Getting Better *Zzzs* to Prevent Chronic Disease

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Disclosures

- None

- Dietitian in:
  - Long-term care
  - Behavioral health
- Writing/researching topic of nutrition, sleep, stress management
- Eat To Sleep book
  - Published in 2019
- PBS 1-hour Special
  - Began airing February 2023

Learning Objectives

1. Identify what quality sleep is at different stages of life.
2. Understand the foundational role of sleep for good health and prevention of disease.
3. Learn what dietary and non-dietary changes can be made to improve quality of sleep and/or extend sleep cycle.

Sleep Throughout the Lifespan

Quality Sleep from Infancy Through Adulthood

Sleep Throughout the Lifespan

- All mammals need sleep!
- How sleep works and how it rejuvenates the body/mind remains somewhat of a mystery.
- Sleep is a critical factor in health, weight, and energy levels.

Sleep Throughout the Lifespan

- As we age, the amount of time we spend sleeping both declines and becomes more consolidated.
- Recommended hours per day for sleep across age ranges:
  - Newborns: 16-20
  - Infants (4-11 months): 12-15
  - Children (1-4 years): 11-12
  - Adolescents: 9
  - Adults: 7-8

Changes in Sleep with Age. Division of Sleep Medicine at Harvard Medical School website. http://healthysleep.med.harvard.edu/healthy/science/variations/changes-in-sleep-with-age#:~:text=As%20we%20go%20from%20infants,about%2011%20or%2012%20hours. Last reviewed December 18, 2007. Accessed September 20, 2020.

Sleep Throughout the Lifespan

- 10-30% of adults live with some form of insomnia.
  - Chronic insomnia: trouble sleeping at least 3x per week for at least 3 months.
  - Short-term insomnia: lasts less than 3 months.

- Types of insomnia:
  - Sleep-onset: difficulty falling asleep.
  - Sleep maintenance: difficulty staying asleep throughout the night.
  - Mixed: combination of sleep-onset insomnia and sleep maintenance insomnia.

Sleep Disorders. Sleep Foundation website. Accessed September 28, 2020. https://www.sleepfoundation.org/sleep-disorders

Insomnia

- Common habits that can cause or perpetuate insomnia:
  - Lying in bed awake for more than 15-20 minutes when having trouble sleeping.
  - Inconsistent sleep schedule
  - Doing activities or tasks in bed that aren't conducive for sleep.
  - Napping for long periods during the day or taking multiple naps.
  - Drinking alcohol close to bedtime.

Sleep Guidelines During the COVID-19 Pandemic. The Sleep Foundation website. https://www.sleepfoundation.org/sleep-guidelines-covid-19-isolation. Accessed September 21, 2020

Sleep Deprivation and the Body

Prioritizing Sleep for Better Health Outcomes

Why Should RDs Ask About Sleep?

- One-third of US adults report getting less than the recommended amount of sleep.
- Adequate sleep aids in learning and information retention.
- Sleep is critical for all other aspects of health.
- Changes in lifestyle, especially after COVID-19 Pandemic:[2]
  - Increased anxiety and worry
  - Depression and isolation
  - Excessive screen time
  - Stress-related fatigue

Sleep and Sleep Disorders. Center for Disease Control & Prevention website. https://www.cdc.gov/sleep/index.html Last reviewed April 15, 2020. Accessed September 21, 2020.

Sleep Guidelines During the COVID-19 Pandemic. The Sleep Foundation website. https://www.sleepfoundation.org/sleep-guidelines-covid-19-isolation. Accessed September 21, 2020

