abdominal Effort
  - SaO2
  - Pulse rate
  - Snoring microphone*
  - Position*
- Rule in moderate to severe OSA with high pre-test probability
- Cannot rule out OSA with a negative test (↓ NPPV)
- Not used for other sleep disorders

Collop. JCSM. 2007

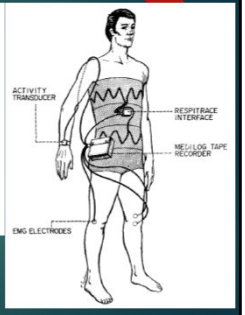
Is Home Sleep Testing a New Concept?

Sleep, 4(3):283–291
© 1981 Raven Press, New York

Comparisons of Home Sleep Recordings and Polysomnograms in Older Adults with Sleep Disorders

Sonia Ancoli-Israel, Daniel F. Kripke, William Mason, and Sam Messin

Department of Psychiatry, University of California, San Diego, and San Diego Veterans Administration Medical Center, San Diego, California



July 1990 • SOUTHERN MEDICAL JOURNAL • Vol. 83, No. 7

Verification of Sleep Apnea Using a Portable Sleep Apnea Screening Device

HELENE A. EMSELLEM, MD, Washington, DC; WILFRED A. CORSON, MD, Minneapolis, Minn; BOB A. RAPPAPORT, MD, Washington, DC; STEVE HACKETT, CRTT, Edina, Minn; LEONARD G. SMITH, and JEFFREY N. HAUSFELD, MD, Washington, DC

ABTRACT: Sixty-seven patients referred to a sleep laboratory with a tentative diagnosis of obstructive sleep apnea were examined with a device designed for home use as an apnea screening system. Direct comparison was made between data obtained by the portable device and by data acquired simultaneously with standard polysomnographic techniques. The portable recorder measured nasal/oral airflow, chest wall movement, cardiac rhythm, and blood oxygen saturation. There was no significant difference in the number of disordered breathing events (apneas and hypopneas) recorded by the two systems. The portable device was found to have a sensitivity of 95% and a specificity of 96%. Indications and limitations for use of the portable home apnea screening test are reviewed and guidelines for normalcy suggested.

Management of Obstructive Sleep Apnea Syndrome in the Home*

The Role of Portable Sleep Apnea Recording

Michael P. Coppola, M.D., F.C.C.P.;† and Michael Lancee, B.S., R.R.T.

Unattended four-channel sleep apnea recording has been shown to be an accurate tool in the diagnosis of moderate to severe obstructive sleep apnea. We selected 11 patients with severe obstructive sleep apnea who had an apnea-hypopnea index (AHI) determined by unattended sleep apnea recording. The mean AHI was 41 (SD, 17.5). We began nasal continuous positive airway pressure (NCPAP) at home empirically with 5 cm to 7.5 cm of pressure for several nights. We then adjusted the level of NCPAP after telephone interview with the patients and their significant others. The level of NCPAP was increased by 2.5-cm increments until the patients reported cessation of snoring and symptom improvement. The mean NCPAP was 8.0 cm (SD, 1.4). We repeated the overnight sleep apnea recording while on NCPAP in all patients at home to determine their response to therapy. All 11 patients had documented return of their AHI to normal (mean AHI, 2.4; SD, 1.6). Statistically significant improvement was noted in the number of obstructive apneas, hypopneas, total respiratory events, and the AHI. Follow-up data confirmed that patients had improvement in their symptoms and remained compliant with therapy (mean follow-up = 18 months; SD, 10.8). No serious complications were encountered when NCPAP was introduced in an unattended setting. We were able to diagnose and treat these patients in an entirely outpatient setting. *(Chest 1993; 104:19-25)*

AHI = apnea-hypopnea index; OSAS = obstructive sleep apnea syndrome; NCPAP = nasal continuous positive airway pressure; RDI = respiratory disturbance index; REM = rapid eye movement

Sleep, 17(4):372–377
© 1994 American Sleep Disorders Association and Sleep Research Society

ASDA Standards of Practice

Practice Parameters for the Use of Portable Recording in the Assessment of Obstructive Sleep Apnea

Standards of Practice Committee of the American Sleep Disorders Association

What is the reimbursement for HST?

