Sleep Disorders in Neurodegenerative Diseases

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Disclosures

• No Disclosures
## Sleep and Healthy Aging

<table>
<thead>
<tr>
<th>Sleep Parameters</th>
<th>20 to 60 years of age</th>
<th>&gt; 60 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep Duration</td>
<td>↓ 10-12 minutes per decade</td>
<td>minimal to no change</td>
</tr>
<tr>
<td>Sleep Latency</td>
<td>↑ minimally</td>
<td>minimal to no change</td>
</tr>
<tr>
<td>Sleep Maintenance</td>
<td>↑ 10 minutes per decade</td>
<td>minimal to no change</td>
</tr>
<tr>
<td>Sleep Efficiency</td>
<td>↓ significantly</td>
<td>↓ declines very slowly</td>
</tr>
<tr>
<td>Napping Duration</td>
<td>Evidence unclear</td>
<td>Evidence unclear</td>
</tr>
</tbody>
</table>

### Circadian Markers Across the Lifespan

- **Sleep Timing**: Phase advance by 60 minutes
- **Melatonin Secretion**: ↓ with age

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## Impact of Neurodegenerative Diseases on Sleep

- **Levodopa therapy, corticosteroids, SSRI, beta blockers**
- **Deterioration of sleep-controlling regions of the brain**
- **Motor symptoms, tremor, spasticity, urological dysfunction, pain**

- **Medication effects**
- **Disease pathology**
- **Disease symptoms**
Impact of Poor Sleep in NDD Populations

- Reduced quality of life
- Psychiatric symptoms
- Reduced independence & functional status
- Excessive daytime sleepiness/fatigue
- Increased cognitive impairment
- Accelerated disease progression
- Increased caregiver burden

Breen et al., 2014; Gaugler et al., 2001; Shin et al., 2014;

Common Sleep Disorders in Neurodegenerative Diseases
Sleep Disorders: Parkinson’s disease (PD)

- Common sleep disruptions:
  - Insomnia (60-70% prevalence in PD)
    - Motor symptoms (bradykinesia, rigidity, and tremor)
    - Psychiatric symptoms
  - Hypersomnia
    - Excessive daytime sleepiness (50% prevalence in PD)
    - Relationship to levodopa therapy

Chung et al., 2013; Gherstad et al., 2006; Yang et al., 2018; Zhang et al., 2017

Sleep Disorders: Parkinson’s disease (PD)

- Common sleep disruptions:
  - Movement-related sleep disorders
    - Restless legs syndrome (20% prevalence in PD)
    - Periodic limb movements
  - Parasomnias
    - REM sleep behavior disorder (60% prevalence in PD)
    - Potential for injury

Chung et al., 2013; Gherstad et al., 2006; Ondo et al., 2002; Yang et al., 2018; Zhang et al., 2017
Sleep Disorders:
Alzheimer’s disease and related dementias (ADRD)

- Common sleep disruptions:
  - **Insomnia** (25-44% prevalence in AD)
    - Fragmented sleep
    - Daytime fatigue
  - Breathing-related sleep disorders (40-70% prevalence in AD)
    - Fragmented sleep
    - Daytime sleepiness, fatigue, & napping

- Circadian disruptions:
  - Irregular sleep-wake patterns (moderate-severe ADRD)
    - Prolonged periods of nocturnal wakefulness
    - Intermittent periods of daytime sleep periods

Brzecka et al., 2018; Malhotra, 2019

Sleep Disorders in Multiple Sclerosis

- Common sleep disruptions:
  - **Insomnia** (50% prevalence in MS)
    - Spasticity
    - Neurogenic bladder
    - Psychiatric symptoms
  - Breathing-Related Sleep Disorders
    - Obstructive Sleep Apnea

  - Restless Legs Syndrome (10-15% prevalence in MS)
    - Daytime sleepiness

Barner et al., 2008; Braley & Chervin, 2015
Sleep Disorders in Neurodegenerative Diseases

*Underreported*

*Underdiagnosed*

*Undertreated*

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Sleep Screening & Assessment: Medical Provider Perspective
Sleep Screening: Starting (& Maintaining) the Conversation

- Inquire about sleep quality and quantity routinely at every clinic visit

- Ideally, investigation of sleep complaints should be incorporated into a review of systems
  - Determine nature of sleep complaints & etiology factors
  - How might nocturnal neurological symptoms interfere with sleep?
    - Tremors, rigidity, dyskinesia, urinary frequency, spasticity, pain, etc.

