Provider Implications I & II Sleep Health

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Disclosures

- Dr. Lisa Kuhen CNP has no financial disclosures

Provider Implications I

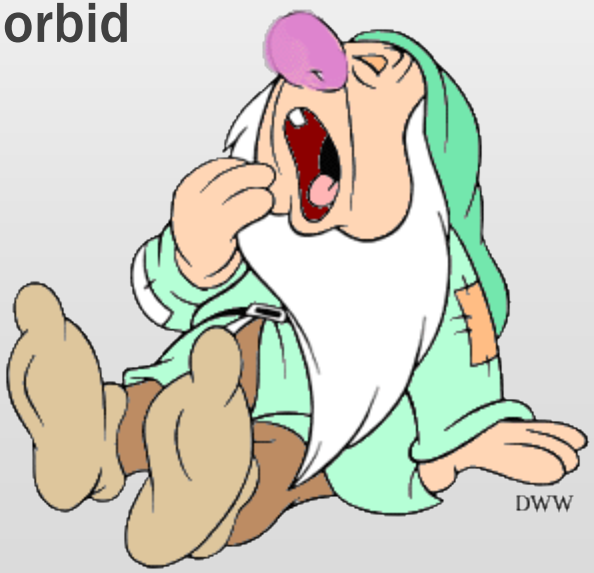
- Summarize health care provider implications for sleep promotion in the specialty areas
  - perioperative
  - occupational health
  - OB/GYN
- Apply questionnaires as a means to gather sleep data

Provider Implications II

- Summarize health care provider implications for sleep promotion in the specialty areas
  - Cardiovascular
  - Endocrine
  - Pediatric
- Apply questionnaires as a means to gather sleep data

Sleep Promotion: What we know so far

- Overview
  - Field of somnology & impact of population health
  - Impact of sleep across the lifespan
  - Age related sleep requirements
  - Sleep growth & development in pediatrics and associated co-morbid diseases
  - The role of sleep in mental health disorders
  - Major sleep disorders
    - OSA/CSA
    - Para insomnia/Insomnia
    - Movement disorders: RLS
    - Sleep-wake circadian rhythm disorders and shift work



Sleep Promotion: What we know so far

- Data collection
  - Screening tools and questionnaires‘
    - Guide assessment
    - Evaluate response to therapies
  - Diagnostic approaches
    - Attended versus home sleep testing
  - Treatment options
    - Standard CPAP & BiPAP
    - Oral devices
    - Inspire ®
    - Alternative therapies

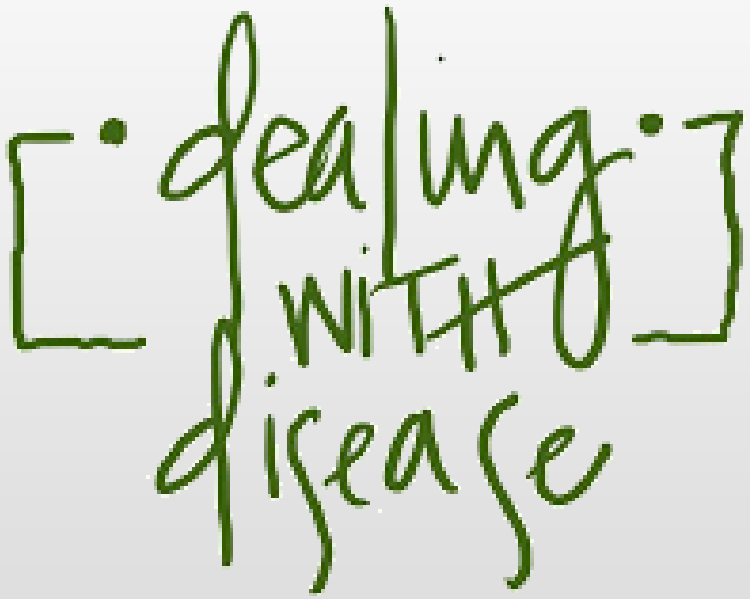
Sleep Promotion: Treating Sleep is a Priority

- Sleep promotion can be defined as activities, behaviors, and environmental changes aimed to enhance sleep induction, maintain sleep duration and promote high quality uninterrupted restorative sleep.

First: What is contributing to non-restorative sleep?

Chronic Disease

- ADHD
- Depression/Anxiety
- Thyroid Disease
- Heart Disease
- Chronic Pain
- Stroke/Head injury
- Connective Tissue Disorders
- Obesity
- Substance abuse
- MTHFR gene mutation
  - Associated with Chiari Malformation
  - Factor V Leiden deficiency
  - Gluten allergies



First: What is contributing to non-restorative sleep?

- Medications
  - Steroids
  - Anti-depressants
    - Fluoxetine
    - Bupropion
  - Antihistamines
  - Beta-agonists
    - Inhalers
  - Methylxanthines
    - Theophylline
  - Beta Blockers
  - Lamotrigine
  - Anti-seizure medications

List is a small sample of drugs with a common side effect of insomnia

Always review a patient's medication list when working to promote sleep

First: What is contributing to non-restorative sleep?

Stress

- Work
- Divorce
- Home life
- Financial
- Anxiety
- Illness in family
- Newborn

Environment

- Technology
  - Cell phones
  - TV
    - Timing of programs
  - Computers
  - E-readers
- Noise
  - Bed partner with untreated OSA
- Light
- Poor mattress
- Poor pillow
- Temperature

Habits

- Caffeine
- Chocolate
- Timing of Meal
- Alcohol
- Tobacco use

Non-Restorative Sleep: Sleep Apnea

- Affects a diverse population and requires individualized therapy
- Screen ALL patients
- AHI: an imperfect metric to define sleep apnea
  - Symptoms
    - Obvious to discrete
  - Outcomes
    - 4% desaturation predictive HTN
    - 2% predictive insulin resistance
    - Arousal frequency predictive memory impairment
    - %time saturation <90% predictive platelet aggregation

Healthy Sleep = Good Health

Discuss sleep habits

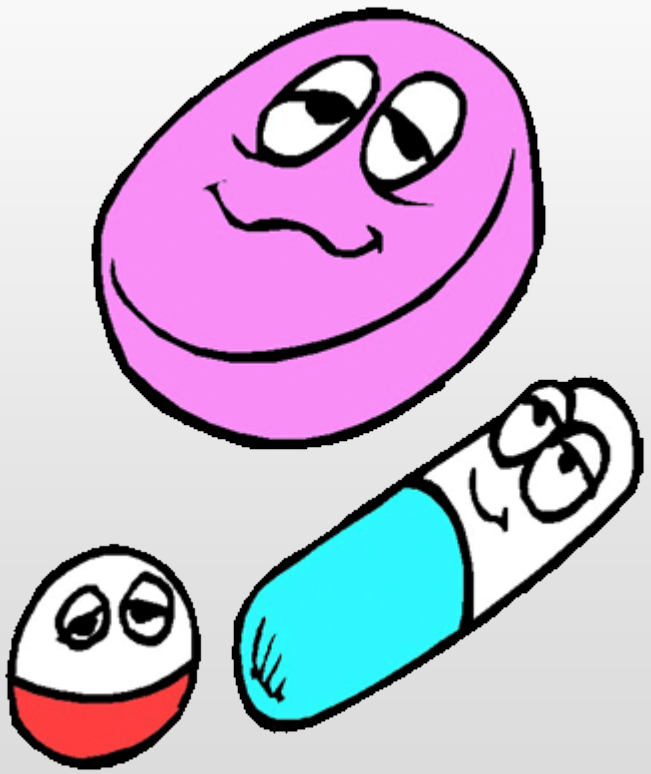
- Sleep duration
  - Trouble falling asleep versus maintain sleep
- Snoring or apneic events
  - Morning headaches
  - Nausea upon awakening
- Fatigue
  - Interfering with work
  - Drowsy driving
- **Dedicated physical activity**

Sleep Promotion

- Practice Sleep Hygiene
  - Bedtime routine/sleep schedule
    - Up same time each day
  - No screens 1 hour before lights out
  - Don’t lay around in bed-clothes
  - Avoid caffeine 12-hours hours before bedtime
  - Don’t lay in bed longer than 15 minutes
    - Cannot sleep get up and walk around 15 minutes
  - Relaxation breathing
  - Writing to do lists
  - Sleep journal
  - Avoid napping longer than 20-minutes

Sleep Promotion: Pharmacologic Sleep Aide

- **OTC sleep aides**
  - Usually not effective
  - May be harmful
    - Tylenol overuse
    - Diphenhydramine
      - Dangerous in elderly
- **Prescription medications**
  - Shortest duration possible
    - Side effects
  - In conjunction with cognitive behavioral therapy



Sleep Promotion: Pharmacologic Sleep Aide

- Sleep Apnea
  - Studies by Heinzer, White, Jordan et al., (2008) and Eckert, Owens, Kehlmann et al., (2011)
    - Pharmacologic approach to raising respiratory arousal threshold and decreasing AHI
      - Carbonic anhydrase inhibitor: acetazolamide
      - Trazadone: insomnia
      - GABA-benzodiazepine receptor complex interacts: eszopiclone

Provider Implications Peri-operative Sleep Promotion

When your patients are at risk... So are you!

