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Research Article

# Psychological interventions in behavioral sleep medicine: An overview for clinicians and psychologists

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## Abstract

Sleep medicine and psychology has a relatively long story to share. The multidisciplinary nature of sleep medicine requires that different specialists work together to diagnose and treat sleep disorders and improve subspecialty areas. In the last decades, various non-pharmacological therapies have been developed and demonstrated their efficacy. There are many non-pharmacological therapeutic available options for sleep disorders, including cognitive, behavioral, psycho-educational, and psychosocial interventions that could help clinicians to improve the quality of life of adult patients. Obstructive sleep apnea syndrome, insomnias, hypersomnias, circadian rhythm disorders, restless leg syndrome and parasomnias can be effectively taken care of, by an integrated approach with the support of sleep medicine psychologists. The paper aims to give a comprehensive view of psychological interventions for adults, in behavioral sleep medicine.

## Introduction

Over the years patients with sleep disorders have more and more benefits from a multidisciplinary approach to their diseases and sleep medicine progressively involved different health professionals, such as psychiatrists, neurologists, pulmonologists, odontologists, otolaryngologists, and psychologists.

Physicians have the primary role in diagnosis but psychologists specialized in sleep disorders provide a wide variety of services to patients undergoing evaluation and treatment in the sleep disorders center setting. Psychological services in a sleep disorders center range from administering personality testing and/or neuropsychological assessment, to other procedures in order to provide cognitive and behavioral treatments for insomnia, circadian rhythm disorders, parasomnias, and hypersomnias. Moreover, psychologists may contribute to support standard medical interventions and assist with patient compliance as well as indicate if and when to refer patients for further evaluation of sleep [1].

Behavioral Sleep Medicine (BSM) is an expanding area of sleep psychology that focuses on the diagnosis and treatment of sleep disorders by addressing behavioral, psychological, and physiological factors that may interfere with sleep.

Behavioral sleep specialists use evidenced-based therapies that often combine behavioral approaches with cognitive techniques. Sometimes device-based treatments such as bright-light boxes are utilized in behavioral sleep medicine treatments.

### Insomnia

Insomnia is the most common of all sleep disorders, occurring in more than 10% of the population, with a much higher prevalence in older age groups and women. The essential feature is frequent and persistent difficulty initiating or



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maintaining sleep that results in general sleep dissatisfaction. The sleep complaint is accompanied by distress about poor sleep and/or impairment in family, social, occupational, academic, or other important areas of functioning.

According to the International Classification of Sleep Disorders (ICSD III) [2], insomnias are classified as Chronic Insomnia Disorder, Short-Term Insomnia Disorder, and other Insomnia disorders.

Differential diagnosis should exclude other sleep disorders such as circadian rhythm sleep-wake disorders (CRSWD), restless legs syndrome (RLS), periodic limb movement disorders (PLMD), and obstructive sleep apnea syndrome (OSAS) [2].

Etiopathogenesis of insomnia is complex and partially unknown. Despite significant improvements in patients' treatment and care, the mechanisms that underlie insomnia are still unclear [3]. Insomnia can be considered a disorder of hyperarousal. Indeed, the increased somatic, cognitive, and cortical activation could take part in the pathophysiology of insomnia along with other contributory factors [4]. Some studies have highlighted increased heart rate, altered heart rate variability, increased whole-body metabolic rate, elevated cortisol, adrenocorticotropic hormone and Corticotropin-Releasing *Factor (CRF)* levels, increased body temperature, and increased high-frequency electroencephalographic (EEG) activity during nonrapid eye movement (NREM) sleep in people affected by insomnia [2].

Other authors propose a new cognitive model of insomnia. In this model, selective attention and monitoring, distorted perception of sleep and daytime deficits, erroneous beliefs, and counterproductive safety behaviors may be responsible for the maintenance of insomnia [5].

At different levels, genes, molecules, circuits, cognition, and behavior contribute to determining this disorder [6].

To focus on what factors should be targeted for treatment, the conceptual model of insomnia, the "Behavioral Model of Insomnia", elaborated by Spielman and colleagues [7], suggests that insomnia is due to three main factors: predisposing factors, precipitating factors (biological, psychological, and social such as medical illness, stress, or a change in the patient's social environment), and perpetuating factors (maladaptive coping behavior and cognitive strategies that individuals adopt in an attempt to get more or better sleep) [8].

Many non-pharmacological therapies have been developed over the years. Cognitive-behavioral therapy for insomnia (CBT-I) includes different techniques that work on different factors to restore appropriate sleep hygiene, re-establish a proper sleep-wake rhythm, lower hyperarousal, and adequate homeostatic pressure. CBT is now recommended as a first-line treatment for chronic insomnia [9,10], also combined with medications [4b].

## Sleep hygiene

Proper sleep hygiene can, in some cases, be an important prerequisite for the treatment of insomnia regardless of other therapeutic approaches. Its benefit is maximized when provided as part of a comprehensive plan. Sleep hygiene (SH) means having both a bedroom environment and a daily routine that promote consistent, uninterrupted sleep. It refers to all those behaviors that are considered promoters of an adequate quantity and quality of sleep and can be conceived as a guide to "lifestyles" and behaviors that contribute to creating a healthy and regular sleep pattern (Table 1) [11,12].