Sleep Screening Questions: Outpatient Settings

<table>
<thead>
<tr>
<th>Selected domains</th>
<th>Suggested questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep timing</td>
<td>What time do you typically fall asleep and get up each day?</td>
</tr>
<tr>
<td></td>
<td>How many hours are you sleeping each night?</td>
</tr>
<tr>
<td></td>
<td>Do you have trouble falling asleep or getting up?</td>
</tr>
<tr>
<td></td>
<td>What gets in the way of falling asleep?</td>
</tr>
<tr>
<td>Sleep awakenings</td>
<td>Do you have trouble staying asleep at night?</td>
</tr>
<tr>
<td></td>
<td>How many times do you wake up?</td>
</tr>
<tr>
<td></td>
<td>What usually wakes you up?</td>
</tr>
<tr>
<td>Frequency</td>
<td>How often do these disturbances occur?</td>
</tr>
<tr>
<td>Napping</td>
<td>Do you nap daily? Duration?</td>
</tr>
<tr>
<td>Daytime impact</td>
<td>How do sleep problems affect you the next day (mood, cognition, energy, performance)?</td>
</tr>
</tbody>
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Braley et al., 2012

Bloom et al., 2009
Additional Sources of Data

• Caregiver/Bed Partner Observations
  – Sleep-wake patterns
  – Nocturnal observations that patients may not be aware of:
    • Snoring, gasping for air, choking
    • Vocalizations, nocturnal movements

• Actigraphy
  – Activity monitor for rest-activity periods
  – Useful in presence of cognitive deficits

Martin & Hakim, 2011

Brief Patient Screening Questionnaires

<table>
<thead>
<tr>
<th>Sleep Complaints</th>
<th>Selected Measures</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insomnia</td>
<td>Insomnia Severity Index</td>
<td>Bastien et al., 2001</td>
</tr>
<tr>
<td></td>
<td>Pittsburgh Sleep Quality Index</td>
<td>Buysse et al., 1989</td>
</tr>
<tr>
<td>Obstructive Sleep Apnea</td>
<td>STOP-BANG Questionnaire</td>
<td>Chung et al., 2008</td>
</tr>
<tr>
<td>Excessive Daytime Sleepiness</td>
<td>Epworth Sleepiness Scale</td>
<td>Johns, 1991</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Fatigue Severity Scale</td>
<td>Krupp et al., 1988</td>
</tr>
</tbody>
</table>

*Limited in presence of cognitive deficits
*Not intended to replace detailed clinical sleep interview
Sleep Management Interventions: Medical Provider Perspective

Management of Medical Conditions

- Are current medical conditions and/or symptoms independent of sleep *optimally* managed?
  - Are medication adjustments needed?
  - Consideration of referral to specialty medicine clinics for further evaluation and/or treatment
    - Ex: Pain, urological conditions
  - Non-pharmacological interventions
    - Occupational/physical rehabilitation
What about Sleep Hygiene for Chronic Insomnia?

Sleep Hygiene

- Lifestyle factors
  - Diet
  - Exercise
  - Substance use

- Environmental factors
  - Light
  - Noise
  - Temperature

- Sleep Education
  - Normal sleep patterns
  - Changes with age

Edinger et al., 2021

Sleep Hygiene = Not an effective stand-alone treatment for insomnia disorder

- American Academy of Sleep Medicine (2021)
  - Sleep hygiene not recommended as single-component treatment for chronic insomnia disorder

  – Sleep hygiene recommendations are necessary but insufficient to treat insomnia disorder

