# Sleep in Women

November 7th, 2025
Omaha Women's Health & Wellness Conference

**Presented by:**
Nebraska Medicine Sleep APP's
Stefanie Breitkreutz, PA-C
Abbie Ketcham, APRN
Rubab Scherger, PA-C

Nebraska Medicine

1

# Objectives

- Describe the physiology of sleep.
- Recognize how sleep patterns differ between men and women.
- Identify disorders that commonly impact sleep in women.
- Apply strategies to improve sleep quality.

Nebraska Medicine

2

# Disclosure Statement

We have no financial relationships with commercial entities or organizations that could influence the content of this presentation. The information provided is unbiased and evidence-based, prioritizing the best interests of the audience.

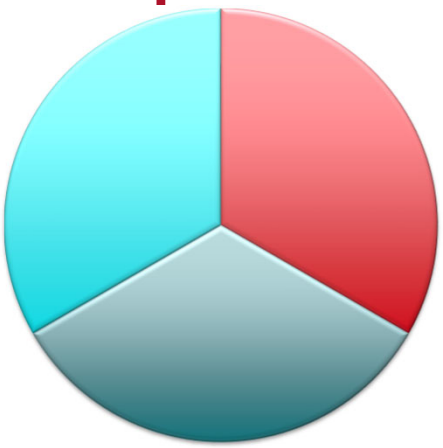
3

# What is sleep?

4

# 3 Pillars of Health : Diet, Exercise and Sleep

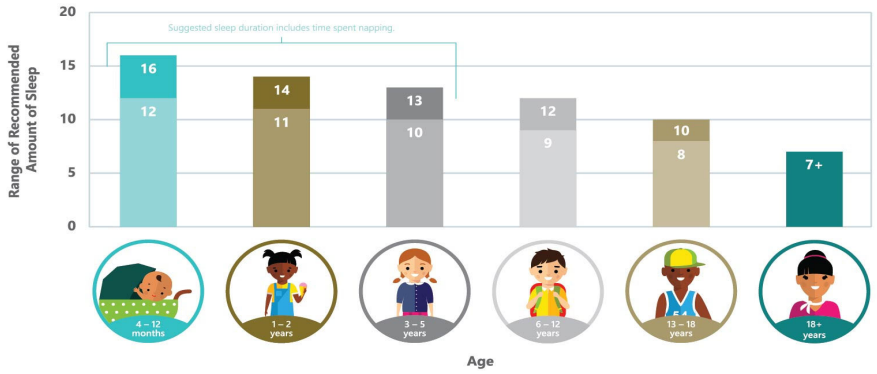
Sleep is necessary for the body to restore / repair itself to function properly.



5

## Healthy Sleep Duration

The American Academy of Sleep Medicine recommends that you get the following hours of sleep on a regular basis for optimal health at each stage of life.




SleepEducation.org

A sleep health information resource by the American Academy of Sleep Medicine

6

# Sleep Architecture

**Sleep Latency:** "the time to fall asleep"
The onset of sleep, when eyes close and sleep begins.

**Stage 1:** lightest period of sleep, presence of slow rolling eye movements, muscle tone relaxes (drowsy state)

**Stage 2:** brain waves slow, less aware of surroundings, drop in body temperature, breathing and heart rate become more regular. 40-60 percent of sleep cycle

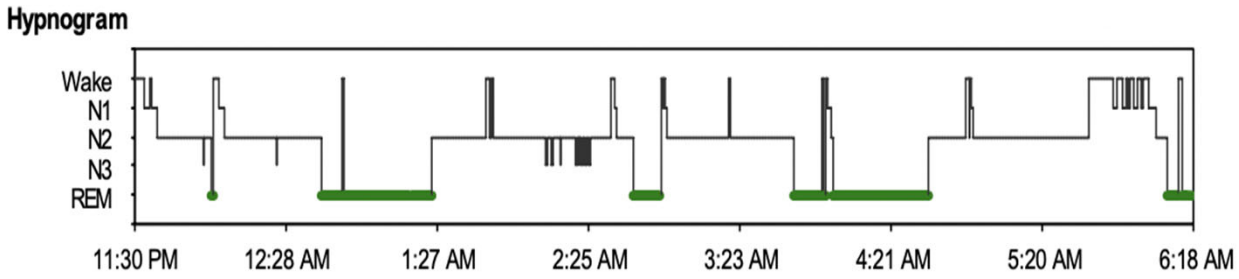
**Stage 3:** deep sleep, restores and recharges the body
(previously referred to as stage 3 and 4, slow wave sleep) slow delta brain waves noted. 5-15 percent of sleep cycle

**REM:** Rapid Eye Movement, body is motionless, brain is as active as it is while thinking, paradoxical sleep: brain active but muscles are not. (dream state) 20-25 percent of sleep cycle

*(example: healthy adult)*

7

# Typical Hypnogram




(Young, healthy adult)