Patient with Sleep Apnea Suffers Respiratory and Cardiac Arrest Following Appendectomy

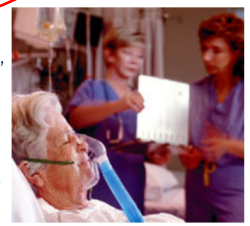
Settlement Amount: $7,000,000.00
Settlement Date: 7/2004
Attorney: Howard D. Mishkind

Description of Case: Plaintiff, a 45-year-old male, presented to Defendant ABC Hospital for treatment of abdominal pain. During the postoperative period he exhibited signs and symptoms of sleep apnea with abnormalities in his heart rhythm. Despite his clinical course, John Doe was transferred from the PACU to an unmonitored medical floor without an EKG monitor, without pulse oximetry monitoring and without continuous blood pressure monitoring. Less than four hours later he was found in cardiopulmonary arrest. John Doe experienced a cardiorespiratory arrest that has resulted in anoxic encephalopathy. He is described as being in a persistent vegetative state

Hospital Nursing Negligence

Salt Lake City Wrongful Death Attorney

Salt Lake City, Tooele and Price, Utah



38-year old "James" was admitted to the hospital for a very simple surgical procedure. Upon admission, the hospital nurses took a detailed history from James and his wife. James indicated on the history form that he had sleep apnea, a respiratory disease that sometimes caused him to stop breathing at night. James' wife also told the nurses and doctors about this condition before the surgery.

James spent the night in the hospital prior to his surgery. During that night, the nurses saw that he was having a hard time breathing so they kept turning up the oxygen they were giving him through his nose. They never told a doctor he was having a hard time breathing and they never did anything to figure out why this was happening. They also observed times when he would stop breathing all together.

The next morning James went into surgery. The procedure lasted less than half an hour. James was then sent back to his room. He was given multiple doses of pain medications that the nurses knew would suppress his respiratory abilities. Throughout the next twelve hours the nurses continued to notice that James was having a hard time breathing and was requiring more oxygen. Still, they did not tell a doctor what was going on and they failed to put James on a monitor that would sound an alarm if he quit breathing.

At two o'clock in the morning a nurse walked into James' room and realized that his face was blue and he was not breathing. James left behind a wife and 6 year-old triplets.

This wrongful death case was settled for an amount that would take care of James' family for a very long time

$1,000,000 Settlement in Medical Malpractice Action Against Physicians for Performing Tonsillectomy on Nine Year Old with Severe Sleep Apnea

Child Wins Medical Malpractice Suit For Brain Damage After Sleep Study

July 23, 2012, by Kroot Law, LLC

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Last month, a Pennsylvanian jury was asked to decide a medical malpractice lawsuit in which an eleven month old boy allegedly suffered brain damage following surgery for sleep apnea. The suit alleged the surgeon failed to properly assess the boy after surgery and order that his oxygen levels be monitored in recovery. The jury agreed and returned a $1.1 million dollar verdict in his favor and against the surgeon.

- Peri-operative sleep promotion begins during <u>pre-admission</u> testing
  - Identification of known sleep apnea
  - Assessing for use of home PAP therapy
  - Sleep apnea risk assessment
  - Sleep history
    - Insomnia
    - Medications

<u>Continues for the duration of hospital stay</u>

- Intra-professional sleep Apnea care algorithms
- Promotion of restorative sleep
- Support circadian rhythm

Sleep Promotion Peri-operative

Begins during pre-admission testing
Requires "Inter-professional team"
Adoption of sleep apnea care policies
Adoption of sleep promotion policies

SLEEP In Hospitalized Patients is Non-restorative:

- **Hospitalized patients are sleep deprived**
  - Lack restorative sleep
  - Clinicians report do not formally assess patients sleep
  - Nursing Interventions: environment, pain
- **Barriers**
  - Limited understanding of sleep
  - No standardized tool for sleep assessment
  - Communication deficiency
    - Nursing history
    - Respiratory therapy history
    - Physician history

    Fragmented

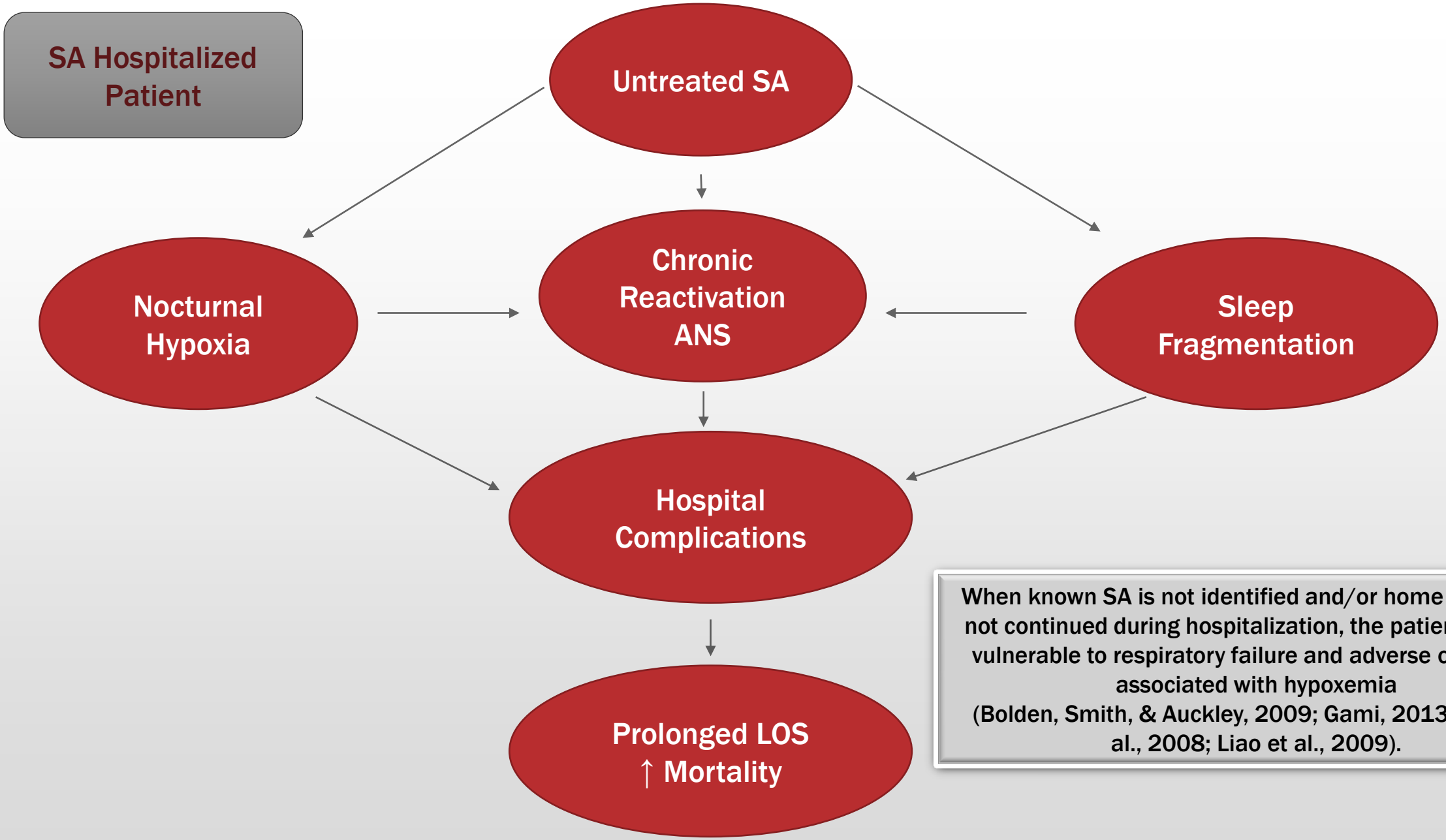
Cumulative affects of sleep disruption

- impaired immune function
  - Delayed wound healing
  - Increased infection rates
- hormonal imbalance
  - Poor glycemic control
  - Increased serum cortisol levels
- behavioral changes
  - Delirium
  - Confusion
  - High fall risk

(Ye, L., Keane, K., Johnson, S., 2013)

Sleep Promotion Peri-operative

- Poor quality sleep +/- presence of SA
  - **Prolonged length of stay- ↑ costs**
  - Increased perioperative morbidity & mortality (Liao et al, 2009; Spurr, Graven, & Gilbert, 2008)
  - Increased risk cardio-pulmonary complication and death (Liao, et al, 2009)
  - Poor patient outcomes
    - Prolonged intubation, risk of re-intubation and higher rates of return to ICU
    - Contributes to cognitive impairment
      - Falls
      - Injury
    - Increased thrombo-embolic risk
    - Contributes to poor glycemic control
      - Delayed wound healing
      - Higher rates of infection
        - Sternal wound infections
  - Increased risk for litigation



When known SA is not identified and/or home therapy is not continued during hospitalization, the patient is more vulnerable to respiratory failure and adverse outcomes associated with hypoxemia (Bolden, Smith, & Auckley, 2009; Gami, 2013; Kasai et al., 2008; Liao et al., 2009).