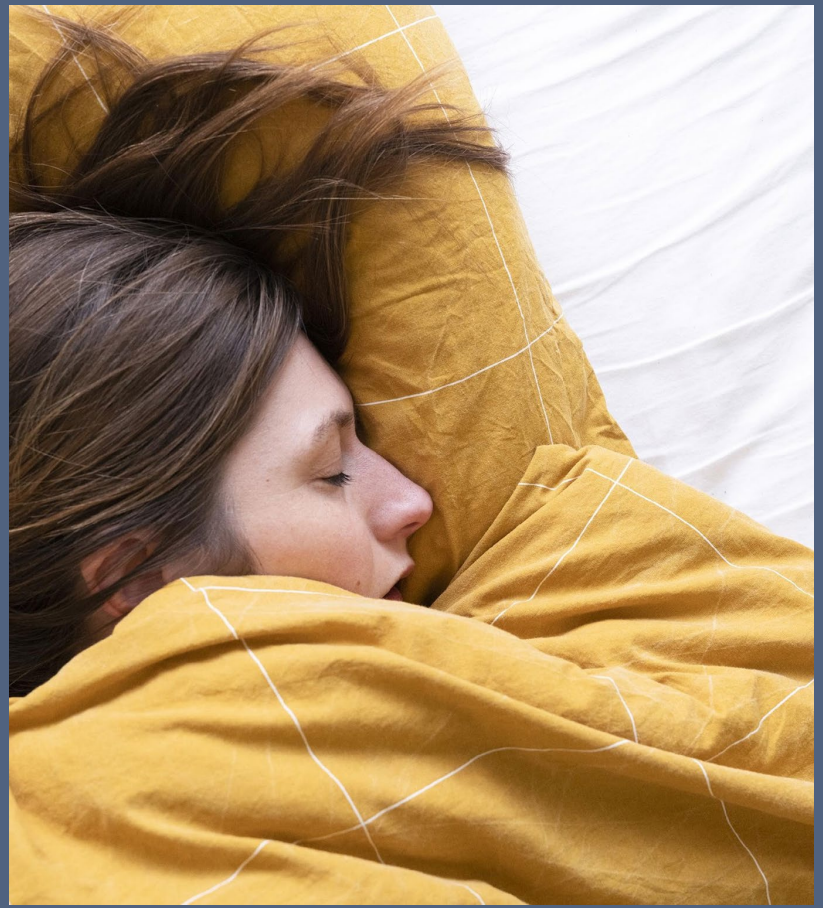
Sleep Deprivation and the Body

- Obesity and Metabolic Disorders:
  - Numerous studies show that we are more likely to make poor food choices, and eat larger quantities of food, when our brains and bodies are deprived of sleep.
  - Why? Imbalance of appetite hormones, leptin and ghrelin.
  - Sleep deprivation increases cravings for calorie-dense carbohydrate foods, sweets, and salty snacks.

Nishiura, C., and Hashimoto, H. “A 4-year study of the association between short sleep duration and change in body mass index in Japanese male workers. ***Journal of Epidemiology***. 2010;20(5):385-390.