8

# Sleep Drive (Process S & C)

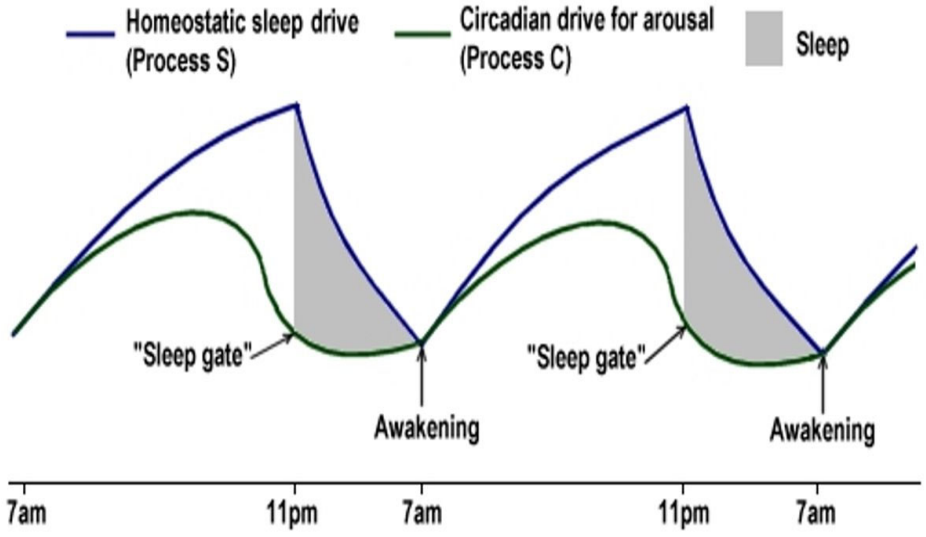
## Process S

- Instinctive desire for sleep
- Sleep debt occurs during the day
- Sleep debt is repaid once sleep occurs
- If not adequately repaid, it accumulates resulting in poor daytime function and potential metabolic abnormalities

## Process C

- Determines the timing of sleep
- Regulated by light exposure, thus light exposure near bedtime delays sleep
- Circadian regulation occurs via the hypothalamic suprachiasmatic nucleus and is synchronized by light via the retino-hypothalamic tract. (thus light exposure near bedtime delays sleep)

9

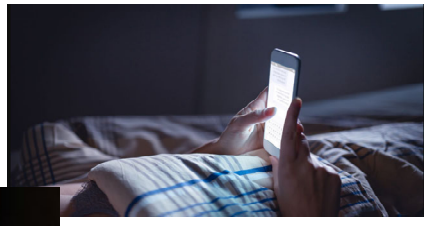


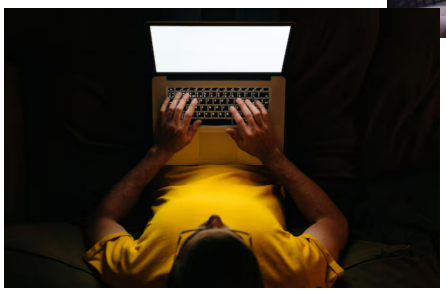

Sleep Optimization and Diabetes Control: A Review of the Literature
Diabetes Ther 2015 Dec 6(4) 425-468
Teresa Arora and Sharard Taheri
Department of Medicine, Weill Cornell Medical College, New York, USA

10

# Disruption of Process S & C

- Caffeine
- Light exposure near bedtime
- Shift work





11

# Shortened Sleep Duration

Sleep deprivation is common:

- busy lifestyles
- the use of modern technology is also increasingly intruding into sleep time.

An early study, The Sleep Heart Health Study, Two exam cycles, 1995-1998 and 2001-2003. Cardiovascular disease outcomes were tracked until 2010.

- Large sample (5,804 adults aged 40 and older) of US men and women, that short self-reported sleep duration (≤5 h per night) 251% increased odds ratio of T2DM compared to those with sleep duration of 7–8 h.

12


13

# Women Across the Life Span

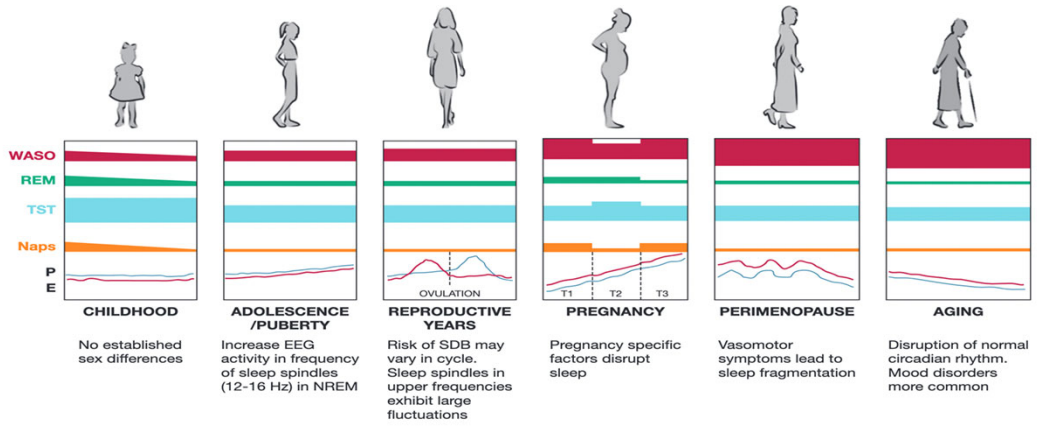



Figure 1 – *Sleep in women across the life span. E = estrogen; NREM = non-rapid eye movement; P = progesterone; REM = rapid eye movement; SDB = sleep-disordered breathing; T = trimester; TST = total sleep time; WASO = wake after sleep onset.*

14

# Sleep Architecture: Women vs. Men

- **Total sleep:** Women tend to sleep slightly longer than men on average
- **Sleep latency:** Men generally fall asleep faster than women.
- **Sleep stages 1 and 2 (light sleep):** Men tend to spend more time in the lighter stages of sleep compared to women.
- **Sleep stage 3 (deep sleep):** Women tend to have longer and more frequent periods of deep sleep than men.
- **REM sleep:** The duration of REM sleep cycles is often longer in men. However, women's REM sleep can fluctuate based on hormonal changes, and older women may experience more REM sleep than older men.
- **Sleep quality:** Despite sleeping longer, women are more likely to report poorer sleep quality, often experiencing more fragmentation and nighttime awakenings. This is particularly noticeable during the early-to-middle adult years.