Epidemiology

More vulnerable to sudden cardiac death between 10PM and 6AM

- **Health Care Burden: <u>estimated 80% of hospitalized patients have sleep apnea</u>**
  - 24% of general surgery patients
    - <u>44% of untreated OSA patients experience perioperative morbidity & mortality</u>
  - 30-64% of patients with heart disease
  - 58% of patients with HTN have SA
  - 90% of patients with SA have HTN
  - Effects 58% of diagnosed diabetic patients
    - 90% if obese

(Bolden, Smith, & Auckley, 2009; Chung et al., 2006;Liao et al., 2009; Kaw et al., 2006; Punjabi et al., 2009; Ramachandran, & Josephs, 2009; Smith et al., 2001)

Sleep Apnea Screening and Management Protocols Are Not A Current National Standard of Care

- JC proposed standardized perioperative SA screening and treatment guidelines as a 2008 safety core measure: due to insufficient accurate national data it was not implemented (Spurr, Graven, & Gilbert, 2008)

- JC 2012 sentinel event alert regarding safe use of opioids in hospitals: identified SA diagnosis and patient characteristics associated with SA as critical indicators of high risk for respiratory depression and negative outcomes (JC, 2012).

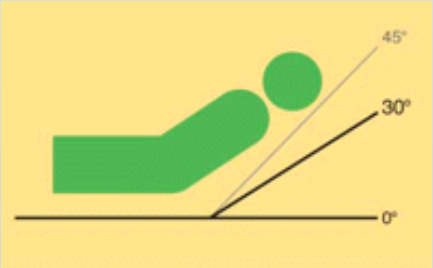
- Only 5.8% of hospitalized patients with known OSA on home treatment, receive treatment during their hospitalization and only 6.8% have OSA listed as a diagnosis (Liao et al., 2009; Spurr, Graven, & Gilbert, 2008).

Hospital-Patient Burden Untreated OSA

ALOS 2.33 extra days compared to same diagnosis with Sleep Apnea that received PAP therapy

Peri-operative Sleep Promotion

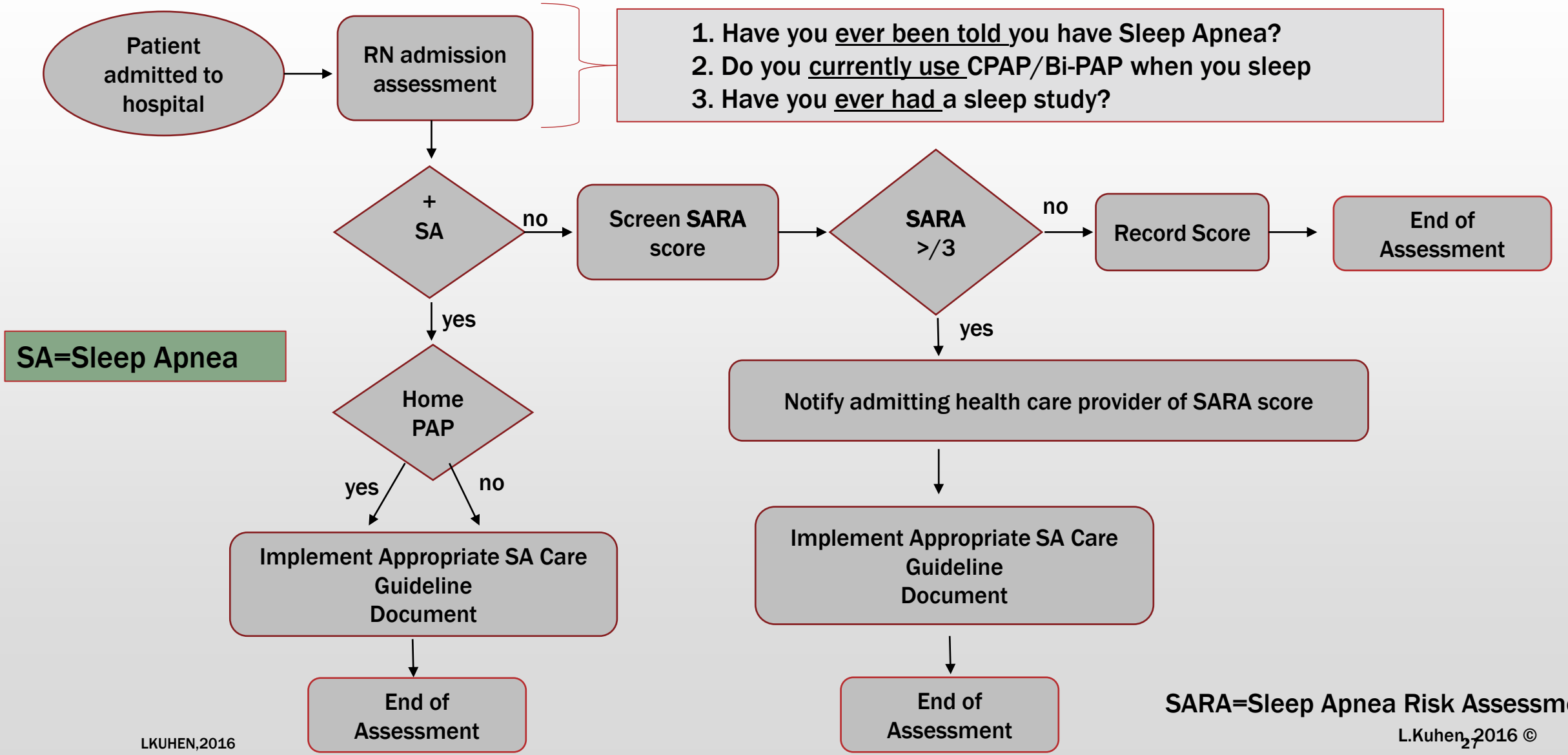
Nursing interventions such as elevating the head of the bed 30-degrees at all times and continuous pulse oxymetry can decrease periods of apnea, hypopnea and hypoxia that are associated with adverse outcomes in hospitalized patients with SA (Bolden et al., 2009, Sheldon, Belan, Neil, & Rowland, 2009)



Peri-operative Sleep Promotion: A Team Approach

- Address knowledge deficit
  - Educate all members of the health care team
    - Sleep promotion and identification and management of sleep apnea
- Enhance inter-professional communication
- Implement sleep apnea screening and care management guidelines
  - Provide sleep study ASAP when undiagnosed SA is suspected
  - Consider addition of APAP when SA diagnosis is suspected or when known and untreated
- Implement sleep promotion protocols