Sleep Services National Payment

CPT Code	Modifier*	Description	2013 Payment	2014 Proposed Payment	% Change
95782		Polysom <6 yrs 4/> params	$1,045.19	$994.71	-4.8%
95782	TC	Polysom <6 yrs 4/> params	$917.60	$862.74	-6.0%
95782	26	Polysom <6 yrs 4/> params	$127.59	$131.96	3.4%
95783		Polysom <6 yrs cpap/bilvl	$1,115.61	$1,061.76	-4.8%
95783	TC	Polysom <6 yrs cpap/bilvl	$976.12	$918.02	-6.0%
95783	26	Polysom <6 yrs cpap/bilvl	$139.49	$143.73	3.0%
95800		Slp stdy unattended	$182.36	$178.68	-2.0%
95800	TC	Slp stdy unattended	$131.33	$125.90	-4.1%
95800	26	Slp stdy unattended	$51.03	$52.78	3.4%
95801		Slp stdy unatnd w/anal	$95.26	$94.87	-0.4%
95801	TC	Slp stdy unatnd w/anal	$47.63	$45.25	-4.9%
95801	26	Slp stdy unatnd w/anal	$47.63	$49.62	4.1%
95806		Sleep study unatt&resp eff't	$183.38	$172.26	-6.1%
95806	TC	Sleep study unatt&resp eff't	$122.48	$109.85	-10.3%
95806	26	Sleep study unatt&resp eff't	$60.90	$62.41	2.5%
95810		Polysom 6/> yrs 4/> param	$645.76	$615.23	-4.7%
95810	TC	Polysom 6/> yrs 4/> param	$526.00	$491.82	-6.5%
95810	26	Polysom 6/> yrs 4/> param	$119.76	$123.40	3.0%
95811		Polysom 6/>yrs cpap 4/> parm	$677.40	$645.90	-4.7%
95811	TC	Polysom 6/>yrs cpap 4/> parm	$552.87	$517.50	-6.4%
95811	26	Polysom 6/>yrs cpap 4/> parm	$124.52	$128.40	3.1%

http://www.aasmnet.org/resources/pdf/CMSPaymentComparison.pdf

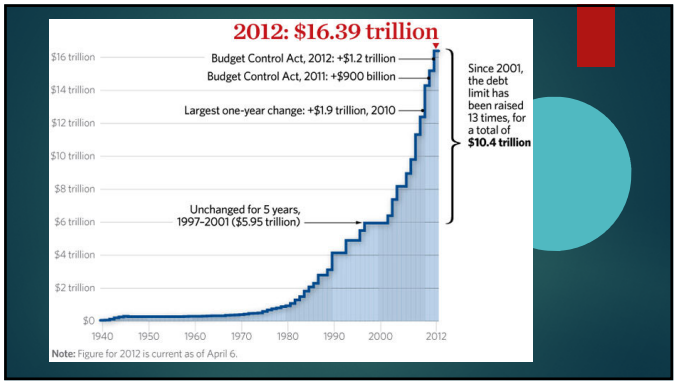
Why are we using home sleep testing if it is less precise and has lower reimbursement?

