Dreaming of Sleep: The Challenges and Benefits

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Goals

• To provide introduction to sleep, its function and common sleep disorders
Objectives

- To understand the changes in sleep with age
- To identify common sleep disorders
Sleep Disorders
Driving Question

- How to move the needle on sleep health and wellness in our communities?
Driving Question

• Unique Features of Sleep Medicine
Driving Question

- Unique Features of Sleep Medicine
  1. Most Evidence Based Therapies are Non-Pharmacological.
Driving Question

- Unique Features of Sleep Medicine
  1. Most Evidence Based Therapies are Non-Pharmacological.

*In contrast to Neurology, for example*
Driving Question

- Unique Features of Sleep Medicine
  1. Most Evidence Based Therapies are non-pharmacological.
  2. Solutions Require Knowledge Transfer

*In Contrast to Pneumonia*
Driving Question

• Unique Features of Sleep Medicine
  1. Most Evidence Based Therapies are non-pharmacological.
  2. Solutions Require Knowledge Transfer
     In Contrast to Pneumonia
     Sleep Medicine Fellowship Experience
Driving Question

3. Sleep solutions are relatively easy to implement.

Contrast…

Obesity where the answers are obvious but extremely difficult in practice

Sleep solutions are often paradoxically difficult to understand but then once understood they are (relatively) easy to implement
Driving Question

• How to move the needle on sleep health and wellness in our communities?
Driving Question

• How to move the needle on sleep health and wellness in our communities?

  1. Explain in a compelling and customized manner the importance of sleep.
Driving Question

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  2. Knowledge transfer sleep conditions
Driving Question

• How to move the needle on sleep health and wellness in our communities?
  
  1. Explain in a compelling and customized manner the importance of sleep.
  2. Knowledge transfer sleep conditions
  3. Knowledge transfer sleep solutions
Contents

- Introduction to Sleep
  - Some functions and consequences of inadequate sleep
  - Sleep in aging
  - Motivating the audience to improve their sleep

- Sleep Disorders
  - Can’t Sleep, Too Sleepy, Weird Things
Importance of Sleep

- CDC study
- correlated sleep with happiness
- controlled for education, income, employment
Sleep Maintains Healthy Brain Cells

Neurons:
- 100 billion neurons

Synapses:
- 100 trillion synapses
Recent Breakthrough: CNS Metabolite/Toxin Clearance

- 2012 breakthrough
- Sleep Serves to clear out toxic metabolites from the brain
- Clears beta-amyloid (Alzheimers, Concussions) pathology

(Xie 2013, Lucke-Wold et al 2015)
Sleep and Insight

- Yesterday Voted #1 Rock Song all time by
  - Rolling Stone
  - BBC Radio 2
  - MTV
- The most covered Rock and Roll song of all time.
- 2,200 different recordings
Sir Paul McCartney

- melody came to him in a dream
- Felt so familiar he assumed that he had merely remembered it.
- Was very concerned he was subconsciously plagiarizing.
“For about a month I went round to people in the music business and asked them whether they had ever heard it before. Eventually it became like handing something into the police. I thought if no-one claimed it after a few weeks then I could have it.”
Sleep and its functions

- Growth
- Immune function
- Brain development
- Synaptic homeostasis
- Memory
- Unlearning theory
- Glymphatic system
Sleep Cycle
Sleep Stages

NREM sleep

- N1 (lightest)
  - If awoken, most would not even believe
  - Drop in Body Temperature
- N2 (Intermediate)
  - OSA, Seizures
- N3 (Deepest Sleep)
  - Most Refreshing Sleep

REM Sleep

- Brain Activity similar to wakefulness
- dreams
- Skeletal muscle paralysis
- Relatively light stage of sleep (ie very easy to awaken out of)
- Ectothermia
Sleep & Aging

NSF recommends 6><9 hrs of sleep with

- better cognition
- mental health
- physical health
- quality of life

Sleep & Aging

Perspective Neurobiology of Sleep and Microbiomics in Aging

Larson-Prior 2017
CHANGES IN SLEEP ARCHITECTURE:

Most by 60 except sleep efficiency continues to decline 90 & beyond

<table>
<thead>
<tr>
<th>Sleep Parameter</th>
<th>Decreased</th>
<th>Increased</th>
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<tr>
<td></td>
<td>• Total sleep time</td>
<td>• Time awake after sleep onset (WASO)</td>
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<td>• Number of arousals from sleep</td>
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CHANGES IN SLEEP ARCHITECTURE:

PHASE ADVANCE:
- Earlier onset of sleep in the evening
- Earlier morning awakening

NAPPING
- Mixed results

MANAGEMENT
- Medical, psychiatric, and psychosocial factors
- Approach as multifactorial geriatric health condition
NREM/REM Cycle

Cat in NREM

Cat in REM
Sleep Education

• Sleep Disorders are:
  • Common, Distressing
  • Numerous comorbidities/early mortality
• Suboptimal Sleep is nearly universal

(National Sleep Foundation-2014 Sleep in America Poll)
Sleep and Performance in the Workplace

- presenteeism
- absenteeism
- Poor productivity
Acute Consequences

- Daytime sleepiness
- Slow reaction time
- Poor memory
- Poor judgment
- Irritability
- Distractibility
Chronic Consequences

- Obesity
- Heart disease
- Diabetes
- Cancer
- Dementia
- Depression and mood disorders
  - More to Come…
Sleep Education: Motivating the Audience

Get a new approach
Sleep Education: High Performance Athletes

- Great interest in optimizing neurological performance
- Ruthlessly objective
  - A 5-8% improvement in brain processing speed can have dramatic changes in outcome