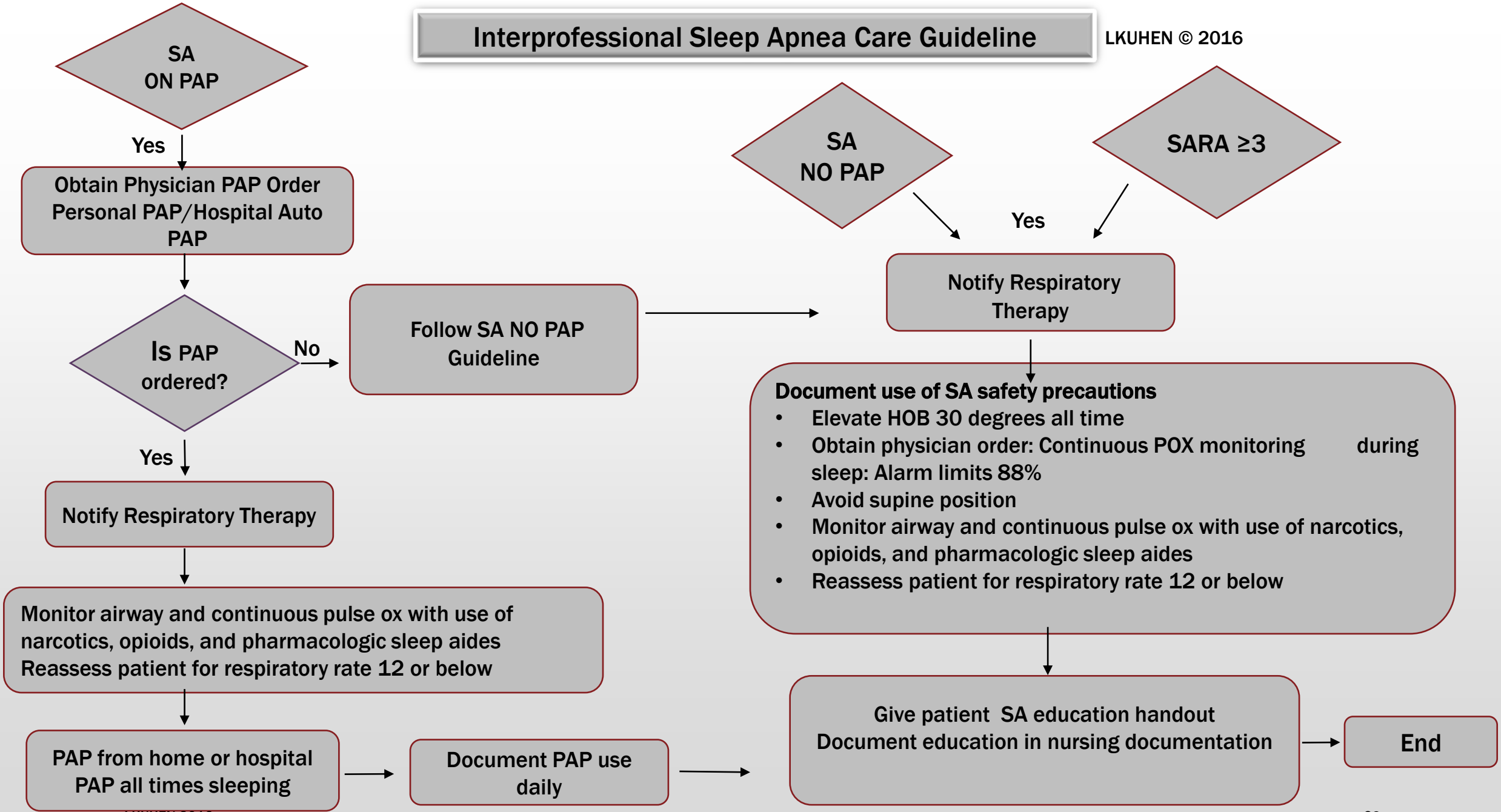
Identification and Management Sleep Apnea: Interprofessional Care Guideline Assessment



SARA	One Point for each YES
1)Does your snoring wake you or others up? Does your bed-partner ever leave the room? Do you gasp, choke, or wake suddenly?	Yes No (one point if answers yes to any question in each section, not one point for each question)
2) Has anyone told you, you stop breathing when you sleep?	Yes No
3)Do you wake frequently during the night to urinate?	Yes No
4) Do you fall asleep easily when watching TV, doing boring work, in meetings, or driving? Do you feel tired during the day or have trouble concentrating?	Yes No
5) Do you have a history of high blood pressure, atrial fib, CHF, PE,DM, stroke or heart disease? (MI, Stent, CABG)	Yes No
Demographic Information: Age: 50 years or above?	Yes No
BMI: 35 or above?	Yes No
Male	Yes No

Answering YES to three or more indicates high risk for sleep apnea

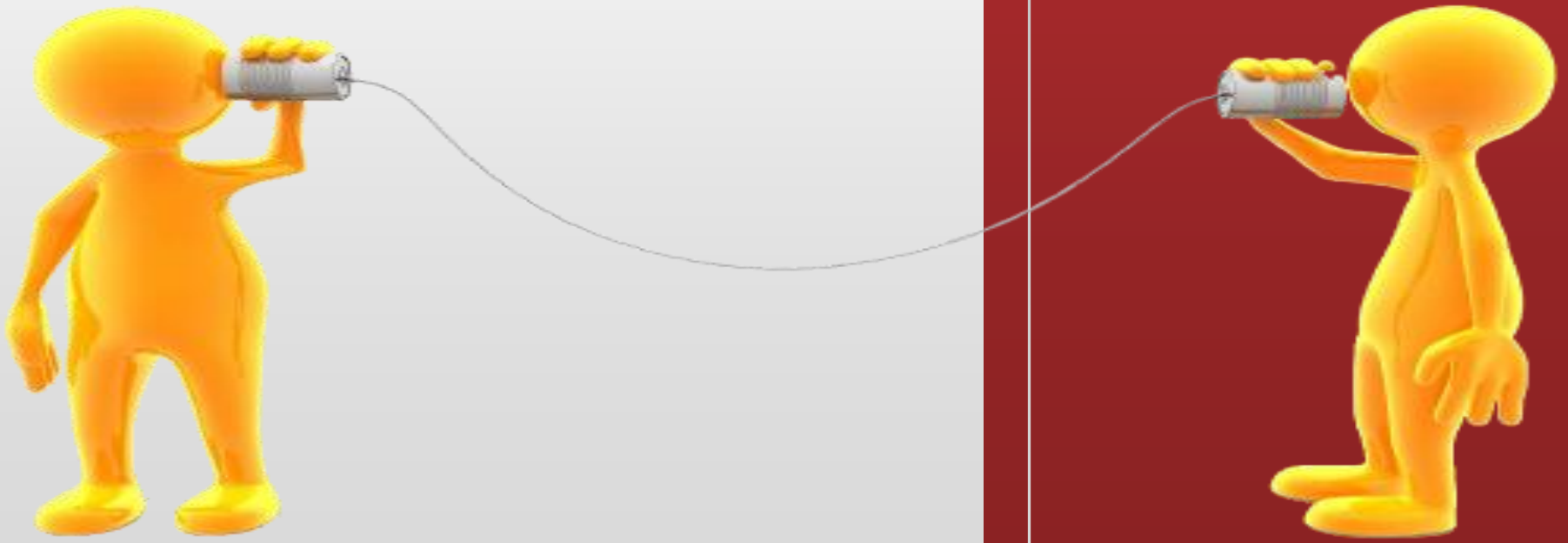
Interprofessional Sleep Apnea Care Guideline



Peri-operative Sleep Promotion

- Promotion of restorative sleep
  - **Optimize environment**
    - Noise reduction
    - Light controls
    - Eye shades
    - Ear plugs
  - **Cluster patient care**
    - Medication timing
    - ADL's
    - PT, OT
    - Patient control sleep times
      - Close door-do not disturb
      - Do not awaken for vital signs during sleep
    - Patient meals on demand
    - Patient control of visitors to accommodate sleep schedule
  - **Pain Management**

- **Communication**
  - PAT
  - SDS
  - PACU
  - RNF
  - ICU
  - SDU
  - RN's, RT's, Health care providers



Peri-operative Sleep Promotion Beyond the Operating Room

Provider Implications
Sleep Promotion
Occupational Health

Sleep apnea associated with lower self-reported quality of life scores when untreated (Finn, Young, Palta, & Fryback, 1998)

Sleep Promotion: Occupational Health

- Drowsy driving
  - 2-fold higher risk of causing motor vehicle fatality
  - 16-billion dollars
  - 1,400 lives lost (Sassani et al. (2004)
- Work disability
  - 70% more likely to experience work related injuries and fatalities (Akerstedt et al., 2002)
- Absenteeism
- Presenteeism
  - Attention deficits
  - Reduced situational awareness and ability to concentrate

Sleep Promotion: Occupational Health

- **Commercial truck drivers with untreated sleep apnea have a 5-fold increased risk of causing an accident**
  - 20% of large truck crashes are due to drowsy driving
  - 25% truck drivers estimated to have OSA
- Currently there is no reporting mechanism in place for health care providers regarding untreated sleep apnea
- **Federal Motor Carrier Safety Administration does not require sleep apnea screening**
  - Have medical exam every two years
  - May send for sleep study if suspect sleep apnea
  - Treat use of cpap and non use of cpap unique to each employer

(Doyle, Mar 21, 2016)

Shift Work Sleep Disorder: SWSD

- Affects people who frequently rotate shifts or work at night
  - Non-traditional hours of work 10PM -6AM
- 20 % of US workforce does shift work
- Opposes the body's natural circadian rhythm
  - A pattern of continual sleep interruption
    - Inability to achieve restorative sleep
    - Excessive sleepiness
      - Increased work absence
      - Increased MVA
      - Reduced job performance

SWSD: What can you do?