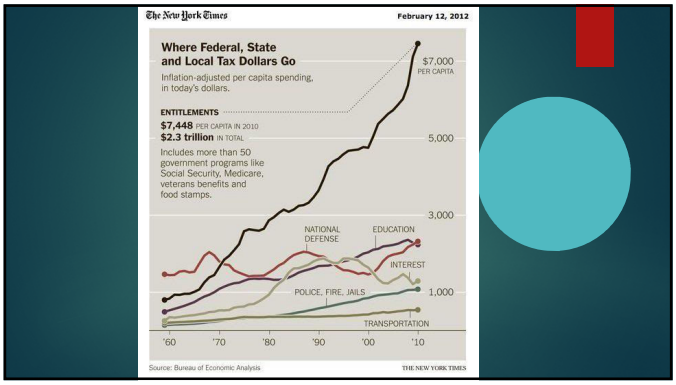
HST in Suspected Simple OSA

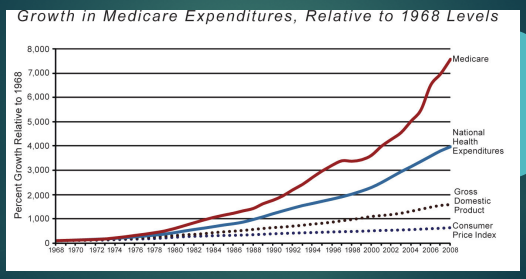
- Patient comfort / convenience
- Lower cost for the patient
  - High coinsurance payments
  - Increasing deductibles
- Patient outcomes appear not to be worsened*
  - Good program on appropriate patients
  - PAP adherence
  - Epworth, QOL
- Mandated by health insurance companies

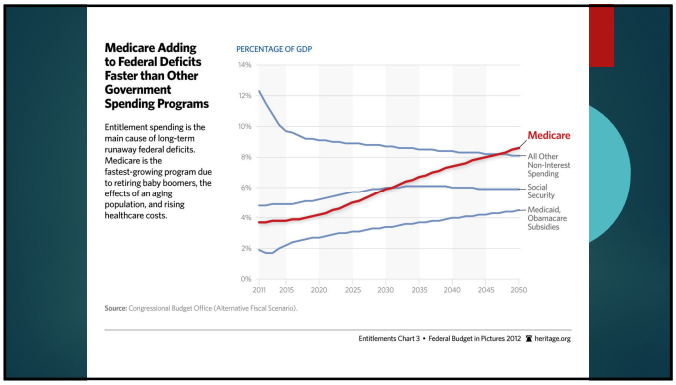
Collop. JCSM. 2007

Why are the Government and Health Insurance Companies Pushing for HST?

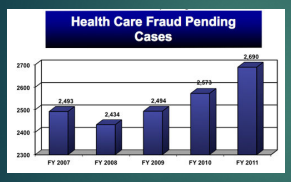






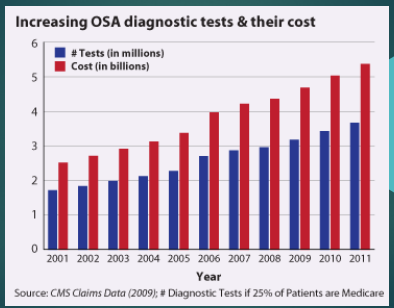


High Cost of Health Care Fraud



- **2011 FBI DATA:**
  - $1.2 billion in restitutions
  - $1 billion in civil settlements
  - $1 billion in fines
  - $96 million in seizures
  - $320 million in civil restitution

www.fbi.gov



Also Affecting Sleep Medicine

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Department of Justice

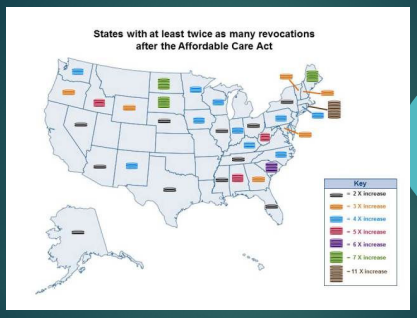
Office of Public Affairs

FOR IMMEDIATE RELEASE Thursday, January 3, 2013

Florida-Based American Sleep Medicine to Pay $15.3 Million for Improperly Billing Medicare and Other Federal Healthcare Programs

Facilities in Alabama, California, Delaware, Florida, Illinois, Indiana, Kansas, Kentucky, Maryland, Missouri, New Jersey, Tennessee, Texas and Virginia

Florida-based American Sleep Medicine LLC has agreed to pay $15,301,341 to resolve allegations that it billed Medicare, TRICARE – the health care program for Uniformed Service members, retirees and their families worldwide – and the Railroad Retirement Medicare Program for sleep diagnostic services that were not eligible for payment, the Justice Department announced today.