15

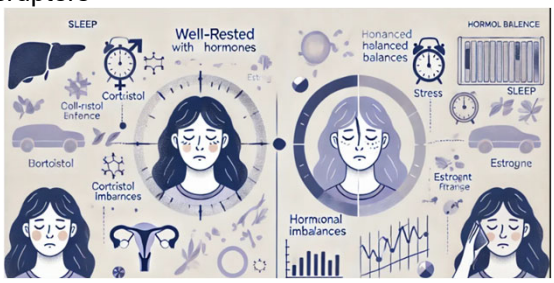
# Circadian Rhythm Differences

- Chronotypes: males are more likely to be "night owls"
- Timing: generally, females experience the urge to sleep earlier than males
- Women have an early timing of circadian rhythms, particularly for endogenous temperature and melatonin
  - Females tend to experience more robust influxes of the sleep hormone melatonin


16

# Biological and Hormonal difference

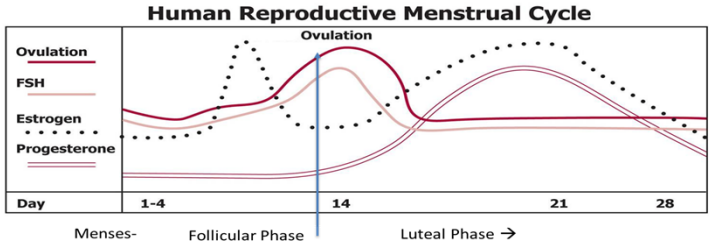
- Hormonal influences
  - Estrogen and progesterone affect sleep architecture
  - Menstrual cycle phases influence sleep
  - Pregnancy
  - Perimenopause/menopause
    - Major sleep disrupters




17

# Menstrual Cycle

- Primary hormones – estrogen and progesterone
- Follicular phase
  - Pre-ovulation, estrogen rises and may help increase sleep drive
- Luteal phase
  - After-ovulation, progesterone rise - a sedative effect
- Late luteal phase (PMS)
  - Estrogen and progesterone drop if pregnancy does not occur




18

## Estrogen

- **Promotes sleep quality:** enhances REM and NREM sleep continuity.
- **Thermoregulation**: lowers core body temperature, facility sleep onset.
- **Serotonin and GABA effect**s: modulates neurotransmitters that promote relaxation

## Progesterone

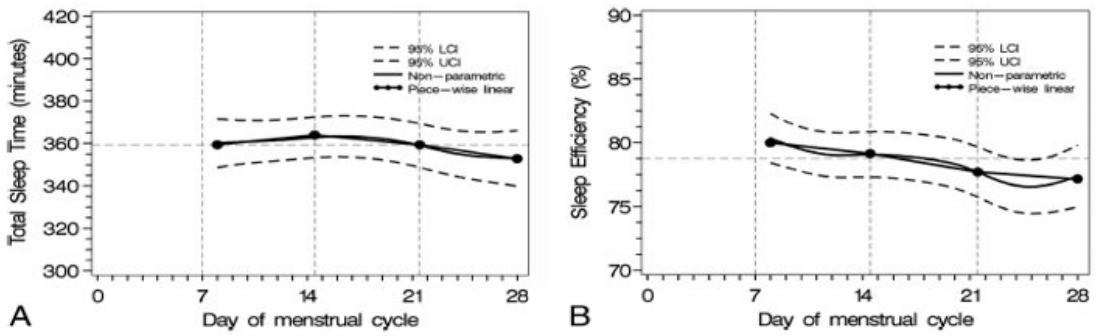
- **Natural sedative effect:** Acts on GABA-A receptors, promoting calmness and sleepiness.
  - Makes it easier to fall asleep and stay asleep
- **Increases slow-wave sleep (deep sleep):** Supports restorative sleep phases.
  - Improves quality of sleep

19

19

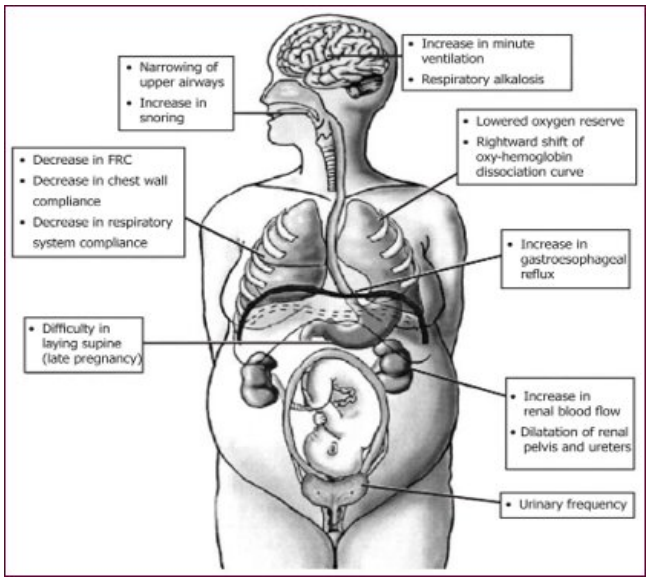
## Menstrual Cycle

SWAN study (mean age 51) shows decline in sleep efficiency most marked in week prior to menses (n=163 women)




20

# Physiological Changes in Pregnancy




21

# Sleep in Normal Pregnancy

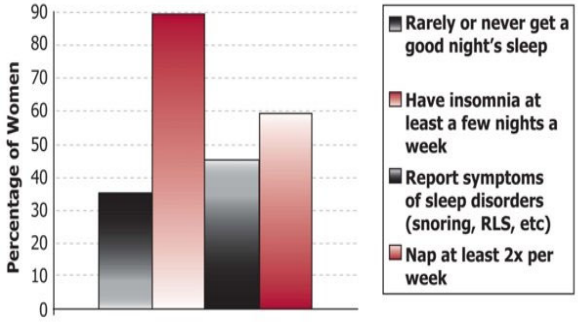
Changes that may affect sleep

- Nocturia
- Musculoskeletal discomfort
- Fetal movement
- Uterine contractions
- Rhinitis and nasal congestion
- Heartburn
- Orthopnea
- Sleeping position

