Behavioral and Psychological Treatments of Chronic Insomnia Disorder in Adults

Anna Ivanenko MD, PhD

Professor of Clinical Psychiatry and Behavioral Sciences , Feinberg School of Medicine, Northwestern University, Division of Child and Adolescent Psychiatry, Ann and Robert H. Lurie Children's Hospital of Chicago

Insomnia Disorder (DSM-5)

- Dissatisfaction with sleep quantity or quality, associated with one (or more) of the following symptoms:
  - difficulty initiating sleep;
  - difficulty maintaining sleep characterized by frequent awakenings or problems returning to sleep after awakenings; or
  - early-morning awakening with inability to return to sleep.
  - must also significantly impact on daytime functioning (social, occupational, educational, or academic)
  - occur at least three nights per week for at least three months.
  - must also not be attributable to another disorder or explained by substance use.

American Academy of Sleep Medicine (AASM) clinical practice guideline

- The AASM commissioned a task force (TF) of sleep medicine and sleep psychology clinicians with expertise in chronic insomnia disorder.

Edinger JD, Arnedt JT, Bertisch SM, et al. Behavioral and psychological treatments for chronic insomnia disorder in adults: an American Academy of Sleep Medicine clinical practice guideline. J Clin Sleep Med, 2021;17(2):255–262.

AASM Task Force(TF) Recommendations

- Strong recommendation in favor of CBT-I based on a large body of moderate quality evidence from:
  - 49 studies, including multiple, recent, large RCTs,
  - showing clinically meaningful improvements in critical outcomes,
  - patients highly preferring behavioral and psychological treatments,
  - and favorable information on cost-effectiveness of CBT-I.

AASM Task Force(TF) Recommendations

- 49 of the studies provided data suitable for meta-analyses for at least one critical outcome.
- Meta-analyses demonstrated clinically significant improvements in remission and responder rates with CBT-I compared to control conditions.

AASM Task Force(TF) Recommendations

- Of these 49 studies,
- 11 studies included patients with insomnia and no comorbidities,
- 6 studies included patients with insomnia and comorbid psychiatric conditions,
- 12 studies included patients with insomnia and comorbid medical conditions

AASM Task Force(TF) Recommendations

- Meta-analyses of sleep quality demonstrated clinically significant mean improvements in patients with
  - insomnia and no comorbidities and
  - patients with insomnia and comorbid psychiatric conditions.

AASM Task Force(TF) Recommendations

- Meta-analyses of sleep latency and wake after sleep onset demonstrated clinically significant mean improvements in patients with
  - insomnia and comorbid psychiatric conditions and,
  - in patients with insomnia and no comorbidities

AASM Task Force(TF) Recommendations

- Based on clinical experience, the TF determined that the benefits of CBT-I strongly outweighed the short-term undesirable effects for adults with chronic insomnia disorder

Taking a Sleep History

- Bedtime
- Sleep latency (time to fall asleep after lights out)
- Nocturnal awakenings; frequency and duration
- Time of final morning awakening
- Final time out of bed
- Daytime naps: number, time, duration
- Daytime symptoms: levels of EDS and fatigue

Taking a Sleep History

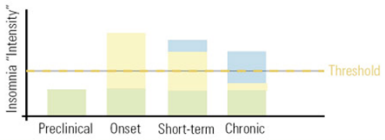
- Sleep-related habits and behaviors
  - What time does the patient goes to bed ?
  - What is his bedtime routine?
  - Does he have adequate opportunity to calm down or settle before going to bed?
  - How long does it take to fall asleep?
  - Does the patient sleep in a comfortable bed?
  - Are there other people or pets in the room or bed with the patient who might disrupt sleep?
  - What body position does the patient usually sleep in?
  - Is the room dark and quiet ?
  - Does the patient watch TV, use a computer, or read in the bedroom?

Taking a Sleep History

- Collateral information from parents, family members and school teachers
  - Snoring
  - Breathing pauses during sleep
  - Unusual behaviors during sleep such as sleepwalking, thrashing, head-banging, body rocking and limb movements
  - Tendency to fall asleep unintentionally during the day
  - The extent and frequency of naps
  - Cognitive and behavioral disturbances associated with insomnia or EDS
  - Family sleep history such as RLS and parasomnias

A Model of Chronic Insomnia

Predisposing Factors	Precipitating Factors	Perpetuating Factors
• Biological traits • Psychological traits • Social factors	• Medical illness • Psychiatric illness • Stressful life events	• Excessive time in bed • Napping • Conditioning



Contributing Factors

- Predisposing factors
  - Personality
  - Sleep-wake cycle
  - Circadian rhythm
  - Coping mechanisms
  - Age
- Precipitating factors
  - Situational
  - Environmental
  - Medical
  - Psychiatric
  - Medications
- Perpetuating factors
  - Conditioning
  - Substance abuse
  - Performance anxiety
  - Poor sleep hygiene

Hauri PJ. Clin chest med. 1998; 19:157-168
Spielman AJ et al. Psychiatr Clin North Am. 1987; 10:541-553

What is CBT-I?