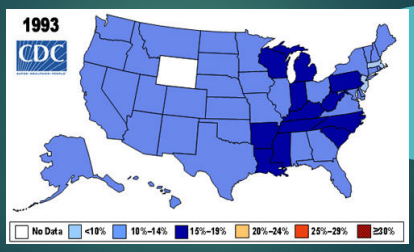
www.cms.gov

Prevalence of SDB in the General Population is Increasing

- Wisconsin Cohort Group
- General Population
- SDB = OSA + CSA
- AHI > 5 / hr
  - Women 9% SDB; 5% OSA
  - Men 24% SDB; 7% OSA

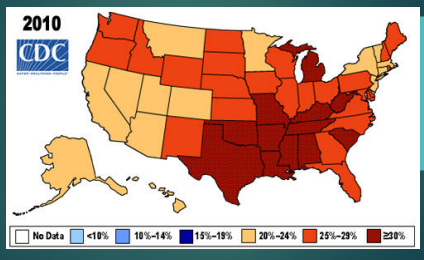
Young. NEJM 1993

Obese Adults – BMI > 30



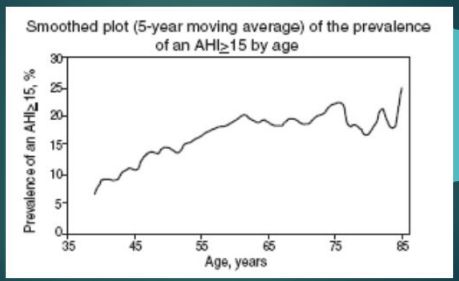
http://www.cdc.gov/obesity/data/trends.html

Obese Adults – BMI > 30



http://www.cdc.gov/obesity/data/trends.html

OSA Worsens with Age



Young. Arch Intern Med 2002

Other Patients at High Risk for OSA

- Obesity (BMI > 35)
- Congestive heart failure
- Atrial fibrillation
- Refractory hypertension
- Diabetes Type 2
- Stroke
- Nocturnal dysrhythmias
- Pulmonary HTN
- High-risk driving populations (CDL)
- Preoperative for bariatric surgery

Epstein. JCSM. 2009

What are the Contraindications for an HST?

HST Contraindications

- Severe pulm disease
- BMI > 40
- Narcotic analgesic use
- Raynaud's
- Neuromuscular disease
- Stroke
- CHF
- Inability to cooperate
- Lack of dexterity
- Asymptomatic patients
- Individuals suspected of having other sleep disorders
- Identification of individuals working in safety-critical occupations
- Pediatric populations

Blackman. Can Resp J. 2010 - Collop. JCSM. 2007

Does a HST adversely affect OSA outcomes?

Noninferiority of Functional Outcome in Ambulatory Management of Obstructive Sleep Apnea

Samuel T. Kuna[1,2], Indira Gurubhagavatula[1,2], Greg Maislin[3], Sakhena Hin[1], Kathryn C. Hartwig[4], Sue McCloskey[1], Robert Hachadoorian[3], Sharon Hurley[3], Rajesh Gupta[1], Bethany Staley[2], and Charles W. Atwood[4,5]

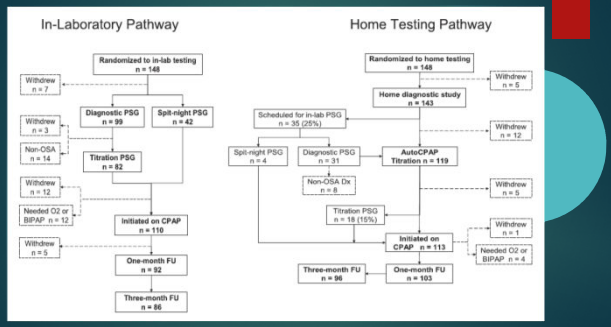
[1]Department of Medicine, Philadelphia Veterans Affairs Medical Center, Philadelphia; [2]Department of Medicine, University of Pennsylvania, Philadelphia; [3]Biomedical Statistical Consulting, Wynnewood; [4]Department of Medicine, Veterans Affairs Pittsburgh Healthcare System, Pittsburgh; and [5]Department of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania

Am J Respir Crit Care Med Vol 183. pp 1238–1244, 2011
Originally Published in Press as DOI: 10.1164/rccm.201011-1770OC on January 21, 2011
Internet address: www.atsjournals.org

Baseline Participant Characteristics

Variable	Participants Randomized to Home Testing (n = 113)	Participants Randomized to In-laboratory Testing (n = 110)	P Value
Age, yr	55.1 ± 10.3	51.8 ± 10.4	0.02
Percent males	95.6	94.5	0.77*
Percent African American	44.2	34.5	
Percent Hispanic	1.8	2.7	
Body mass index, kg/m²	35.0 ± 7.5	34.2 ± 5.2	0.34
Weight, kg	108.6 ± 24.1	108.8 ± 17.4	0.94
FOSQ total score	15.0 ± 3.2	14.7 ± 2.9	0.55
General productivity	3.2 ± 0.6	3.1 ± 0.6	0.43
Vigilance	2.9 ± 0.7	2.9 ± 0.7	0.97
Social outcome	3.2 ± 0.8 (n = 109)	3.2 ± 0.8 (n = 107)	0.79
Activity level	2.8 ± 0.7	2.7 ± 0.7	0.22
Intimacy and sexual relationships	2.9 ± 1.0 (n = 103)	2.9 ± 1.0 (n = 106)	0.60
SF-12 score			
Physical activity component	36.7 ± 10.9	38.2 ± 10.2	0.29
Mental health component	44.4 ± 10.8	41.1 ± 10.7	0.02
Epworth total score	12.0 ± 5.3	12.9 ± 5.1	0.21
PVT transformed lapses	3.8 ± 2.6 (n = 111)	4.3 ± 3.7	0.26
CES-D total score	23.3 ± 7.8	25.0 ± 8.8 (n = 109)	0.13
MAP index	0.78 ± 0.13 (n = 107)	0.76 ± 0.14 (n = 104)	0.25

Definition of abbreviations: CES-D = Center for Epidemiologic Studies Depression Scale; FOSQ = Functional Outcomes of Sleep Questionnaire; MAP index = Multivariable Apnea Prediction index; PVT = Psychomotor Vigilance Task; SF-12 = Short Form 12.
* Fisher's exact test.



Results & Conclusion

- 296 subjects enrolled
- 260 (88%) diagnosed with OSA
- 213 (75%) initiated on CPAP
- Mean FOSQ ± SD improved
  - 1.74 ± 2.81 in the home group (P < 0.001)
  - 1.85 ± 2.46 in the in-laboratory group (P < 0.0001)
- Mean ± SD hours of daily CPAP adherence
  - 3.5 ± 2.5 hours/day in the home group
  - 2.9 ± 2.3 hours/day in the in-laboratory group (P = 0.08)
- **CONCLUSIONS:**
- FOSQ & Adherence were not significantly different

Kuna, S. AJRCCM. 2011

Other Similar Studies Exist

- A multisite randomized trial of portable sleep studies and positive airway pressure autotitration versus laboratory-based polysomnography for the diagnosis and treatment of obstructive sleep apnea: the HomePAP study. ***Rosen et al. Sleep. 2012 Jun 1;35(6):757-67***
- Therapeutic decision-making for sleep apnea and hypopnea syndrome using home respiratory polygraphy: a large multicentric study. ***Masa et al. Am J Respir Crit Care Med. 2011 Oct 15;184(8):964-71***
- Outcomes of home-based diagnosis and treatment of obstructive sleep apnea. ***Skomro et al. Chest. 2010 Aug;138(2):257-63***
- Portable monitoring and autotitration versus polysomnography for the diagnosis and treatment of sleep apnea. ***Berry et al. Sleep. 2008 Oct;31(10):1423-31.***
- Diagnosis and initial management of obstructive sleep apnea without polysomnography: a randomized validation study. ***Mulgrew et al. Ann Intern Med. 2007 Feb 6;146(3):157-66.***

What about auto titration positive airway pressure (APAP)?