22

# Sleep Patterns in Pregnancy

- 30% of pregnant women rarely/never get a good night's sleep
- 84% experience a sleep problem a few nights/wk (vs. 67% of women overall)
- 40% report symptoms of sleep disorders:
  - snoring
  - sleep apnea
  - restless legs syndrome
  - insomnia

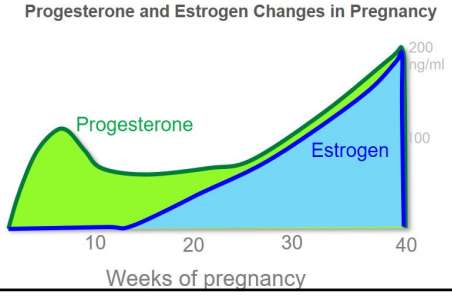



23

# Pregnancy

Trimester 1

- Progesterone ↑ → makes women sleepy
- Sleep architecture
  - Sleep latency decreases (faster sleep onset)
  - Slight Increase in NREM (N2) sleep and slow wave (N3) sleep
- Fragmented sleep due to nausea, frequent urination and breast tenderness




24

# Pregnancy

## Trimester 2

- Hormones stabilize
  - Estrogen and progesterone plateau
- Most stable period for sleep
- Less fatigue, more energy
- Sleep architecture
  - REM sleep rebounds
  - Slow wave (N3) sleep declines
- May see onset of snoring, restless leg symptomatology, irregular uterine contractions, back pain and joint pain

25

# Pregnancy

## Trimester 3

- Marked sleep fragmentation and shortened total sleep time.
- Increased sleep latency and more frequent night awakenings (discomfort, fetal movement, reflux, nocturia, pain, anxiety).
- Sleep architecture
  - Reduced REM sleep and slow wave (N3) sleep
  - Increase in lighter (N1/N2) sleep stages

26

# Sleep Post-Partum

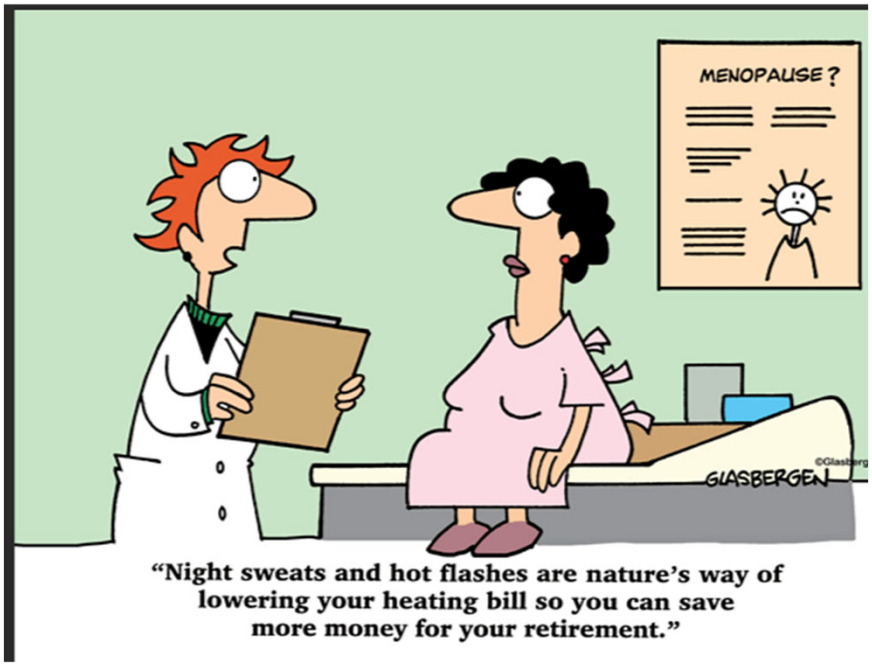
- Sleep does not immediately return to normal
- 84% have insomnia a few nights week
- 19% experience post-partum blues/depression
- 20% have driven drowsy with kids

27

# Sleep Impact on Pregnancy

- Poor sleep during pregnancy can contribute to higher risks of:
  - Prenatal depression
  - Gestational diabetes
  - Pre-eclampsia
  - Long labors
  - Increased Cesarean sections
  - Abnormal fetal growth
  - Preterm birth

28

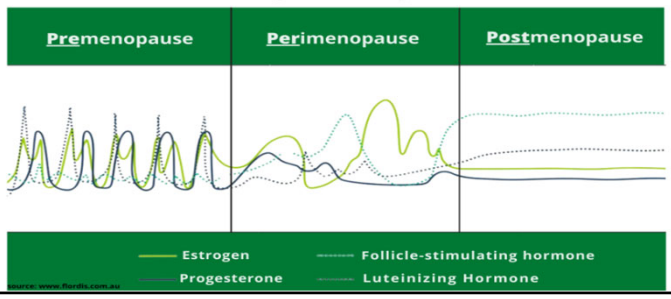



"Night sweats and hot flashes are nature's way of lowering your heating bill so you can save more money for your retirement."

29

# Menopause

- After 12 months of amenorrhea
- Median age of transition is 47 years
- Mean age for final menstrual period is 51 years
- Peri-menopause: hormonal changes begin 7-10 years before the final menses
- Decreasing estrogen and progesterone - leads to sleep disruptions
- Increasing FSH and LH




30

# Sleep Disturbances in Menopause

Sleep disturbances are among the most common symptom affecting 40–60% of menopausal women.