- Keep a sleep journal
  - Get adequate sleep
  - Make time for social life
- Decrease the number of night shifts worked in a row
  - Repetitive night shift increases sleep deprivation
  - Recovery requires limiting number of third shifts
    - 12 hour shifts/limit four in a row
- Avoid overtime
  - Limit commute time
  - Avoid rotating shifts
- Nap before work
- Appropriate light exposure
  - First half of shift

Sleep Promotion: Occupational Health

- Jet Lag
  - High percent of travel for work
    - Allow for healthy sleep
- School
  - Later start times
- Media
  - Push to move up prime time
  - Earlier night time news

Good News! Sleep and Transportation

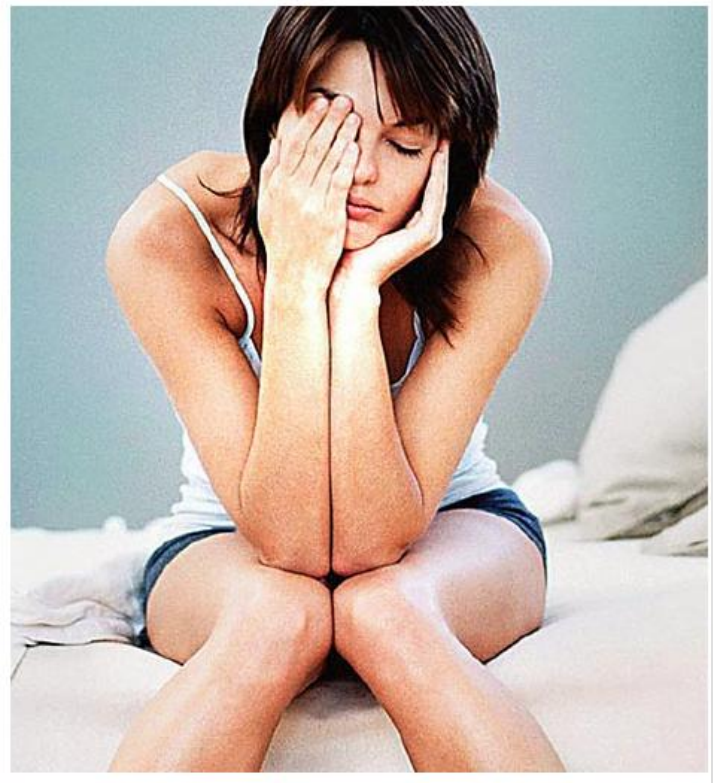
March 8, 2016 announcement made by the US Department of Transportations (DOT) and the Federal Railroad Administration (FRA) that they are taking action to address OSA screening and treatment for ALL transportation workers

- Seeking public input over next 90-days regarding
  - Screening
  - Evaluating
  - Treating
  - https://www.fra.dot.gov/elLib/Details/L17364

Provider Implications
Sleep Promotion
OB/GYN

PMS

- Severe PMS linked to
  - Hypersomnia
  - Insomnia
  - Fatigue
  - Disturbing dreams

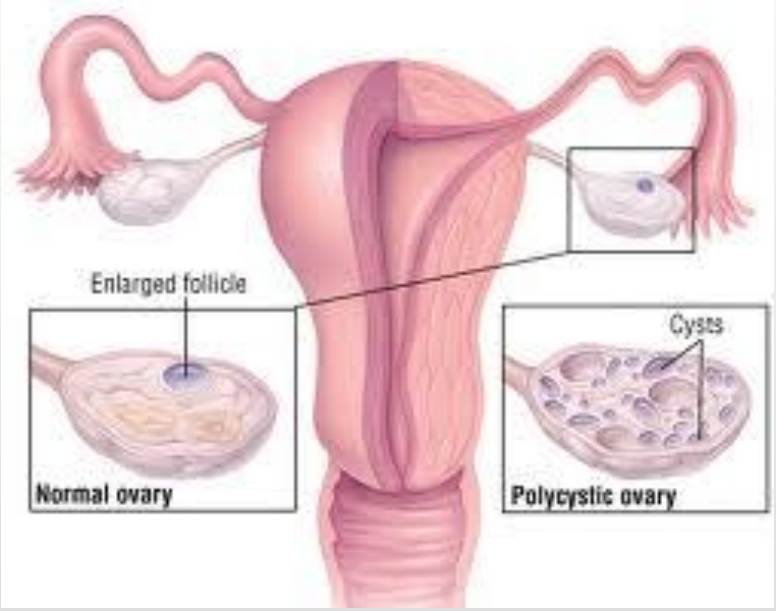


Menstrual Cycle

- ~25-35 day fluctuations in hormone levels
  - Gonadal steroids, pituitary hormones, melatonin and cortisol
- Fluctuations in hormones are associated with sleep changes
- ~1/3 of menstruating women complain of sleep disturbances during the pre-menstrual week/menses
- Mid-follicular phase may elevate core body temperature
- Upper airway resistance is lower during the luteal phase compared to the follicular phase
  - Possible explain the increase in OSA in menopausal women

Polycystic Ovarian Syndrome(PCOS)

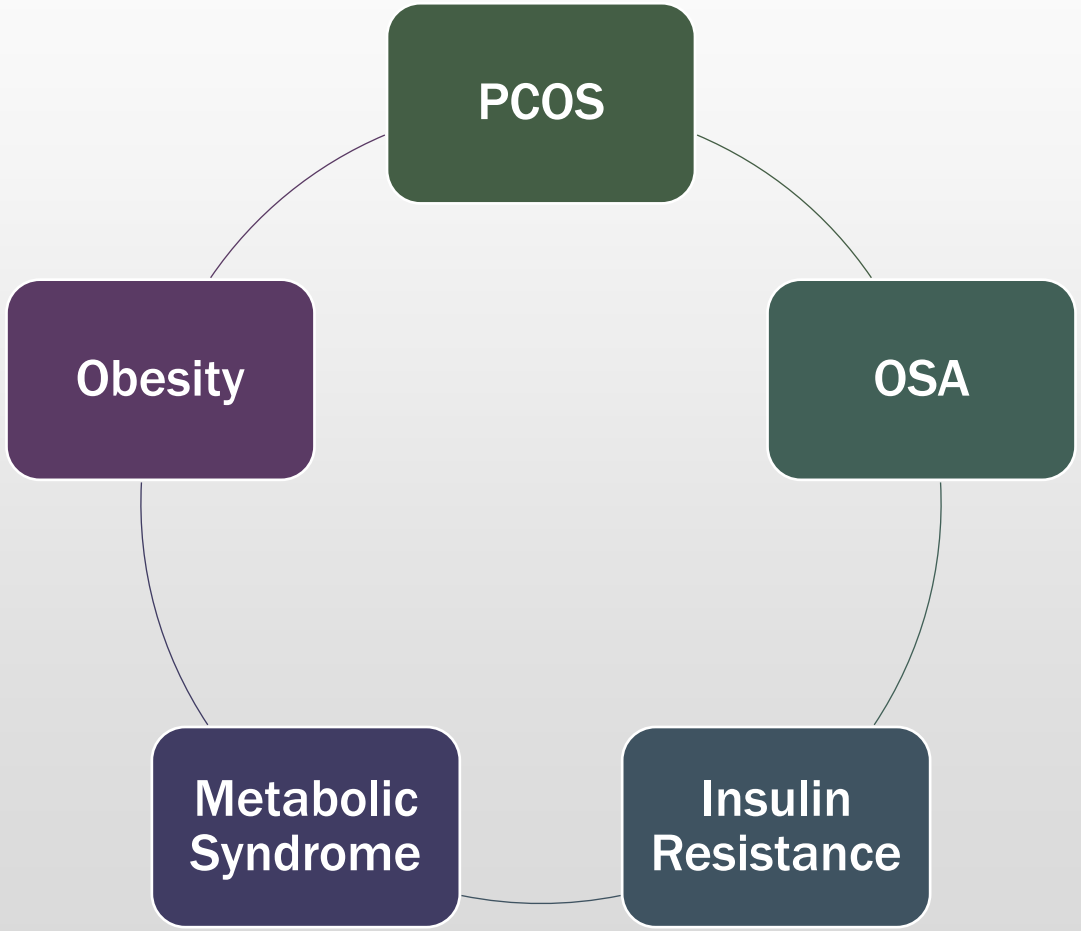
- Most common of endocrine disorder of premenopausal women (Vgontzas et al., 2001)
- Ovaries do not make enough hormones for the ovum to develop
- The undeveloped follicles turn into cysts
- The cysts in turn, inhibit normal menstrual cycle by the lack of progesterone production
- The cysts also produce an abundance of androgen



Why is PCOS important in women's sleep medicine?

- Affects 5-10% of women, beginning with menarche
  - Hyperandrogenism
  - Insulin Resistance
  - Reduced progesterone and estrogen
- Lead to OSA
  - 30 times higher than controls (Vgontzas et al, 2001 JCE&M)
    - 17% of PCOS had dx of OSA/UARS, vs 0.6% controls
- Increased EDS and inflammatory cytokines

PCOS-Relationships



Sleep Disturbances

Sleep disturbances in a community-based sample of women with polycystic ovary syndrome

STUDY QUESTION Is there an excess of sleep disturbances in women with polycystic ovary syndrome (PCOS) in a community-based sample?