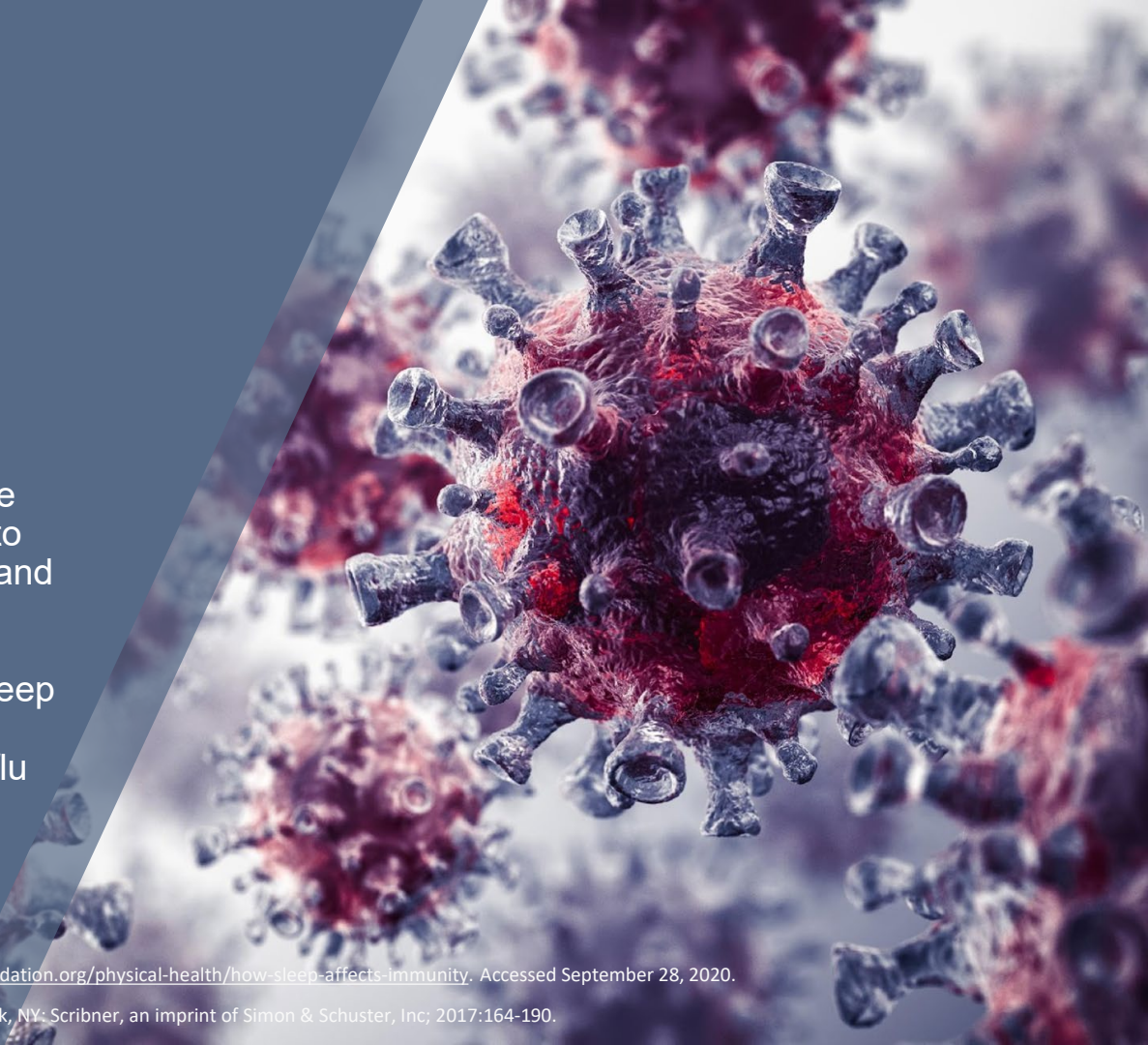
Sleep Deprivation and the Body

- Insulin Sensitivity and Diabetes:
  - Cells become less receptive to insulin in sleep-deprived individuals.
  - Low blood sugar levels while sleeping can lead to a stimulation in the release of adrenaline and cortisol, which promote awakening.
  - Chronic sleep deprivation now recognized as one of the major contributors to the rise of type 2 diabetes in first-world countries.



Sleep Deprivation and the Body

- Immune Health
  - Bidirectional relationship between sleep and immune system health.
  - Sleep can strengthen immune memory including the ability to remember how to recognize and react to dangerous antigens[1]
  - People getting <6 hours of sleep are more than 4x as likely to become ill after exposure to flu virus[2]



How Sleep Affects Immunity. Sleep Foundation website. https://www.sleepfoundation.org/physical-health/how-sleep-affects-immunity. Accessed September 28, 2020.

Walker, M. Cancer, Heart Attacks, and a Shorter Life. In: ***Why We Sleep***. New York, NY: Scribner, an imprint of Simon & Schuster, Inc; 2017:164-190.

Sleep Deprivation and the Body

- Cardiovascular Disease and Cortisol Levels:
  - Cortisol levels increase at night when sleep quality is poor.
  - The body remains stuck in a degree of flight-or-fight state.
  - Prevents body from entering deep, restorative stages of sleep where heart and blood pressure are lowered.
  - One to two hours of sleep reduction at night can increase systolic blood pressure.

How Sleep Affects Immunity. Sleep Foundation website. https://www.sleepfoundation.org/physical-health/how-sleep-affects-immunity. Accessed September 28, 2020.

Walker, M. Cancer, Heart Attacks, and a Shorter Life. In: ***Why We Sleep***. New York, NY: Scribner, an imprint of Simon & Schuster, Inc; 2017:164-190.