- Difficulties falling asleep
- Fragmented sleep
- More nighttime wakefulness
- Increased risk of sleep disordered breathing

31

# Possible Causes of Sleep Complaints in Menopause


32

# Menopause & Perimenopause

- Estrogen Decline:
  - Disrupts thermoregulation → night sweats and hot flashes.
  - Alters serotonin and GABA pathways that promote sleep.
  - Leads to increased sleep latency and nighttime awakenings.
- Progesterone Decline:
  - Loss of its sedative, GABA-agonist effect.
  - Decreased slow-wave (deep) sleep and increased insomnia complaints.

33

# Hot Flashes and Sleep

- Hot flashes – sudden feeling of warmth, accompanied by sweating, palpitations and anxiety
- Though the exact etiology is unknown – it is thought that estrogen withdrawal leads to disruption in the hypothalamic thermoregulation
  - Increased sympathetic nervous system activity
- Hot flashes are circadian, peak frequency in late evening
- Linked to poor quality sleep
  - Reduced sleep efficiency - sleep fragmentation
  - Associated with insomnia
  - Early morning awakenings

34

# Treating Hot Flashes

- First Step: Life-style changes
  - Avoid smoking and alcohol
  - Avoiding stimulants such as caffeine and nicotine
- Regulating core body temperature may modulate hot flashes
  - Cool, ambient temperature
  - Dress in layers
  - Drink cold drinks
  - Weight loss
- Other non-Pharmacologic intervention
  - Paced respiration
  - Cognitive behavioral therapy
  - Mindfulness based stress reduction
- Pharmacologic
  - Estrogen replacement
  - Gabapentin
  - Clonidine
  - SSRI's and SNRI's
    - Paroxetine, venlafaxine, FDA approved, others off label

35

## Summary Table

| Hormone | Mechanism | Sleep Effect | Clinical Impact |
|---|---|---|---|
| Estrogen | Lowers body temp, stabilizes neurotransmitters | Improves REM/NREM, reduces awakenings | Sleep disruption when levels fall (e.g., menopause) |
| Progesterone | GABA-A receptor agonist | Promotes slow-wave sleep | Sedative in pregnancy, deficiency causes insomnia |

**Take-Home Message**

- Hormonal fluctuations across the menstrual cycle, pregnancy, and menopause significantly alter sleep quality.
- Estrogen and progesterone work synergistically to maintain stable, restorative sleep.
- Recognition of hormonal effects on sleep is key in managing women's health and sleep disorders.

36

# Psychosocial and lifestyle factors

- Mental health
  - Women are more prone to anxiety and depression, both of which disrupt sleep
- Caregiving roles
  - Gender roles influence sleep patterns (e.g., interrupted sleep with infants).
  - Interrupted sleep leads to chronic fatigue and mood changes


37

# Sleep Disorders

Sleep Apnea

Insomnia

Restless Leg Syndrome

Hypersomnia

Circadian rhythm sleep disorders

Parasomnias


38

# When to seek care?

39

# Obstructive Sleep Apnea

Repetitive episodes of full or partial airway obstruction occurring during sleep.

These events may cause reduction in oxygenation and brief arousals from sleep.

Categorized by **AHI (apnea hypopnea index)**

Mild 5-14 events per hour

Moderate 15-29 events per hour

Severe 30+ events per hour

40

# OSA in Women

- OSA in women is underrecognized, studies did not recognize women in OSA case studies until after the 1990s
- It takes women longer to get diagnosed compared to men even when they present with "classic symptoms"
- Only 1 in 4 women with OSA are diagnosed.
- After diagnosis women are less likely to be referred for treatment especially with mild OSA

41

# What Clinical Differences Exist?

**Symptom Presentation**

| | Men | Women |
|---|---|---|
| Snoring/Apneas | *** | * |
| Sleepiness | *** | ** |
| AM Headaches | * | *** |
| Depressive Features | * | ** |
| Apnea Freq. | ** | * |
| Hypopnea Freq. | * | ** |

Kapsimalis F, Kryger MH. Gender and obstructive sleep apnea syndrome, part 1: Clinical features. Sleep 2002;25(4):412-9.

42

# Women's Risk Associated with OSA

Women with OSA have an increased risk for subclinical myocardial injury

Unlike men

Women with moderate to severe SDB have a higher risk of serious cardiovascular complication

Including heart failure and death, compared to those with mild or no SDB

SDB is associated with insomnia, respiratory disease, and worse quality of life scores

In women but NOT in men

43

# Treatment of OSA

## Positive Airway Pressure Therapy (PAP)

- Device pumps pressurized air through mask worn while individual sleeps.
- The air keeps the airway open preventing collapse while sleeping.
- Women specific titrating algorithms are available

## Non-PAP Treatment

- Mandibular Advancement Device (MAD)
- Positional Therapy
- Surgical options
  - Upper Airway Surgery
  - Hypoglossal Nerve Stimulators (Inspire)
- Weight loss
  - Men have greater AHI reduction with weight loss

44

# Central Sleep Apnea

- Sleep disorder which breathing stops because of the brain not sending proper signals to the muscles that control breathing.
- 3.5x more common in men than women
- Generally seen more in those > 60 years old
- Prevalence of CSA in those with congestive heart failure is between 25-40%

45

# What is Insomnia?

A <u>persistent</u> complaint of:

- Difficulty falling asleep
- Difficulty staying asleep
- Waking earlier than desired

Associated with:

- Impaired daytime function

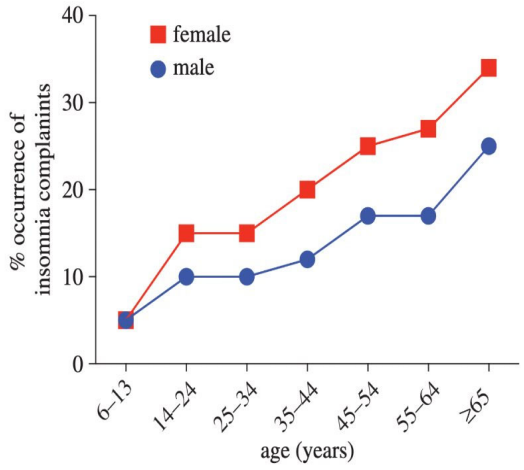
OR

- Daytime symptoms related to poor sleep

46

# Prevalence of Insomnia

- Most common sleep complaint in the industrialized world
- Women have a 50% higher prevalence of insomnia than men
- Almost 70% of women experience insomnia several times per week (vs. about 50% of men)




47

# Risk Factors for Insomnia

- ***Female sex***
- Previous history of insomnia
- Increasing age
- Psychiatric symptoms and disorders
- Medical symptoms and disorders
- Stress
- Lower socioeconomic status

48

# Insomnia Contributors:

Antidepressants
Stimulants
Steroids
Bronchodilators
Antihistamines
Decongestants
Caffeine
Alcohol
Tobacco


49

# Treatment of Insomnia

- Sleep hygiene & stimulus control
- Cognitive Behavioral Therapy for Insomnia (CBT-I)
  - Working with trained behavioral psychologist
- Pharmacological Treatment
- Combination CBT-I/pharmacotherapy
- Co-morbid medical and mood disorders should be addressed

50

# Cognitive Behavioral Treatments

| TECHNIQUE | AIM |
|---|---|
| **Sleep hygiene** | Promote habits that help sleep; provide rationale for subsequent instructions. |
| **Stimulus control** | Strengthen bed & bedroom as sleep stimulus |
| **Sleep restriction** | Restrict time in bed to improve sleep depth & consolidation |
| **Relaxation training** | Reduce arousal & decrease anxiety |
| **Cognitive therapy** | Address thoughts and beliefs that interfere with sleep. |

51

# Pharmacotherapy: Indications

**Predictable Stress**

**Chronic Insomnia**

**Acute Stress**

**Shift Work/Jet Lag**

52

# Restless Leg Syndrome

Urge to move limbs sometimes associated with uncomfortable sensations which is worse with rest and primarily presents in the evening

- Much more common in women
  - **Women 2x prevalence than men**
  - Increases with age up to 60-70 years

- Associated with:
  - Iron deficiency
  - Pregnancy (peaks in 3rd trimester)
  - Chronic renal failure
  - Strong family history

53

# RLS Triggers

- Caffeine
- Alcohol
- Nicotine
- Medications such as antihistamines or antidepressants
- Prolonged sitting or inactivity
- Hot weather or overheating

54

# RLS Treatment

- **Determine Iron Status**
  - Serum ferritin <75mg/L
  - Treat with oral iron or IV replacement
- **Medications**

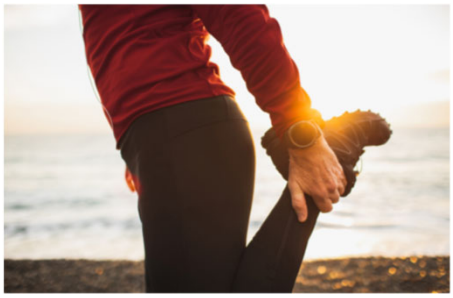
| Pharmacologic Treatments | Side Effects |
|---|---|
| **Alpha-delta ligand modulator**<br>Gapapentin enacarbil<br>Gabapentin<br>Pregabalin | Sedation<br>Dizziness<br>Weight gain |
| **Dopamine agonists**<br>Pramipexole<br>Ropinirole<br>Rotigotine patch | Nausea<br>Headache<br>Impulse control disorder<br>Augmentation |
| Levodopa-carbidopa | Augmentation/ Rebound<br>Loss of efficacy |
| Opiates | Respiratory (OSA/CSA)<br>Tolerance/dependence<br>Constipation/urinary retention |
| Benzodiazepines | Tolerance, sedation |

Silber MH, Buchfuhrer MJ, Earley CJ, Koo BB, Manconi M, Winkelman JW, Earley CJ, Becker P, Berkowski JA, Buchfuhrer MJ, Clemens S, Connor JR, Ferré S, Hensley JG, Jones BC, Karroum EG, Koo B, Manconi M, Ondo W, Richards K, Sharon D, Silber MH, Trotti LM, Uhl G, Walters AS, Winkelman JW. The Management of Restless Legs Syndrome: An Updated Algorithm. *Mayo Clinic Proceedings*. 2021;96(7):1921-1937. doi:10.1016/j.mayocp.2020.12.026.

55

# RLS Management Tips

- Avoid stimulants in the evening
- Regular exercise
- Stretching or gentle massage
- Warm bath or cool compress
- Adequate hydration
- Distraction techniques or relaxation practices



56

# Hypersomnia

Disorders that cause excessive daytime sleepiness not caused by circadian rhythm sleep wake disorder or other untreated sleep disorder such as sleep apnea.

- Narcolepsy
- Idiopathic hypersomnia
- Insufficient sleep syndrome

57

# Key factors for Women with Hypersomnia

**Main challenges: Contraception and Pregnancy**

- Treatment options may interfere with hormonal contraception
- Most medications used for treatment are Pregnancy class C risk
- The postpartum period is complicated by sleep restriction due to nocturnal newborn needs. Most drugs have small molecular weight and are believed to transfer into breast milk.

58

# Circadian Rhythm Sleep Disorders

Disruption of the natural sleep-wake pattern

- Delayed Sleep Wake Phase
- Advanced Sleep Wake Phase
- Shift work Disorder
- Jet Lag Disorder

59

# Parasomnia

An undesirable physical event or experience that occurs during entry into sleep, within sleep or during arousal from sleep.