There is insufficient evidence to recommend sleep hygiene education as a single therapy; it should be associated with other components of CBT-I [13-15].

## Sleep restriction

Spielman, Saskin, and Thorpy conceived the restriction of sleep (Sleep Restriction Therapy, SRT) in the '80 [16]. This technique works to improve sleep efficiency by limiting the amount of time to spend in bed. Many people suffering from insomnia spend too much time in bed, trying to sleep, thus fragmenting and lightening sleep itself.

SRT require the patients to limit the amount of time they spend in bed to the total time spent asleep based on the average total sleep time recorded in a one-week sleep diary. The clinician and the patient establish a fixed wake-up time according to the patient's needs. Once a target amount of time in bed is set, the patient's bedtime is delayed so that the time in bed (TIB) and average total sleep time (TST) are the same. As sleep efficiency (TST/TIB*100) increases (at least 90%), patients are instructed to gradually increase the amount of time they spend in bed (by 15-minute). The goal is to re-establish a consistent sleep schedule and consolidate sleep increasing the sleep drive. The patient is also given additional advice such as not to take afternoon naps or to stick to the prescribed bedtime [17].

SRT requires a high level of compliance to be effective and is more time-consuming compared to medications but is considered an individually effective therapy and meets the criteria for empirically supported psychological treatments for insomnia [14,15].

## Stimulus control

People suffering from insomnia often associate their bedroom with habits that make sleeping more difficult, like eating, watching TV, or using a cell phone or computer. These behaviors creates a negative association (wakefulness and frustration) between the bedroom and sleep with the consequent inability to sleep. Stimulus Control Therapy (SCT)

**Table 1:** Sleep Hygiene rules.

| |
|---|
| • Optimize the sleep schedule: avoid spending too much time in bed, have a fixed wake-up time, do not (over)nap |
| • Have a pre-bed routine |
| • Have a pleasant sleep environment (light, temperature, humidity, noise, mattress) |
| • Do not smoke |
| • Be physically active to promote good quality sleep |
| • Avoid too much food or food that can be disruptive before sleep |
| • Avoid caffeine, nicotine, alcohol, or other stimulating substances |



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[18,19] is aimed to change this association and focuses on re-establishing a positive connection between bedtime and rapid-onset, well-consolidated sleep. Stimulus control therapy helps people to reset their "negative links" with bedtime and restore the link for a good night's sleep.

Typical instructions include:

- Do not go to bed before you are sleepy
- Use the bed only for sleep and sex
- Lie down only when sleepy
- Get out of bed when it's difficult to fall asleep for more than 20-30 minutes and, return to bed only when sleepy
- Set an alarm for the same time every morning
- Avoid daytime naps

This technique has the dual purpose of avoiding behaviors against sleep hygiene rules and, as in the case of sleep restriction, influencing sleep homeostasis.

SCT is considered an individually effective therapy and meets the criteria for empirically supported psychological treatments for insomnia [14,15].

## Relaxation techniques

These methods imply learning self-induced relaxation and imaginative techniques to reduce hyperarousal, which is frequently associated with increased sleep latency. Relaxation techniques can help in reducing racing thoughts and tension that often accompany lying in bed awake, increasing the body's natural relaxation response, which is helpful for the body and mind. Progressive muscle relaxation is used to diminish skeletal muscle tension by relaxing different muscle groups [20,21]. Autogenic training is a technique that creates a relaxation response through self-suggestion, such as warmth and heaviness, to counteract unwanted mental and physical symptoms [22].

Imagery training requires patients to select a relaxing image or memory, evoke the image, and engage with it from a multisensory perspective. Breathing exercises typically involve taking slow, deep breaths to decrease heart rate and breathing, and reduce stress and feelings of anxiety and anger.

Progressive muscle relaxation is considered an individually effective therapy and meets the criteria for empirically supported psychological treatments for insomnia [14,15].

## Cognitive techniques

Cognitive techniques help people learn how to identify and change dysfunctional or disturbing thought patterns that have a negative influence on behavior and emotions. They are based on the assumption that negative emotions, maladaptive behaviors, and physiological symptoms associated with specific disorders are associated with dysfunctional cognitions. Sleep disorders such as insomnia can be exacerbated by the personal concept of insomnia itself and its consequences on the quality of life. Cognitive therapy helps the patient in considering insomnia and its consequences from a more realistic and rational perspective. It is a structured program that helps the patient recognize and replace thoughts that cause or worsen sleep problems. Therapy begins by identifying (recording a daily diary) the patient's dysfunctional thoughts about sleep (i.e. overgeneralization, mental filter, all-or-nothing thinking, jumping to conclusions, magnification or minimization, personalization, blaming, etc). It is important to encourage the patient to consider his concepts only as one of the many possible interpretations and then to promote a change in beliefs that affect the ability to sleep.

Different cognitive restructuring techniques (paradoxical intention, downward arrow technique, distraction and imagery, re-evaluation, re-alignment, attention deviation, and hypothesis examination) can be used to change maladaptive cognitions.