Technique	Aim
Sleep education	Promote habits that help sleep; provide rationale for subsequent instructions.
Stimulus control	Set of instructions designed to reassociate the bed-bedroom with sleep
Sleep restriction therapy	Method designed to curtail time in bed to the actual amount of sleep time Restricting time in bed improves sleep depth/consolidation
Cognitive behavior therapy	Psychological methods aimed at challenging and changing misconceptions about sleep and insomnia
Relaxation training	Clinical procedures aimed at reducing somatic tension

Efficacy of CBT

- CBT produces benefits for sleep onset latency, sleep quality, for the number of awakenings, duration of awakenings, and total sleep time
- 70 – 80% of patients achieve a therapeutic response, whereas about 40% achieve clinical remission
- Subjective sleep latency and time awake after sleep onset are reduced from an average baseline of 60 – 70 min to about 35 min, and total sleep time is increased by 30 min, from 6 h to 6.5 h
- CBT produces sleep improvements that are sustained over time, a clear advantage compared with drug treatment

Mechanism of CBT-I

- CBT-I works by focusing on:

1. Psycho-education
2. Behavioral conditioning
3. Cognitive restructuring
4. Modifying sleep processes to optimize them

CBT-I

- First Line:
  - Sleep Education
  - Stimulus Control Therapy
  - Sleep Restriction Therapy
  - Sleep Hygiene (adjunctive)
- Second Line:
  - Cognitive Therapy
  - Arousal Reduction/Behavioral Relaxation Training
- Relapse Prevention

Delivery of CBT for Insomnia

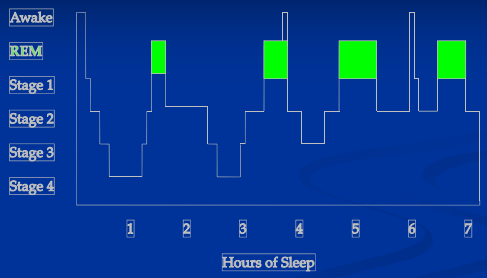
- Typically 4 – 6 sessions (one per week)
- Generally well accepted by patients
- Few clinicians are trained in CBT for insomnia
- Can be delivered 1:1 or in groups or by telephone & telemedicine
- Videos of CBT for insomnia are also effective

Sleep Education

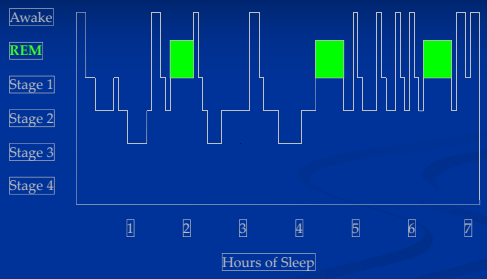
The Sleep Cycle

- Cyclic nature of sleep is reliable
- REM periods every 90 – 120 minutes
- First REM period is shortest
- Most deep sleep (Stage 3) occurs early
- Most REM occurs late
- On average, about 75% of sleep is NREM and 25% is REM (in adults)
- ***Nobody sleeps through the night!***

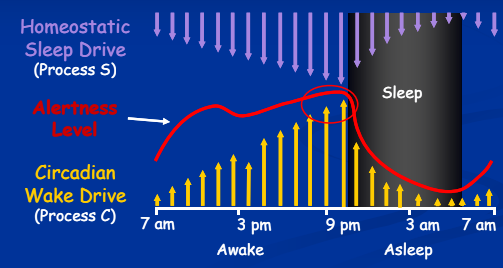
Normal Sleep Cycle in Young Adults

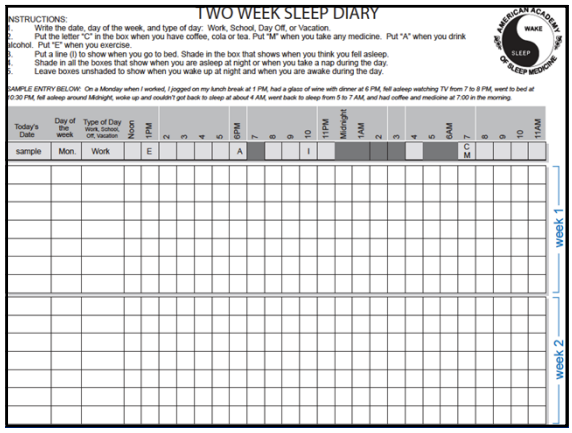


Normal Sleep Cycle in Elderly



Two Process Mode of Sleep Regulation





TWO WEEK SLEEP DIARY

INSTRUCTIONS:

1. Write the date, day of the week, and type of day: Work, School, Day Off, or Vacation.
2. Put the letter "C" in the box when you have coffee, cola or tea. Put "M" when you take any medicine. Put "A" when you drink alcohol. Put "E" when you exercise.
3. Put a line (|) to show when you go to bed. Shade in the box that shows when you think you fell asleep.
4. Shade in all the boxes that show when you are asleep at night or when you take a nap during the day.
5. Leave boxes unshaded to show when you wake up at night and when you are awake during the day.

SAMPLE ENTRY BELOW: On a Monday when I worked, I jogged on my lunch break at 1 PM, had a glass of wine with dinner at 6 PM, fell asleep watching TV from 7 to 8 PM, went to bed at 10:30 PM, fell asleep around Midnight, woke up and couldn't get back to sleep at about 4 AM, went back to sleep from 5 to 7 AM, and had coffee and medicine at 7:00 in the morning.

Today's Date	Day of the week	Type of Day Work, School, Off, Vacation	Noon	1PM	2	3	4	5	6PM	7	8	9	10	11PM	Midnight	1AM	2	3	4	5	6AM	7	8	9	10	11AM
sample	Mon.	Work		E					A					I								C M				

week 1

week 2

Stimulus Control Therapy

Stimulus Control Therapy

- **Goal**: Reducing the amount of time awake in bed
- **Rationale**: Extinction Learning
- Breaking the association between bed to arousal
- Acquiring a new association between bed and sleep/ sleepiness

CBT: Stimulus Control Therapy

- Stimulus control therapy
  - To break the cycle, the patient must not spend time wide awake in the bedroom
  - Go to bed only when sleepy
  - Do not use the bedroom for sleep-incompatible activities
  - Leave the bedroom if awake for more than 20 minutes
  - Return to bed only when sleepy
  - Do not nap during the day
  - Arise at the same time every morning

Stimulus Control Therapy (2)

- Review patient sleep logs
- Identify realistic sleep goals
  - e.g., reducing the amount of time awake in bed (as opposed to the number of hours asleep)
- Validate that the behavioral changes they're about to start aren't easy and will be difficult
  - E.g., they must be very resilient to have come this far in life sleeping this poorly
- Roll with resistance (e.g., people don't understand how much you're suffering)
- View a photo of the sleep environment & review pros and cons

Sleep Restriction Therapy (SRT)

Indications for SRT

- Insomnia, including troubles sleeping during:
  - Beginning,
  - Middle, and/or
  - End of the time spent in bed
  - Sleep Efficiency < 85%
  - Based on a 1-2-week sleep log

Contraindications for SRT

- Those who need to maintain optimal vigilance to avoid serious accidents, such as:
  - Long-haul truck drivers
  - Long-distance bus drivers
  - Air traffic controllers, etc.
- Those who fall asleep quickly and have short, compact sleep prior to awakening are unlikely to benefit from RST
- Intolerance to side effects of SRT like fatigue, sleepiness, irritability, diminished concentration, etc.

Rationale for SRT

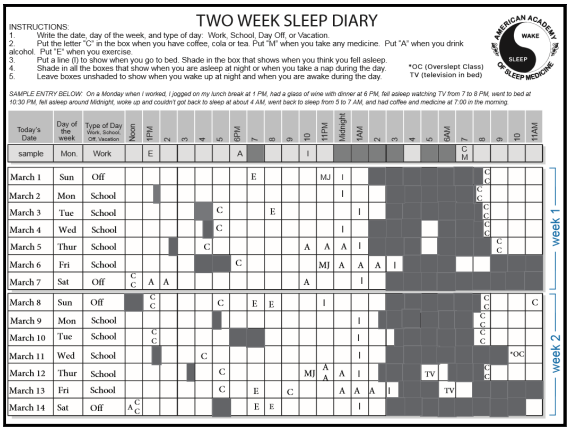
- To strengthen the homeostatic sleep drive
- SRT replaces light sleep with deeper and more consolidated sleep
- SRT eliminates perpetuating factors of insomnia, such as anticipatory anxiety
- Hyperarousal is directly reduced by sleep loss
- Tightens regulatory sleep control by the strengthening the endogenous circadian pacemaker