STUDY ANSWER Sleep disturbances are almost twice as common in women with PCOS compared with women of similar age without PCOS, with the association slightly accounted for by body weight and, to a greater extent, by depressive symptoms

Morin et al., (2014) Hum. Reprod.
doi: 10.1093/humrep/deu318

Pregnancy and Sleep

- Sleep time is increased over all; REM stable
- More awakenings, less "deep sleep" and more "light sleep" (Lee et al, 2008;J Women's Health)
- With increased weight gain there is an increase in sleep related breathing problems
  - Data are mixed regarding pre-eclampsia and lower gestational weight

Sleep Disturbances in Pregnancy

One hundred eighty-nine women completed both baseline and follow-up sleep surveys.

	Baseline (Mean Gest Age:13.8 ± 3.8 weeks)	Follow Up (mean Gest Age 30 ±2.2 weeks)
Mean Sleep Duration	7.4 hrs	7.0
Snoring Frequency (3 nights/wk)	11%	16.4%
RLS	17.5%	31.2%
PSQI > 5	39%	53.5%

Facco et al Obstetrics & Gynecology:
January 2010 - Volume 115 - Issue 1 - pp 77-83

Restless Leg Syndrome

- Occurs in about 20-26% by the 3rd trimester (Lee et al, (2008) J Women's Health; NSF Website, accessed Jan, 2010)
- Associated with anemia of pregnancy, low iron or folate levels and genetic or familial problems with dopamine and iron metabolism

Sleep Promotion: OB/GYN

Pregnant women with untreated sleep apnea have a five-fold increased risk of death when hospitalized (Healthy Day News, 5/6/2014)

Untreated sleep apnea during pregnancy is linked to higher rates of:

- Pulmonary emboli
- Cardiomyopathy
- Eclampsia
- Gestational diabetes

Sleep Promotion: OB/GYN

- Untreated Sleep Apnea during pregnancy
  - Increased oxidative stress to baby
  - Linked to reduced socialization abilities at 12mos when compared to infants who's mothers did not have sleep apnea or who those who treated sleep apnea while pregnant
- Post Partum
  - Depression
    - Higher risk for women with untreated sleep apnea
  - Interrupted sleep cycle newborn care
- Menopause
  - 61% of women experience sleep disruption
  - Hot flashes
    - Treatment with HRT, SSRI's may help

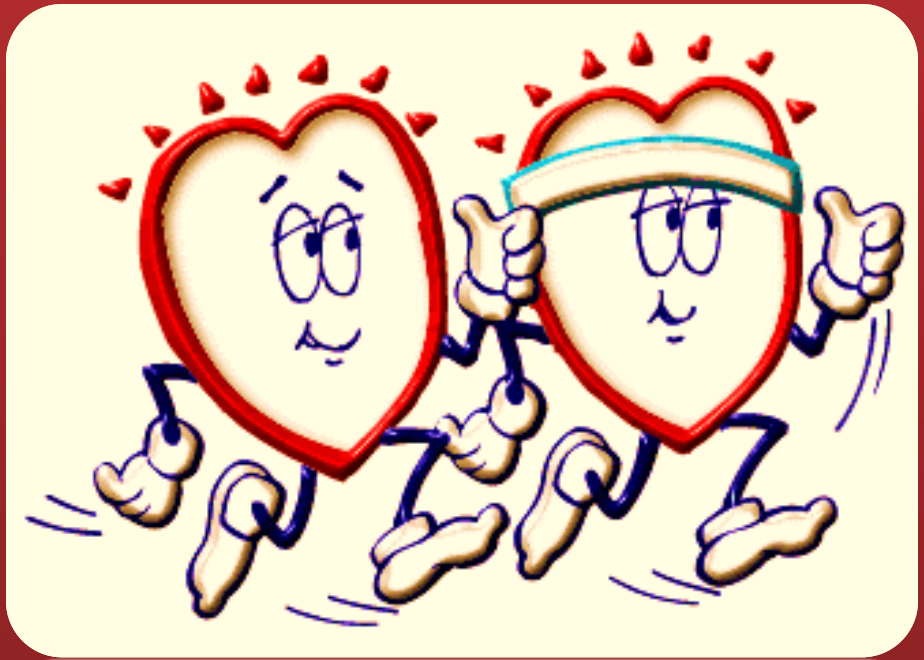
Sleep Promotion: OB/GYN

- Counselling
  - Pregnancy and post-partum
    - Husband and support network to assist in infant care
    - Planned naps
  - Menopause
    - Treatment of hot flashes
      - Nocturnal sweats can also give a clue to underlying OSA
    - Educate on alternatives
      - HRT
      - SSRI's
      - Daily exercise 4 hours or more before sleep

Provider Implications II

- Summarize health care provider implications for sleep promotion in the specialty areas
  - Cardiovascular
  - Endocrine
  - Pediatric
- Apply questionnaires as a means to gather sleep data

Provider Implications Sleep Promotion Cardiovascular Disease



Sleep Promotion: Cardiovascular

Sleep apnea is an independent predictor of mortality

- Sleep Apnea Causal link
  - Ischemic cardiomyopathy
  - CHF
  - Stroke
  - HTN
  - MI
  - Arrhythmias
  - Hypercholesterolemia
    - Cardiac vessels
    - Carotid arteries
  - Hyperglycemia
    - Damage blood vessels

Sudden cardiac death in individuals with OSA occur between 10PM and 6 AM more than 50% of the time (Sleep Heart Health Study)

Nocturnal Hypoxia

Untreated SA

Sleep Fragmentation

Vasoconstriction

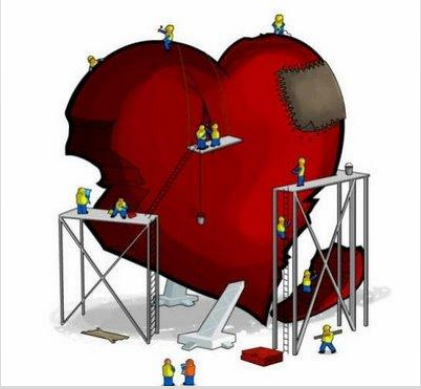
Chronic Reactivation ANS

Gluconeogenesis Glycogenolysis by liver

HTN Tachycardia

Endothelial dysfunction

Increased platelet aggregation



PE/DVT

Oxidative stress key component

Sleep Promotion: Cardiovascular

Cardiovascular mortality is increased when sleep apnea is not treated

CPAP can improve cardiac biomarkers and slow progression of atherosclerosis (Budhiraja, Budhiraja, & Quan, 2010)

CPAP can

- Reverse right ventricular dysfunction
- Reduce pulmonary pressures
- Enhance post afib ablation outcomes
- Improve post-stroke survival
- Reverse cardiovascular consequences (Devulopally, Pongonis, & Khayat, 2008)

Sleep Promotion: Cardiovascular

- Chronic intermittent hypoxia, hypercapnia, arousals
  - Body unable to rest, repair, restore
  - Surges of catecholamine with each apneic event
    - Increases BP, HR, Metabolic rate, gluconeogenesis, glycogenolysis by the liver and skeletal muscles
    - Stress vulnerable plaques
      - Acute MI or CVA 10PM -6AM
  - "Syndrome Z" (Wilcox et al., 1998)
    - HTN, central obesity, insulin resistance, hyperlipidemia, plus OSA

Sleep Promotion: Cardiovascular

Sleep Apnea- A modifiable risk factor

- Sleep apnea screening recommended
  - All patients with diagnosis of hypertension
  - All patients with atrial fibrillation or other cardiac arrhythmias
  - All patients with heart disease
  - All patients who've experienced a CVA
  - All patients at every health care encounter

Provider Implications: Sleep Promotion Endocrine

Sleep Promotion: Endocrine

- Linked to development of Diabetes
  - OSA ↑demand of beta cells=altered glucose homeostasis
    - Nocturnal desaturations → metabolic instability → cytokine stressors → altered glucose metabolism (Pallayova et al., 2011)
- Auto immune disease: contribute to sleep problems
  - Thyroid disease
    - Hyperthyroid versus hypothyroid
  - Insulin resistance
    - Develops in response to repetitive hypoxia
  - Celiac disease
    - Interrupted sleep
    - Depression and anxiety
  - Digestive diseases
- Prevalent in the presence of PCOS
- Obesity
  - Linked to sleep disorders both as risk and result of pathyphysiology
  - Challenges to weight management
  - Leptin levels