- Sleepwalking
- Sleep Terrors
- Sleep Related Eating Disorder
  - 60-83% of patients are female
  - Onset 22-39 years
  - Particularly frequent in those with underlying eating disorder.

60

# Parasomnia

- REM Sleep Behavior Disorder
- Recurrent Isolated Sleep Paralysis
- Nightmare Disorder
  - Dreams and nightmares are recalled at a higher frequency by women
  - Women have a higher level of distress associated with negative dreams
  - Posttraumatic stress disorder (PTSD) is diagnosed more frequently in women

61


62

# You are not alone / seek evaluation and guidance


63

# What can we do?

64

# Healthy Sleep Habits

- ✓ Get up at the same time EVERY day
- ✓ Don't go to bed due to the time on the clock. Go to bed when sleepy.
- ✓ Avoid napping if possible. If unavoidable, never nap after 3pm. Keep naps short < 45 minutes
- ✓ Avoid excessive caffeine (> 200 mg / day) and specifically avoid caffeine within 8 hours of intended sleep
- ✓ Avoid nicotine near bedtime
- ✓ Use your bed for sleep and intimacy only
- ✓ Keep a regular schedule to your day
- ✓ Establish healthy relaxing rituals before bed

65

# Healthy Sleep Habits

- ✓ Keep bedroom cool and dark. AVOID BRIGHT LIGHTS FROM ELECTRONICS before bed and during sleep.
- ✓ Exercise every day however avoid strenuous exercise with 4-6 hours of bedtime
- ✓ If unable to fall asleep or stay asleep get up after 20 minutes and do a quiet activity until you feel sleepy again
- ✓ Avoid alcohol within 4 hours of bedtime (after supper)
- ✓ Keep pets out of the bed
- ✓ Consider a white noise machine or fan for background noise

66

## Making sense of over-the-counter options


Magnesium


Melatonin


Unisom / Tylenol PM / Benadryl

67

Sleep is the single most effective thing we can do to **reset our brain and body health each day.**

DR. MATTHEW WALKER

68

# Thank you for having us!


FIND A DOCTOR AND SCHEDULE

Sleep Disorders Center at Oakview Health Center

531.559.9999 Phone

**Overall Provider Rating**

Includes ratings for all providers at this location

★★★★★

*5 out of 5 (97 Ratings)*

69

# References:

Carskadon, M.A., & Dement, W.C. (n.d.). *Normal Human Sleep: An Overview.*

The Sleep Heart Health Study, BioLINCC: Sleep Heart Health Study (SHHS)

*Sleep Optimization and Diabetes Control: A Review of the Literature* Diabetes Ther 2015 Dec 6(4) 425-468 Teresa Arora and Sharard Taheri Department of Medicine, Weill Cornell Medical College, New York, USA

American Academy of Sleep Medicine. (2023). *International classification of sleep disorders: Third edition, text revision (ICSD-3-TR).* American Academy of Sleep Medicine
Bublitz M, Adra N, Hijazi L, Shaib F, Attarian H, Bourjeily G. A Narrative Review of Sex and Gender Differences in Sleep Disordered Breathing: Gaps and Opportunities. *Life*. 2022;12(12):2003. doi:10.3390/life12122003.

Quintana-Gallego, E.; Carmona-Bernal, C.; Capote, F.; Sánchez-Armengol, A.; Botebol-Benhamou, G.; Padillo, J.P.; Castillo-Gómez,J. Gender differences in obstructive sleep apnea syndrome: A clinical study of 1166 patients. Respir. Med.2004,98, 984–989.
Kumar, S.; Anton, A.; D'Ambrosio, C.M. Sex Differences in Obstructive Sleep Apnea. Clin. Chest Med.2021,42, 417–425
Mallampalli, M.P.; Carter, C.L. Exploring Sex and Gender Differences in Sleep Health: A Society for Women's Health Research Report.J. Womens Health2014,23, 553–56

Campos-Rodriguez, F.; Martinez-Garcia, M.A.; de la Cruz-Moron, I.; Almeida-Gonzalez, C.; Catalan-Serra, P.; Montserrat, J.M.Cardiovascular mortality in women with obstructive sleep apnea with or without continuous positive airway pressure treatment:A cohort study.Ann. Intern. Med.2012,156, 115–122

Roca, G.Q.; Shah, A.M. Sleep Disordered Breathing: Hypertension and Cardiac Structure and Function.Curr. Hypertens. Rep.2015,17, 91

Bublitz M, Adra N, Hijazi L, Shaib F, Attarian H, Bourjeily G. A Narrative Review of Sex and Gender Differences in Sleep Disordered Breathing: Gaps and Opportunities. *Life*. 2022;12(12):2003. doi:10.3390/life12122003.

May, A.M.; Gharibeh, T.; Wang, L.; Hurley, A.; Walia, H.; Strohl, K.P.; Mehra, R. CPAP Adherence Predictors in a Randomized Trial of Moderate-to-Severe OSA Enriched with Women and Minorities.Chest2018,154, 567–578

McArdle, N.; King, S.; Shepherd, K.; Baker, V.; Ramanan, D.; Ketheeswaran, S.; Bateman, P.; Wimms, A.; Armitstead, J.; Richards,G.; et al. Study of a Novel APAP Algorithm for the Treatment of Obstructive Sleep Apnea in Women.Sleep2015,38, 1775–1781.