Sleep Deprivation and the Body

- Elevated Cortisol levels can cause:
  - Blood sugar imbalance and diabetes
  - Weight gain and obesity
  - Immune system suppression
  - Cardiovascular disease
  - Fertility issues
  - Insomnia
  - Chronic fatigue syndrome
  - Depression
  - Dementia

Cortisol--Its Role in Stress, Inflammation, and Indications for Diet Therapy.

Today's Dietitian website.
https://www.todaysdietitian.com/newarchives/111609p38.shtml

Updated November 2009. Accessed Oct. 7, 2020

Sleep Deprivation and the Body

- Mental Health
  - Sleep disturbances are documented in all psychiatric disorders.
  - Sleep deprivation can lead to a lowered desire for social interaction (importance of social support for health).
  - Hyperactivity of premotor cortex in sleep-deprived individuals (less comfortable with social proximity).
  - The Amygdala, the brain's emotional epicenter, is 60% more reactive with a lack of sleep.

Sleep Deprivation and the Body

- Mental Health: Serotonin Depletion
  - Can be induced with acute tryptophan depletion
  - Serotonin levels can be dropped down to 10%
    - Terrible mood, impulsivity, aggressive behaviors, and long-term planning inhibited
    - Prefrontal cortex and amygdala no longer able to communicate (emotion control centers).
  - Serotonin is not naturally found in foods, but we can impact levels by consuming tryptophan-containing foods

Review: Sleep Deprivation and the Body

Side Effects of Lack of Sleep				
Obesity and Metabolic Disease	**Insulin Sensitivity and Diabetes**	**Cardiovascular Disease**	**Immune Health**	**Mental Health**
• Increased levels of ghrelin • Decreased levels of leptin	• Decreased insulin sensitivity • Chronic stress → elevated cortisol → elevated blood glucose levels	• Increase in cortisol release at night • Chronic elevated blood pressure	• Fewer cytokines • Reduction in natural killer T-cell activity • Poor immune system memory	• Increased stress and anxiety • Release of cortisol and adrenaline from adrenal glands • Irritability • Poor memory

Improving Sleep Quality and Quantity

Dietary and Non-dietary Changes to Recommend

Improving Sleep Quality and Quantity

- Determine the root cause(s) of sleep troubles:
  - Stress?
  - Pain?
  - Sleep apnea?
  - Lack of consistent sleep routine?
- Provide a food/sleep log to track changes made, stressors, and sleep patterns.
- Refer to sleep specialist if needed.
  - American Medical Association recommends CBT-I as first line of treatment for insomnia, not sleeping pills.

New guideline provides clinical recommendations for specific insomnia drugs. American Academy of Sleep Medicine website. https://aasm.org/new-guideline-provides-clinical-recommendations-for-specific-insomnia-drugs/. Updated February 14, 2017. Accessed October 9, 2020.

Sleep-Nutrition Connection

- Food is responsible for fueling everything our body does, and that includes sleep

- 2020-2025 Dietary Guidelines for Americans
  - Most concerning under consumed nutrients: calcium, potassium, vitamin D, and fiber.
  - Three of these four nutrients play an important role in getting a good night's sleep: *potassium, calcium, vitamin D*

United States Department of Agriculture. Dietary Guidelines for Americans 2015-2020. https://health.gov/our-work/food-nutrition/2015-2020-dietary-guidelines/guidelines/. Published December 2015. Accessed September 20th, 2020.

Nutrients/Compounds to Consider for Sleep

- Magnesium
- Potassium
- Vitamin B6
- Calcium
- Vitamin D
- Tryptophan
- Melatonin

What to Eat for Better ZZZs

- Magnesium
  - Helpful in aiding sleep, reducing stress and inflammation, relaxation of muscles.
  - Enjoy these foods: nuts and seeds, avocado, leafy green vegetables, yogurt
- Potassium
  - Important for blood flow, muscle contraction, and prevention of muscle cramps.
  - Enjoy these foods: bananas, tomatoes, spinach, sweet potatoes, yogurt & milk
- Vitamin B6
  - Important for production of serotonin and melatonin.
  - Enjoy these foods: beef, chickpeas, yellowfin tuna, halibut, bananas, and pistachios

Meyer, K. *Eat To Sleep: What To Eat & When To Eat It for a Good Night's Sleep.* Avon, MA: Adams Media; 2019: 45-146