  – Exclusive focus = delays initiation of more effective behavioral sleep interventions
To Rx or Not: Sleep-Promoting Medications

• Evidence suggests modest improvements in sleep latency and duration
  – Limited evidence available for PD/MS populations
  – Benefits dissipate following discontinuation of medications

• Risk-benefit ratio for NDD populations
  – Dependency
  – Cognitive impairment
  – Falls/fractures
  – Daytime sedation

• Ultimately, collaborative decision-making between provider-patient
  – Preferences, values, and access to non-pharm treatments

Sateia et al., 2017

To Rx or Not: Sleep-Promoting Medications

• Moderate-Severe Dementia (AD)
  – Lack of empirical evidence regarding prescribing guidelines
    • Especially other dementia subtypes
  – Behavioral strategies recommended 1st
  – Risk-benefit ratio

• Ultimately, collaborative decision-making between provider-patient
  – Preferences, values, and access to non-pharm treatments

McCleery & Sharpley, 2020
Referral to Sleep Medicine

• Require specialized evaluation and/or treatment

  – **Breathing-related sleep disorders**
    • Polysomnography
    • Increased adherence to PAP therapy

  – **Hypersomnolence disorders**
    • Polysomnography
    • Multiple sleep latency test
    • Pharmacological management

  – **Movement-related sleep disorders**
    • Polysomnography (RBD, PLMD)
    • Pharmacological management

  – **Circadian-rhythm sleep disorders**
    • Specialized behavioral treatment

• **Chronic Insomnia Disorder**
  – Specialized behavioral treatment

• Minimal to no benefit from sleep medications

• Persistent sleep difficulties despite NDD treatment optimization

• NDD + additional medical comorbidities
Referral to Behavioral Sleep Medicine Provider

• Focused on the evaluation and treatment of sleep disorders by addressing behavioral, psychological, and physiological factors that interfere with sleep

• Clinical expertise to tailor behavioral treatments to NDDs

Behavioral Sleep Medicine Evaluation
1st Line Treatment for Insomnia: Cognitive Behavioral Therapy for Insomnia

Cognitive behavioral therapy for insomnia (CBT-I)

Recommendation 1: We recommend that clinicians use multicomponent cognitive behavioral therapy for insomnia for the treatment of chronic insomnia disorder in adults. (STRONG)

Remarks: This recommendation is based primarily on studies in which CBT-I was delivered by a trained professional to patients with and without comorbid conditions.

American Academy of Sleep Medicine, 2021

Behavioral Treatments Applicable to NDD Populations

- Individualized approach to CBT-I
  - Sleep education:
    - Understanding impact of their specific NDD on sleep
  - Setting realistic expectations for treatment outcomes
  - Adjusting behavioral treatments for:
    - Physical & motor limitations
    - Mild cognitive impairment
  - Integrating (often) complicated NDD medication regimen (i.e., levodopa therapy) and dosing schedule into treatment
  - Strategic use of napping
  - Inclusion of care partner into treatment to reinforce session content
Behavioral Treatments Applicable to NDD Populations

- CBT for hypersomnia

- CBT for circadian rhythm disorders
  - Lightbox therapy

- Behavioral strategies to support tapering off sedative medications

Behavioral Treatments Applicable to Dementia

- Bright light therapy
  - Target: 60-120 minutes of exposure during morning hours

- Consistency in daytime & bedtime routine
  - Stimulating activities
  - Physical exercise (30 minutes/daily)
  - Limit napping

- Collaboration and education with family caregiver is essential

- Management of medical comorbidities

- Medication review

Hanford & Figueiro, 2013; Ooms & Ju, 2016
How Do I Find a Behavioral Sleep Medicine Provider?

• International Directory for the Society of Behavioral Sleep Medicine

• International Directory of CBT-I Providers
  – [https://cbti.directory/](https://cbti.directory/)

Conclusions

• Sleep disturbances in neurodegenerative diseases are very common.

• Clinical assessment and continual monitoring of sleep is part of comprehensive neurological care.

• Behavioral sleep interventions should be considered as part of a multidisciplinary approach to manage.