APAP as Good as a CPAP Titration in Simple OSA

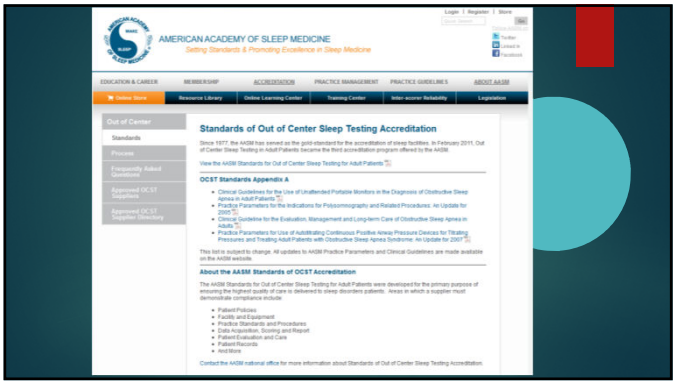
- APAP was equivalent to CPAP in efficacy, adherence, and functional outcomes after 3 or 6 months
  - Kushida, Sleep. 2011
- APAP was more cost effective and offered similar outcomes among patients with moderate-severe OSA without serious co-morbidities.
  - McArdle. Thorax. 2010
- Quality, algorithms and reports vary amongst vendors.
- APAP cost is the same or less* than for fixed pressure CPAP

APAP Contraindications

- To diagnose OSA (instead of a PSG)
- Congestive heart failure
- Significant lung disease; (i.e. COPD)
- Obesity hypoventilation syndrome
- Patients who do not snore (naturally or s/p palate surgery)
- Central sleep apnea syndromes

Morgenthaler. Sleep. 2008

How do I start an out of sleep center testing program?



Deciding if You Can Start an OCST

- Equipment
- Personnel
- Sleep providers
- Patient flow
- Economics
- Other Considerations

Equipment

- Deciding the home testing device to use
  - Simplicity of use, accuracy in leads (SCOPERS Method)
  - Automatic reports versus ability and ease of scoring
  - Number of channels (more leads make it more difficult for the patient)
  - Additional data: position, snore, EEG
  - Cost (upfront, disposables) – Sleep Review Magazine
- Number of devices needed (what is your estimated volume?)
- Buying vs. Leasing
- Compatibility with existing PSG software
- Previsions in case the patient does not return the equipment

Personnel

- Identify the following people
  - Scheduling
  - Coordinating shipments or HST delivery
  - Patient instruction and education
  - Equipment cleaning / inventory
  - HST Scoring / Interpretation
  - Software / IT
  - Billing
  - Monitoring outcomes (failures, negative studies, turnover time, etc.)
- Full time vs. part time vs. contracted services

Patient Flow

- Who is allowed to order an HST?
  - Sleep physician, primary care, other specialists
- Who will first contact / communicate with the patient?
- Patient education
- Coordination of delivery and return of equipment
  - Sleep center, home, mail / courier
- Scoring / interpretation of studies
- Patient / health insurance billing
- Patient follow up and treatment
  - Sleep physician, primary care, other specialists
- ***This model works only with adequate patient evaluation & follow up***

Economics

- Who else is doing HST in your area? (know your competition)
  - Primary care groups, specialty groups, dentists, chiropractors, DME
- Are you allowed to provide HST to patients?
  - Check contracts with various payors (start with the largest ones)
  - Are you excluded in favor of "preferred providers"?
- Getting to be part of an "authorized provider" for 3rd party payor
  - Obtain application form
  - Track outcomes (number of studies, failed data, turnover time, compliance, ESS, FOSQ, etc)
- What is your expected profit margin? Will it pay the bills?