What to Eat for Better ZZZs

- Calcium
  - Helps the body use tryptophan to manufacture melatonin, and nervous system function
  - Enjoy these foods: milk, yogurt, sardines and canned salmon, and almonds
- Vitamin D
  - Important for mood regulation, immune function
  - Enjoy these foods: salmon, sardines, egg yolks, and fortified foods
- Tryptophan
  - Precursor for serotonin production which leads to melatonin production
  - Enjoy these foods: beef, dairy, poultry, seafood, eggs, nuts and seeds

Meyer, K. *Eat To Sleep: What To Eat & When To Eat It for a Good Night's Sleep.* Avon, MA: Adams Media; 2019: 45-146

What to Eat for Better ZZZs

- Melatonin
  - Natural hormone found in the body that regulates sleep-wake cycle, but also found naturally in certain foods:
    - Tart cherries
    - Pistachios
    - Almonds
    - Tomatoes
    - Eggs
  - Bioactivities of melatonin:
    - Anti-inflammatory
    - Immune support
    - Antioxidant activity
    - Cardiovascular protection
    - Neuroprotective

Meng X, Li Y, Li S, et al. Dietary Sources and Bioactivities of Melatonin. ***Nutrients***. 2017;9(4):367.

Herbs/Herbal Tea

- Chamomile
  - Used for centuries as sleep-inducer and anxiety-reducer
  - Apigenin (antioxidant) is thought to be responsible for the calming effects
- Lavender
  - May help with sleep, depression, and anxiety
- Peppermint
  - Contains menthol which can help relax muscles, ease stomach upset, and alleviate tension. Also works as a decongestant
  - Those with GERD may not benefit from peppermint tea (may make symptoms worse)
- Valerian Root
  - Reported to help fight insomnia and decrease anxiety by calming the central nervous system
  - May take anywhere from a week to four weeks before effects become noticeable

Meyer, K. Eat To Sleep: What To Eat & When To Eat It for a Good Night's Sleep. Avon, MA: Adams Media; 2019: 45-146

Foods & Beverages to Limit/Avoid

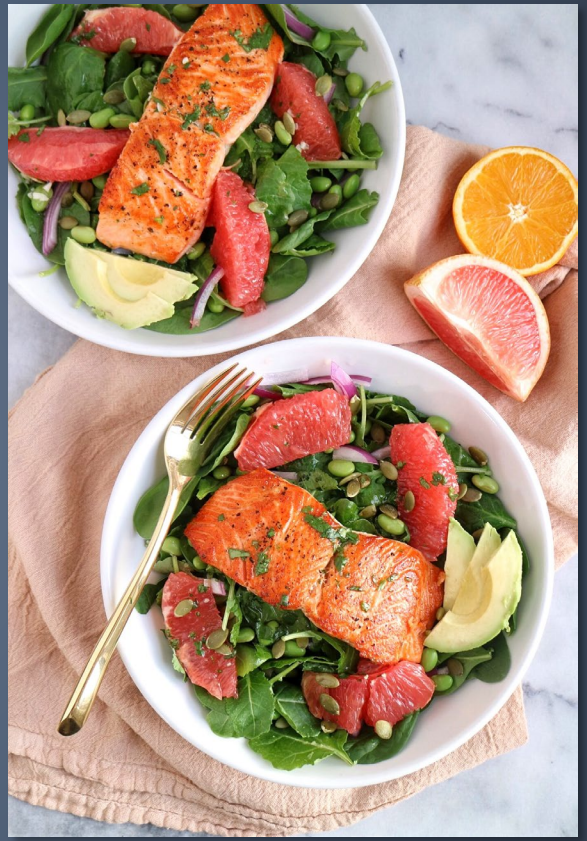
- Caffeine
  - Half life = 6 hours
  - Does not affect everyone in the same way
  - What else is being added to coffee/teas?
  - ***Recommendation: cut off caffeine 8-12 hours before bedtime and limit total intake to 400 mg/day***
- Alcohol
  - Interferes with reaching deep, restorative stages of sleep
  - Can worsen sleep apnea symptoms and snoring
  - Possible depletion of magnesium (Mg deficiency linked to insomnia, depression, anxiety
  - ***Recommendation: consume alcohol with dinner meal or at least 3-4 hours before bedtime; rehydrate with 16 ounces of water for every alcoholic beverage consumed***