SRT Protocol

- Collect a 2–week sleep log
- Set the initial Total In Bed (TIB) = average estimated sleep time
- Set the wake time when the patient needs to be awake for school or work
- Minimum amount of TIB should not be less than 5 hours
- Reassess in 1 week

SRT Protocol

- If Sleep Efficiency (SE) is > 90%, TIB is increased by 15 min
- If SE is < 85%, TIB is decreased to the average estimated sleep time
- If SE is between 85 and < 90 %, no changes are made
- Naps are not permitted



TWO WEEK SLEEP DIARY

INSTRUCTIONS:
1. Write the date, day of the week, and type of day: Work, School, Day Off, or Vacation.
2. Put the letter "C" in the box when you have coffee, cola or tea. Put "M" when you take any medicine. Put "A" when you drink alcohol. Put "E" when you exercise.
3. Put a line (|) to show when you go to bed. Shade in the box that shows when you think you fell asleep.
4. Shade in all the boxes that show when you are asleep at night or when you take a nap during the day.
5. Leave boxes unshaded to show when you wake up at night and when you are awake during the day.

*OC (Overslept Class)
TV (television in bed)

SAMPLE ENTRY BELOW: On a Monday when I worked, I jogged on my lunch break at 1 PM, had a glass of wine with dinner at 6 PM, fell asleep watching TV from 7 to 8 PM, went to bed at 10:30 PM, fell asleep around Midnight, woke up and couldn't get back to sleep at about 4 AM, went back to sleep from 5 to 7 AM, and had coffee and medicine at 7:00 in the morning.

Today's Date	Day of the week	Type of Day Work, School, Off, Vacation	Noon	1PM	2	3	4	5	6PM	7	8	9	10	11PM	Midnight	1AM	2	3	4	5	6AM	7	8	9	10	11AM	
sample	Mon.	Work		E					A				I									C M					
March 1	Sun	Off								E				MJ	I								C C				
March 2	Mon	School													I							C C					
March 3	Tue	School					C				E					I						C C					
March 4	Wed	School						C							I							C C					
March 5	Thur	School					C							A	A	A	I					C C					
March 6	Fri	School						C						MJ	A	A	A	I									
March 7	Sat	Off	C C	A	A									A			I										
March 8	Sun	Off		C C				C		E	E				I							C C				C	
March 9	Mon	School														I						C C					
March 10	Tue	School		C C												I						C C					
March 11	Wed	School				C										I							*OC				
March 12	Thur	School					C						MJ	A A	A	I			TV			C C					
March 13	Fri	School					C			E		C			A	A	A	I		TV							
March 14	Sat	Off	A C C							E	E					I											

week 1
week 2

SRT Example

2 – week sleep log demonstrates the following baseline average data. In addition, the patient naps for ~ 1h x 5 days/week.

Bedtime to rising time	12:00am to 7:30am
TIB	7h 30 min
SOL	1h 30min
Nightly sleep time	6h
Wake-up time	7:30am

SRT Example Treatment Plan

SRT prescription:
Avoid Napping
7 days/week

Recommended TIB	6h
Bedtime	1:30am
Wake-up time	7:30am

Example 2

If patient reports sleep latency = 1h , terminal awakening =30min

SRT prescription, 7 days a week

Recommended TIB	6h
Bedtime	1:00am
Wake-up time	7:00 am

Example 3

**If patient reports sleep latency = 35 min ,
2 middle of the night awakenings = 20 min ,
terminal awakening = 30 min**

SRT prescription, 7 days a week

Recommended TIB	6 h
Bedtime	12:30am
Wake-up time	6:30 am

Sleep Hygiene

What Interferes with Our Sleep?

- Substances - alcohol, tobacco, caffeine, drugs and medications
- Stress - work, relationships, school
- Medical and Psychiatric Illness - anxiety, depression, pain
- Scheduling - deadlines, frequently changing bedtimes
- Sleep Environment - animals and partners, reading in bed, watching TV

What is Sleep Hygiene?