Sleep Promotion: Endocrine

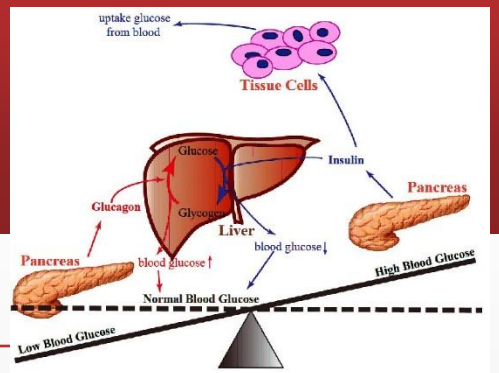


Figure 1 Homeostatic regulation of blood glucose by pancreas

Sleep deprivation linked to

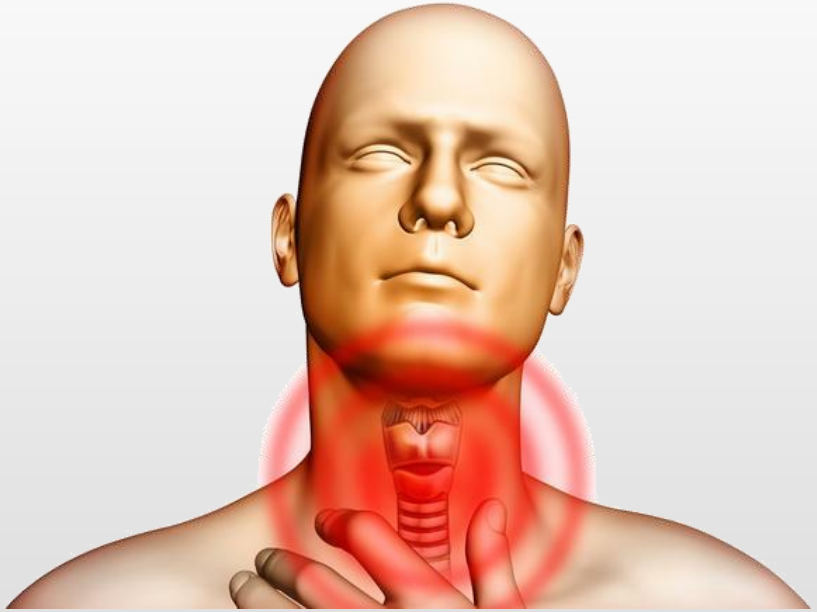
Altered Glucose metabolism	Insulin resistance
	Diabetes type II
Altered Serum Cortisol	Increase in circadian cortisol
	Contributes to cognitive decline
	Negative feedback→ lowered morning cortisol

Thyroid Dysfunction & Sleep Apnea

The presence of thyroid dysfunction (hypothyroid) increases with age and has an association with sleep apnea and fatigue; women have higher rates of hypothyroidism than male counterparts

Hypothyroid and Sleep

- Higher risk for OSA due to:
  - Altered/reduced ability to react to chemical changes in the blood
  - Muscles and nerves that control the upper airway and associated with breathing may become damaged
  - Macroglossial changes (enlarged tongue)
  - Heightened risk for obesity



Hyperthyroid: Graves Disease and Sleep

Hyperthyroidism

- Causes
  - Graves' disease (autoimmune)
  - toxic nodular goiter
  - toxic adenoma
  - exogenous from excess thyroid hormone medication

- Exhaustion
  - Overactive thyroid results in
    - Insomnia
    - Stress on body associated with
      - Tachycardia
      - HTN
      - Diarrhea
      - tremors

Sleep Promotion: Endocrine

- Screen for Sleep Apnea or other sleep disorders
  - CPAP when sleep apnea is identified
- Sleep hygiene
  - As previously discussed
- Maintain healthy weight
- Exercise
- Educate

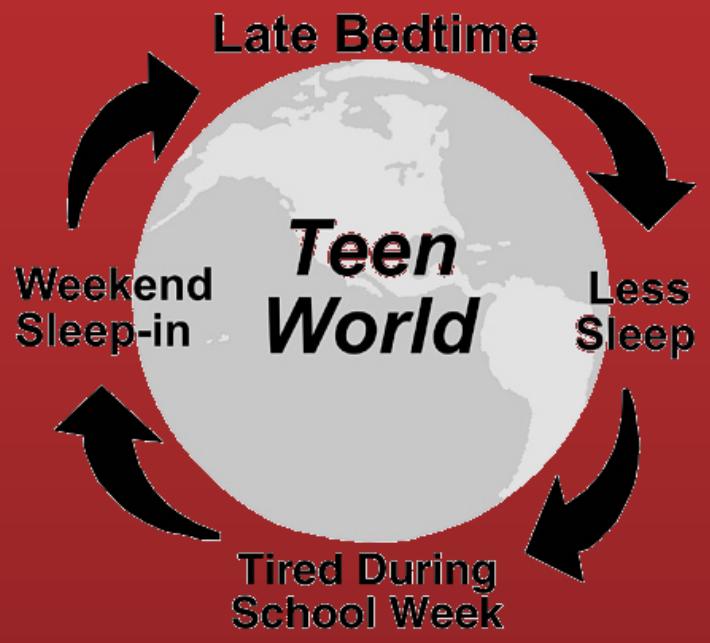
Celiac Disease & Gluten Allergy

Inhibit restorative sleep

Regardless of maintaining gluten free diet

- Anxiety
- Diarrhea
  - Leaky gut syndrome
- Depression
  - 17% more likely to be depressed
  - Higher at time of diagnosis
- Nutritionally depleted
- Migraines
- Seizure disorders

Provider Implications: Sleep Promotion Pediatric



Sleep tight kids

Sleep Promotion: Pediatric

- 87% adolescents get inadequate sleep (NSF, 2006)
- Sleep debt increases risk
  - Car accidents
  - Poor academic performance
  - Behavioral problems
- 1/3 adolescents have sleep problems with associated
  - Learning problems
  - Mood disorders
    - Depression
  - Behavioral aggression
  - Obesity
  - Diminished athletic abilities
  - Heart disease
  - Substance abuse

Differences in Sleep Across Lifespan

Life Stage	Compared Aspect
Infancy	Less sleep and more awakenings in boys
Childhood	Longer sleep duration in girls, earlier bedtime in girls, more severe sleep problems in boys
Adolescent	Longer sleep time in girls, earlier wake time in girls, more sleepiness in girls, more awakenings in boys
Adults	More stage 1 in men, more SWS in women, more awakenings in men and worse subjective sleep in women

Adapted from Principles and Practices of Sleep Medicine, Chap 108. Table 108-2

Sleep and Adolescent Females

- Longer sleep time
- Earlier wake up times
  - School week
- More daytime sleepiness
- More awakenings
- Age effect differences (childhood vs. adolescents)
  - More REM
  - Less wakefulness
  - Lower SWS (both sexes)

Sleep and Adolescent Females

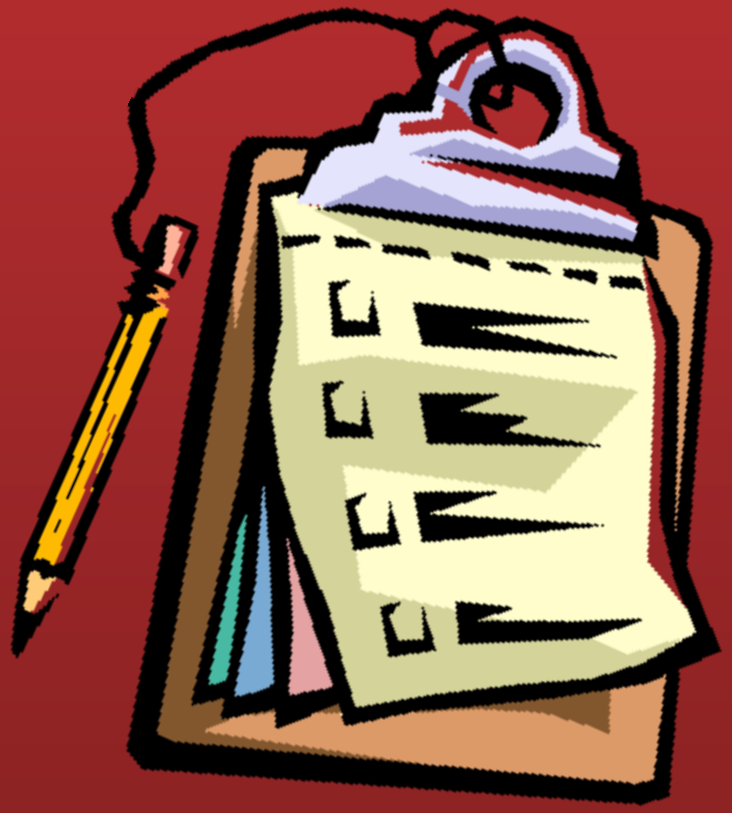
- Risk for insomnia after the onset of menses
- Sleep disturbances linked to phases in the menstrual cycle.
  - Premenstrual reporting disrupted sleep from
    - Bloating
    - Cramps
    - Headaches
  - Objective measures yield mixed results
    - Lower sleep efficiency; less REM