Partnering with a National Ambulatory Sleep Testing Company

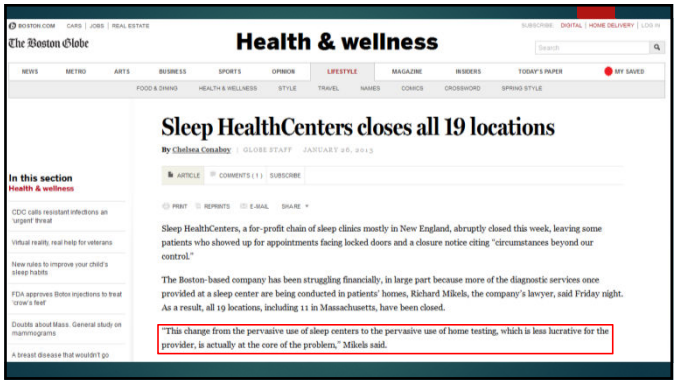
- May represent a reasonable alternative
- Check quality
- Research companies
- Ensure they are contracted with local 3rd party payors
  - NovaSom
  - Sleep Quest
  - National Sleep Services
  - Watermark Medical
  - Sleep Disorder Services

Durable Medical Equipment

- AASM's Innovation Care Delivery and Management Program for Patients with OSA
- DME in the Sleep Center to provide integrated care to OSA patients
- Not for patients with Government Insurance
- Meant to minimize transitions of patient care and improve outcomes
- Can add an additional revenue stream to the sleep center
- Plan logistics carefully

  - http://www.aasmnet.org/resources/pdf/SleepInnovationProposal.pdf
  - http://www.aasmnet.org/resources/pdf/DMEApplication.pdf

What if I wait before changing my practice?



The Boston Globe

Health & wellness

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Sleep HealthCenters closes all 19 locations

By Chelsea Conaboy | GLOBE STAFF | JANUARY 26, 2013

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Doubts about Mass. General study on mammograms

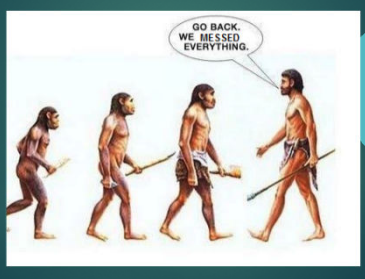
A breast disease that wouldn't go

Sleep HealthCenters, a for-profit chain of sleep clinics mostly in New England, abruptly closed this week, leaving some patients who showed up for appointments facing locked doors and a closure notice citing "circumstances beyond our control."

The Boston-based company has been struggling financially, in large part because more of the diagnostic services once provided at a sleep center are being conducted in patients' homes, Richard Mikels, the company's lawyer, said Friday night. As a result, all 19 locations, including 11 in Massachusetts, have been closed.

"This change from the pervasive use of sleep centers to the pervasive use of home testing, which is less lucrative for the provider, is actually at the core of the problem," Mikels said.

Change is Here to Stay



What to do with the existing infrastructure?

In Laboratory Polysomnography

Non-Sleep Disordered Breathing

- Parasomnias (RBD)
- Nocturnal Seizures
- Narcolepsy
- Other Hypersomnias
- Research

Sleep Disordered Breathing

- Central sleep apnea
- Hypoventilation – CO_2
- OSA
  - Pediatric
  - Lack of dexterity / behavioral
  - Overlap syndrome (+ COPD)
  - At risk for Complex Sleep Apnea

Final Remarks

Summary – The Ugly

- HST & APAP will become more prevalent as health insurance companies and government attempt to cut costs
- Prior authorizations for in laboratory studies will become more onerous and routine
- Reimbursement for in laboratory polysomnography will drop
- Sleep centers and people working in them will be affected

Summary – The Good

- Expect more OSA patients as the population grows older & heavier
- HST will open the door to patients who would otherwise not be tested.
- Higher volume of more complex patients (card, neuro, pulm, pain, peds)
- An initial sleep consultation with defensive documentation will ensure the appropriateness of an in lab study.
- Good patient care will be rewarded. (compliance, proper evaluation and follow up)


Thank You