- A series of recommendations and practices designed to improve sleep quality, quantity, and daytime alertness, including:
  1. Environmental (e.g., temp, noise, light)
  2. Scheduling (e.g., sleep/wake schedule)
  3. Practices (e.g., bedtime routine)
  4. Physiological (e.g., exercise, meal timing, caffeine)
- Often advised by healthcare practitioners, although the evidence-base is not significant for most of the recommendations

Sleep Hygiene

- Identify the cause or other psychiatric disorder (if possible) and treat
- Set a sleep/wake schedule
- Avoid naps
- Exercise daily but not at night
- Avoid caffeine, cigarettes, alcohol, and drugs
- Invent a relaxing bedtime ritual (e.g., bathing, reading, watching TV, etc.)
- Use the bed for sleeping and intimacy only
- Wake up to the sun, exposing yourself to morning sunshine
- Adjust the room temperature as desired

Cognitive Therapy for Insomnia

Cognitive Therapy

Goal: Reducing the cognitive arousal associated with insomnia

Rationale: Maladaptive thoughts ("cognitive distortions") increase emotional arousal → interferes with the ability to fall asleep and stay asleep

Cognitive Distortions Impact Sleep Behaviors

- Dysfunctional Thoughts
  - Worry over sleep loss
  - Rumination over consequences
  - Unrealistic expectations
  - Misattributions/ amplifications
- Maladaptive Behaviors
  - Excessive time in bed
  - Irregular sleep schedule
  - Daytime napping
  - Sleep-incompatible activities

Cognitive Therapy

Thoughts that contribute to insomnia: Cognitive Distortions & Misinformation

- Cognitive Distortions
  - "I won't be able to work tomorrow"
- Worry and rumination
  - "I'll be a wreck if I don't sleep"
- Incorrect beliefs about sleep
  - "I should not wake up through the night"
- Misperception of sleep
  - "I did not sleep all night"

Cognitive Therapy

How?

- Restructure Maladaptive thoughts (Cbt "Cognitive")
- Techniques
  - Socratic questioning
  - Behavioral experiments
  - Cost-benefit analysis
  - Thought records

Cognitive Therapy

- **Socratic questioning**

  Where did you get the idea that you need 8 hrs of sleep? When did you last have 8 hrs of sleep? Have you been able to function on other days? What allowed you to do that? Have other factors ever made you feel unwell, besides sleep? Can you always tell what factors are responsible for how you feel?
- **Scientific data**
  - When good sleepers try to sleep more than they normally do, they start to have trouble sleeping!
- **Behavioral experiments**
  - Record # hours on sleep log, on separate paper, record energy level, performance each day - e.g., what happens to your energy if you skip your morning run after a bad night?

Cognitive Therapy

- Cost-Benefit Analysis
  - e.g., what is the cost to you of sleeping in the spare room
- Use Thought Record
  - Examine the evidence and restructure cognitions

Cognitive Therapy

Thought Record (Greenberg & Padesky):

Situation	Automatic thoughts	Evidence that supports the thought	Evidence against the thought	Emotion	Behavior	Alternative/ balanced thoughts

Arousal Reduction Behavioral/ Relaxation Training

Relaxation Training for Insomnia I

- Deep Breathing
  - Breathe in through your nose, out through your mouth
  - About 4 seconds per breath
  - Count to 4 with each breath or say to yourself: "I am here" upon inspiration; "I am calm" upon expiration.
  - Box Breathing

Relaxation Training for Insomnia II

- Progressive Muscle Relaxation (PMR)
  - Step 1: Get comfortable, lie still & quiet
  - Step 2: Try to focus only on your body, not any thoughts
  - Step 3: Tense & relax each muscle group for 5 seconds each ("tight like a robot, loose like a rag doll")
    - Start at top or bottom
    - Focus on large muscle groups

Relapse Prevention

Goal:

- Identifying key barriers, key helpful strategies
- Plan what to do if relapse

Examples:

- How did my problem develop and what kept it going?
- What were my most unhelpful thoughts/behaviors that kept my problem going?
- What have I learned in therapy that is useful?
- How can I maintain my recovery?
- What could trigger my problem in the future?
- If I notice these early warning signs, what should I do?

Brief therapies for insomnia (BTIs)

- BTIs include abbreviated versions of CBT-I (typically 1–4 sessions) emphasizing the behavioral components.
- BTIs typically consist of education about sleep regulation, factors that influence sleep, and behaviors that promote or interfere with sleep, along with a tailored behavioral prescription based on stimulus control and sleep restriction therapy and on information typically derived from a pretreatment sleep diary.
- Some therapies include brief relaxation or cognitive therapy elements.

Biofeedback

- A variant of relaxation training that employs a device capable of monitoring and providing ongoing feedback on some aspect of the patient's physiology.
- This technique has most commonly employed continuous monitoring of frontalis electromyography (EMG) activity to assess the overall level of muscle tension.
- Typically, the biofeedback device produces an ongoing auditory tone to train the patient to relax by learning how to alter the auditory feedback tone in the desired direction (eg, reduced muscle tone).

THANK YOU !

a-ivanenko@northwestern.edu