Sleep Routines

Roger Federer
11-12 hrs

Usain Bolt
8-10 hrs

Lebron James
12 hrs

(Abrams 2011, McCann 2012)
Controlled Study Using Golfers recently diagnosed with OSA

Correction with CPAP resulted in a mean drop in handicap from 12.4 to 11.0

Greater response amongst skilled golfers

9.2 to 6.3

(Benton et al 2013)
Review of Sleep Problems

I. Can’t fall asleep

II. Too sleepy during the day

III. Something weird is happening during sleep
Can’t Fall Asleep

- 30% of adults will describe some difficulty falling asleep annually
  - One third (10% total population) have daytime dysfunction
- 5.5 million office visits (US)
  - Sedative Rx
    - 1999-5.3 million
    - 2010-20.8 million

(Roth 2007, Ford et al 2014)
I. Can’t Sleep

The Three Causes

1. Circadian (night owl, morning lark)
2. Restlessness
3. Mind won’t shut off (Overactive brain)
Circadian (Biological clock) Delay

Modern problem

Two Causes
  • Evening exposure to lights
  • Relative absence of morning sunlight
Can’t fall asleep and hard to wake up

“I go to bed at 11 pm. I lay in bed trying to sleep, but my brain will not shut down. It takes me at least an hour (sometimes several) to fall asleep”
Can’t fall asleep and hard to wake up

“Once I fall asleep, I will usually sleep well until the alarm goes off, but then I need to hit the snooze button. I could sleep a lot longer”
CIRCADIAN DELAY
CIRCADIAN DELAY

• THIS
CIRCADIAN DELAY

- THIS IS
CIRCADIAN DELAY

- THIS IS NOT
CIRCADIAN DELAY

• THIS IS NOT AN OVERACTIVE BRAIN!!!
CIRCADIAN DELAY

- THIS IS NOT AN OVERACTIVE BRAIN!!!
- YOU DO NOT NEED A PILL FOR THIS
CIRCADIAN DELAY

• THE GOAL IS TO SHIFT YOUR SLEEP TIMING
Circadian Delay Protocol

1\textsuperscript{st} thing to do - sunlight or 10,000 lux light exposure 30-120 minutes in AM

2\textsuperscript{nd} thing to do - low dose 0.5-1mg melatonin 2-6 hours prior to bedtime (some flexibility)

3\textsuperscript{rd} thing to do…
Circadian advancement

- Early morning awakening
  - Light before bedtime
  - Reassurance
Restlessness

“I lay in bed and I can’t get comfortable. I feel like I could fall asleep, but I can’t because of this urge to rollover, adjust position, get up and walk…… If it wasn’t for these sensations I could fall asleep”
Restlessness

You have restlessness if you answer yes to the following questions

1. Do you have discomfort at night?
2. Does this discomfort compel you to move?
3. Does movement make it better?
4. Does this interfere with your ability to sleep?
Restless Legs Syndrome - The Vexing Syndrome

- Symptoms often vague or difficult to describe
  - Often only history given is “I can't fall asleep”
  - The discomfort they do feel is often misattributed to some other diagnosis
    - “Oh that’s just my back pain”
    - “That’s my diabetic neuropathy”
    - “I get anxious at night”
Non-Motor Symptoms

- Restless Smoking
  - Patients will describe a need to smoke in order to “calm down and fall asleep”
    - Smokers without RLS do not describe this experience

- Restless Eating
  - urge to eat, not driven by hunger but instead a perception that eating will make it easier to fall asleep
Restlessness

• THIS IS NOT AN OVERACTIVE BRAIN!!!
Restlessness

- THIS IS NOT AN OVERACTIVE BRAIN!!!
- YOU DO NOT NEED A SLEEPING PILL FOR THIS
Restlessness

• THE GOAL IS NOT TO

“SHUT DOWN YOUR BRAIN”
Restlessness

- THE GOAL IS TO ELIMINATE THE RESTLESSNESS THEN YOU SHOULD NATURALLY FALL ASLEEP
Overactive Brain

“I go to bed and my mind won’t shut down”

“I am constantly waking up for prolonged periods at night”

“When the alarm goes off in the morning, it is a relief because I can now get out of bed”

“I am exhausted during the day but I cannot nap”
What About Sleeping Pills?

- Commonly prescribed (zolpidem, eszopiclone..etc)
- Sleeping Pills have concerning adverse side effects.
- Only modest improvement on objective sleep efficiency
  - Primarily improve subjective sleep efficiency
An Example of a Patient Prescribed a Sleeping Pill

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Best Therapy for an Overactive Brain...
Best Therapy for an Overactive Brain…

Cognitive Behavioral Therapy for Insomnia

CBT-I
Can’t Sleep Management Review

• Once circadian delay and Restlessness have been RUTHLESSLY excluded...

• pursue CBT-I
Sleep Cycle

![Diagram of sleep cycle with stages: Awake, REM, N1, N2, N3, and hours of sleep](image)
Have a comfortable flight
Excessive sleepiness

• MOST COMMON CAUSE?
  • Sleep Deprivation (or mistiming)
  • Sleep Disordered Breathing
  • Narcolepsy
Excessive sleepiness

- MOST COMMON CAUSE?
  - Sleep Deprivation (or mistiming)
Excessive sleepiness

- MOST COMMON CAUSE?
  - Sleep Deprivation (or mistiming)
  ...Sleep MD anecdote
sleep apnea
REM-sleep behavior disorder (RBD)

Used with Permission of Carlos Schenck MD
Conclusion

- Sleep is fascinating and important.
- Sleep disorders are common, frequently misdiagnosed, and most importantly treatable.
Conclusion

http://etc.ch/LPpt
Thank you