Sleep Promotion: Pediatrics DISTRACTIONS

- Education: Sleep Hygiene
  - Parents
  - Child
- Technology
  - No Screens: several hours before bed
  - Turn off the cell phone
  - Fit-Bit ®
- Avoid napping
- Foods
- Exercise

Please
Turn off Your
Mobile Phones

Questionnaires



Sleep Hygiene Index(Mastin, Bryson, & Corwyn, 2006)

- 13- item index
  - Assesses sleep habits over the last 30-days
  - Napping, hours in bed
  - Activities around sleep time
- Predicts sleep quality, daytime hypersomnolence, and well being
  - Emotional
  - Social
  - Psychological

Rome Questionnaire

- RQ
  - Seven item yes/no questions completed by the bed-partner
    - Breathing patterns during sleep and wakefulness
    - Each yes = 10 points
    - RQ score ≥ 40 with a BMI≥ 26 positive predictors for sleep apnea
    - (Casale et al., 2008)

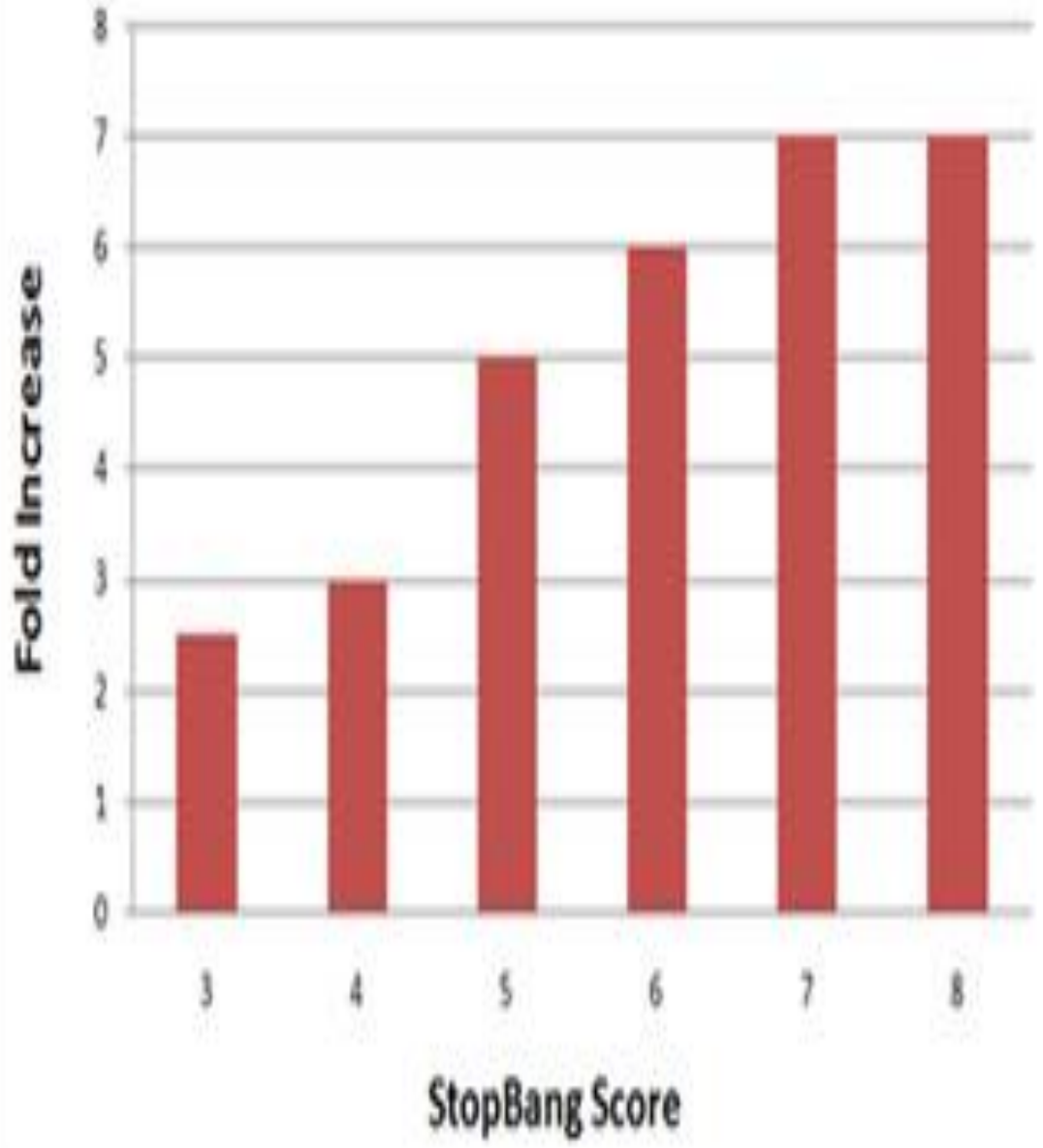
Berlin Questionnaire

- 10-questions divided into three categories
- 5-questions
  - Snoring
- 3-questions
  - Daytime somnolence
- 2-questions
  - BMI
  - HTN

Positive score in two categories of the BQ confirm high sleep apnea risk

STOP-Bang Chung et al., 2008

- STOP
  - A modification of the Berlin questionnaire
  - Four yes/no questions
    - Sleep, tiredness, obstructive nocturnal breathing, pressure (HTN)
  - Bang
    - BMI≥35, age ≥ 50years, neck 16/13, gender male
  - Originally tested and created for use in perioperative area
  - Extensively tested and validated
    - Reliability: 96.4% of patients had same score on test-retest
    - Validity
    - Compared STOP score with the apnea hypopnea index derived from an attended sleep study
    - Sensitivity of STOP-Bang with a score > 3 93% for detecting moderate SA and 100% for severe SA (Chung et al., 2008)



STOP-Bang Scoring Model

Patient Name: _____

Health Card Number: _____

Date: _____

Completed by: _____

1. **Snoring** Do you snore loudly (louder than talking or loud enough to be heard through closed doors)?	☐ Yes ☐ No
2. **Tired** Do you often feel tired, fatigued, or sleepy during daytime?	☐ Yes ☐ No
3. **Observed** Has anyone observed you stop breathing during your sleep?	☐ Yes ☐ No
4. **Blood Pressure** Do you have or are you being treated for high blood pressure?	☐ Yes ☐ No
5. **BMI** Is your BMI more than 35 kg/m^2?	☐ Yes ☐ No
6. **Age** Is your age over 50 years old?	☐ Yes ☐ No
7. **Neck Circumference** Is your neck circumference greater than 40 cm?	☐ Yes ☐ No
8. **Gender** Is your gender male?	☐ Yes ☐ No
High risk of Sleep Apnea if **YES** answered to **3 or more questions**	☐
Low risk of Sleep Apnea if **YES** answered to **less than 3 questions**	☐

American Society of Anesthesiologists Checklist

- Checklist comprise of 12- questions divided into three categories
  - Physical characteristics
  - Nocturnal airway obstruction
  - Daytime hypersomnolence
- Categories scored to determine level of risk of sleep apnea
- No assessment of co-morbid diseases

Surgical Screening

Epworth Sleepiness Scale

- Identifies level of self-report sleepiness
- Not an effective predictor of sleep apnea

THE EPWORTH SLEEPINESS SCALE
(To assess risk of Obstructive Sleep Apnea)

Use the following scale to choose the most appropriate number for each situation:-

0 = would never doze
1 = Slight chance of dozing
2 = Moderate chance of dozing
3 = High chance of dozing

Situation	Chance of dozing
Sitting and reading	
Watching TV	
Sitting, inactive in a public place (e.g. a theatre or a meeting)	
As a passenger in a car for an hour without a break	
Lying down to rest in the afternoon when circumstances permit	
Sitting and talking to someone	
Sitting quietly after a lunch without alcohol	
In a car, while stopped for a few minutes in the traffic	
Total	

Score:

0-10	Normal range
10-12	Borderline
12-24	Abnormal

Observation Based Nocturnal Sleep Inventory

- Nurse administered observation based sleep inventory used to screen the elderly population > 70 years of age
- Nurses complete an hourly checklist through five hourly visits
  - Observe interrupted breathing
    - Apnea, choking, gasping
    - Snoring
    - Awakening
  - High sensitivity, specificity, and positive predictive value for obstructive sleep apnea
    - Not effective for central apnea, frequent awakenings without snoring/apnea
    - Tested in Caucasian ethnicity only

SIMPLY STATED:
PATIENTS SLEEP SHOULD NOT BE OVERLOOKED

"The cumulative effects of sleep loss and sleep disorders have been associated with a wide range of deleterious health consequences including an increased risk of hypertension, diabetes, obesity, depression, heart attack, and stroke" (IOM, 2006)