70

# References:


Jayaraman, G.; Majid, H.; Surani, S.; Kao, C.; Subramanian, S. Influence of gender on continuous positive airway pressure requirements in patients with obstructive sleep apnea syndrome. Sleep Breath.2010,15, 781–784

Bublitz M, Adra N, Hijazi L, Shaib F, Attarian H, Bourjeily G. A Narrative Review of Sex and Gender Differences in Sleep Disordered Breathing: Gaps and Opportunities. *Life*. 2022;12(12):2003. doi:10.3390/life12122003.

American Academy of Sleep Medicine. (2023). *International classification of sleep disorders: Third edition, text revision (ICSD-3-TR).* American Academy of Sleep Medicine

Javaheri S. Sleep disorders in systolic heart failure: a prospective study of 100 male patients. The final report. Int J Cardiol 2006;106(1):21-8.

Sin DD, Fitzgerald F, Parker JD, Newton G, Floras JS, Bradley TD. Risk Factors for Central and Obstructive Sleep Apnea in 450 Men And Women with Congestive Heart Failure. Am J Respir Crit Care Med 1999;160(4):1101-6.

Sateia MJ, Doghramji K, Hauri PJ, Morin CM. Evaluation of chronic insomnia. An American Academy of Sleep Medicine review. Sleep 2000;23(2):243-308.

Sateia MJ, Pigeon WR. Identification and management of insomnia. Med Clin North Am 2004;88(3):567-96

Mong JA, Cusmano DM. Sex differences in sleep: impact of biological sex and sex steroids. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 2016;371(1688):20150110. doi:10.1098/rstb.2015.0110.

Zhang B, Wing YK. Sex differences in insomnia: a meta-analysis. Sleep 2006;29(1):85-93.

Smith MT, Perlis ML, Park A, Smith MS, Pennington J, Giles DE, Buysse DJ. Comparative meta-analysis of pharmacotherapy and behavior therapy for persistent insomnia. Am J Psychiatry 2002; 15(1)9:5-11.

Allen RP, Walters AS, Montplaisir J, et al. Restless Legs Syndrome Prevalence and Impact: REST General Population Study. Arch Intern Med 2005;165(11):1286-92.

Howell MJ; Schenck CH. Restless nocturnal eating: a common feature of Willis-Ekbom Syndrome (RLS). *J Clin Sleep Med* 2012;8(4):413-419.

Silber MH, Buchfuhrer MJ, Earley CJ, Koo BB, Manconi M, Winkelman JW, Earley CJ, Becker P, Berkowski JA, Buchfuhrer MJ, Clemens S, Connor JR, Ferré S, Hensley JG, Jones BC, Karroum EG, Koo B, Manconi M, Ondo W, Richards K, Sharon D, Silber MH, Trotti LM, Uhl G, Walters AS, Winkelman JW. The Management of Restless Legs Syndrome: An Updated Algorithm. *Mayo Clinic Proceedings*. 2021;96(7):1921-1937. doi:10.1016/j.mayocp.2020.12.026.


71

# References:


Thorpy M, Zhao CG, Dauvilliers Y. Management of narcolepsy during pregnancy. Sleep Med 2013;14:367-76.
Miller MA, Mehta N, Clark-Bilodeau C, Bourjeily G. Sleep Pharmacotherapy for Common Sleep Disorders in Pregnancy and Lactation. *Chest*. 2020;157(1):184-197. doi:10.1016/j.chest.2019.09.026.

Winkelman JW. Clinical and polysomnographic features of sleep-related eating disorder. J Clin Psychiatry 1998;59(1):14-9.
Brion A, Flamand M, Oudiette D, Voillery D, Golmard JL, Arnulf I. Sleep related eating disorder versus sleepwalking: a controlled study. Sleep Med 2012; 3:1094–101

Barbara C. Galland, Barry J. Taylor, Dawn E. Elder, Peter Herbison, Normal sleep patterns in infants and children: A systematic review of observational studies, Sleep Medicine Reviews, Volume 16, Issue 3, 2012, Pages 213-222, ISSN 1087-0792

Tonetti L, Fabbri M, Natale V. 2008 Sex difference in sleep-time preference and sleep need: a cross-sectional survey among Italian pre-adolescents, adolescents, and adults. Chronobiol. Int.25,745–759. (doi:10.1080/07420520802394191)

Zheng H, Harlow SD, Kravitz HM, et al. Actigraphy-defined measures of sleep and movement across the menstrual cycle in midlife menstruating women: Study of Women's Health Across the Nation Sleep Study. Menopause 2014.

PK, Jain SS, Dhand R. Sleep disorders in pregnancy. Curr Opin Pulm Med 2003;9(6):477-83.

Hedman C, Pohjasvaara T, Tolonen U, Suhonen-Malm AS, Myllyla VV. Effects of pregnancy on mothers' sleep. Sleep Med 2002;3(1):37-42.

Lee KA et al., *American Journal of Obstetrics & Gynecology*, 2000;182(5):1208–1216.

Facco FL et al., *Obstetrics & Gynecology*, 2010;115(2 Pt 1):229–235.

Julie Carrier, Kazue Semba, Samuel Deurveilher, Lauren Drogos, Jessica Cyr-Cronier, Catherine Lord, Zoran Sekerovick, Sex differences in age-related changes in the sleep-wake cycle, Frontiers in Neuroendocrinology, Volume 47, 2017, Pages 66-85, ISSN 0091-3022, https://doi.org/10.1016/j.yfrne.2017.07.004.*

Shaver JL, Woods NF. Sleep and menopause: a narrative review. Menopause. 2015 Aug 1;22(8):899-915.*

Xu Q, Lang CP. Examining the relationship between subjective sleep disturbance and menopause: a systematic review and meta-analysis. Menopause. 2014 Dec 1;21(12):1301-18.*

Eichling P, Sahni J. Menopause-related sleep disorders. Journal of Clinical Sleep Medicine 2005;1(3):291-300.


72


73