Foods & Beverages to Limit/Avoid

- Big meals
  - Americans tend to eat the most calories and largest quantities of food at the dinner meal
  - ***Recommendation: encourage mindful eating practices and slowing down while eating***
- Reflux-inducing foods
  - High-fat foods, acidic foods, and spicy foods
  - Stimulation of stomach acid and loosening of the esophageal sphincter increases the chance of heartburn and can interfere with the ability to sleep
  - ***Recommendation: encourage mindful eating practices and slowing down while eating***
- Refined Carbohydrates/Excess Added Sugar
  - High BG levels while sleeping → Increased insulin release; possible adrenaline and cortisol release.[1,2]
  - May cause sleep disruptions, waking up hot or with night sweats
  - ***Recommendation: choose complex carbohydrates, avoid snacking on high-sugar/carbohydrate foods and beverages, especially close to bedtime.***

Putting it into practice

- Emphasis on protein, fiber, fat at meals & snacks
  - Protein quality, healthy fats
  - Minimize desire for late-eating
- Recommend sleep-beneficial foods & provide practical solutions on how to enjoy them based on individual's lifestyle/preferences
- Assess foods that could be causing sleep interferences



Non-Dietary Approaches to Better Sleep

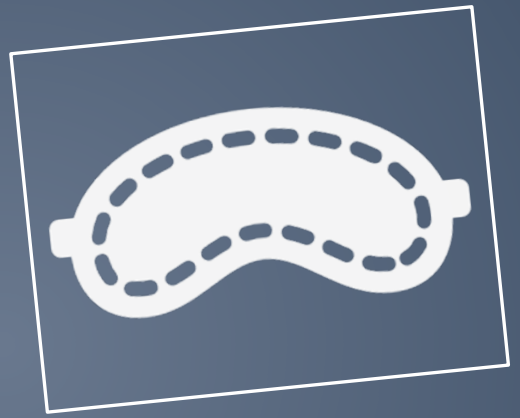
- Managing Stress
  - Breathing exercises and meditation, yoga, aromatherapy
- Regular exercise
  - Bidirectional relationship between exercise and sleep.
  - After 4 months of increased activity, people who previously reported insomnia were able to sleep 1 hour more a night.
  - Recommend at least 3 hours before bedtime.

Diet, Exercise, and Sleep. Sleep Foundation website. https://www.sleepfoundation.org/articles/diet-exercise-and-sleep#:~:text=Food%20is%20also%20related%20to. Reviewed December 2009. Accessed October 9, 2020.

Non-Dietary Approaches to Better Sleep

- Managing circadian rhythm
  - Aim for 20 minutes of sun exposure in the morning (BONUS: vitamin D!).
  - Keep a consistent wake time and bedtime (even on weekends!).

- Relaxing sleep environment
  - Limit artificial lights, tech use about an hour before bedtime.
  - Keep bedroom a peaceful environment
  - Cool bedroom temperature (about 65°F).



Recap:

Dietary & Non-Dietary Changes to Recommend				
Determine Root Cause	**Nutrients/Compounds to Consider**	**Foods/Beverages to Recommend**	**Food/Beverages to Limit/Avoid**	**Non-Dietary Recommendations**
• Stress • Pain • Sleep apnea • Lack of sleep routine • Make referral if needed	• Magnesium • Vitamin B6 • Potassium • Melatonin • Tryptophan • Calcium • Vitamin D	• Magnesium-rich foods • Melatonin-containing foods • Foods rich in calcium, vitamin D, potassium • Tryptophan-foods: beef, eggs, tuna, salmon • Adequate hydration from non-caffeinated beverages • Herbal tea	• Caffeine • Alcohol • High-fat meals before bed • Reflux-inducing foods • Refined sugars and carbs	• Consistent sleep schedule • Stress management techniques • Regular physical activity • Limit tech use 1-2 hours before bed • Cool, quiet sleep environment

Connection between each area of health and when one area is positively or negatively impacted, the others will be impacted too!

Questions?

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