Although the American College of Physicians (ACP) recommends that all adult patients receive cognitive behavioral therapy as the initial treatment for chronic insomnia disorder [23], the American Academy of Sleep Medicine (AASM) stated insufficient evidence to recommend cognitive therapy as single therapy. Positive outcomes have been highlighted if part of a multifaceted intervention, even if the specific contribution of cognitive therapy remains unclear [13,14].

There is consensus in the scientific and professional sleep community that cognitive-behavioral therapy should be the treatment of choice for chronic insomnia [14,18,23-25]. Nevertheless, there are still many reasons that prevent this therapy from being prescribed as a first therapeutic choice: social stigma, CBT is more time-consuming than managing medications, and there are few providers with adequate training to provide CBT for insomnia [26,27].

In addition, it requires a high level of compliance, extensive provider contact, and has a slower therapeutic action than medications. CBT has been demonstrated to be at least as effective for treating insomnia when compared with sleep medications, its effects may be more durable with fewer side effects [28], and, treating factors that may be responsible for perpetuating chronic insomnia, it produces long-lasting results.

## Telemedicine interventions and telemonitoring

Telehealth utilizes a broad range of electronic information and telecommunication technologies (such as telephone, video, or home computers to more complex ones) to provide long-distance clinical health care [29,30].

Telemedicine in sleep medicine can be synchronous when patients and provider interact in real-time, or asynchronous, when patients and provider are separated by both distance and time, and the provider interaction can be full, partial or none (videoconferencing, telephone visits, mobile phone apps, web-based program) [31]. Despite successes with face-to-face therapies, CBT-I is not easily accessible to all individuals with



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insomnia. To fill this issue, telemedicine may be an option for the delivery of healthcare services and CBT-I programs could be administered through the internet as a means for disseminating treatments to a wider audience [32,33]. Indeed, telehealth applications such as individual telephone calls, video-conferencing, and internet-based apps or websites are far more cost-effective and accessible to deliver than traditional face-to-face interventions [34].

Only recently, the efficacy and acceptability of delivering tele-cognitive behavioral therapy for insomnia have been adequately tested. Several studies demonstrated that, although telemedicine has been questioned on its comparative efficacy to in-person visits and applicability mostly to the older generation, tele-CBT-I was non-inferior to in-person delivery [35]. Recent research comparing face-to-face and telemedicine-delivered CBT for insomnia found no differences in improving insomnia/sleep (Insomnia Severity Scale-ISI) and daytime functioning measures at post-treatment and 3-months follow-up. Also, the therapeutic relationship was not affected [36]. Studies suggest that web-based cognitive behavioral therapy for insomnia incorporating acceptance and commitment therapy processes may be an efficient option to treat chronic insomnia and hypnotic dependence [37].

Internet-delivered CBT-I has been also demonstrated to be effective in improving sleep efficiency, insomnia severity, total sleep time, sleep onset latency, and wake time after sleep onset. It also showed similar efficacy whether as in-person delivery by therapists or delivered through printed materials (paper and pencil) [38].

Digital CBT-I may assume different forms, is tailored, and consists of a wide range of telehealth modalities, including internet-based, self-administered animated videos, video conferences, and a combination of group therapy with individual telephone calls.

## Circadian Rhythm Sleep-Wake Disorders (CRSWDs)

Two main processes control sleep: homeostatic and circadian.

Sleep homeostasis controls the propensity to fall asleep and is regulated by the concentration of adenosine in the frontonasal cortex; it is a longitudinal day-long linear process that increases in strength with the duration of wakefulness [39,40].

The circadian oscillator is responsible for the organization of the 24-hour sleep-wake cycle and is located in the supra-chiasmatic nucleus at the hypothalamic level [7,41].

This process is primarily an endogenous biological rhythm, which increases in strength with the duration of the biological day, opposing and balancing the effect of the homeostatic drive, thus facilitating continuous wakefulness throughout the day [42-44].

While the function of circadian rhythms is endogenous and preserved in the absence of any external cues, the timing of the biological day is regulated by multiple exogenous factors such as light, activity, and mealtimes.

A circadian rhythm sleep-wake disorder (CRSWD) is caused by alterations of the circadian time-keeping system, its entrainment mechanisms, or a misalignment of the endogenous circadian rhythm and the external environment.

Indeed, most CRSWDs arise when a substantial misalignment exists between the internal rhythm and the required timing of the patient's school, work, or social activities.

While prevalence in the population remains unknown, some estimates hold that up to 3% of the adult population suffers from a circadian rhythm sleep-wake disorder [45], with a higher prevalence (7%-16%) in adolescents and young adults [2].

The most common presenting symptoms of all CRSWDs are difficulty initiating and maintaining sleep, and excessive sleepiness, but their impact extends to adverse health outcomes, impairments in social, occupational, and educational performance, and safety concerns. See, in Table 2, the classification of circadian rhythm disorders [2].

The most common of these disorders as encountered in clinical practice are Delayed Sleep-Wake Phase Disorder (DSWPD) and Shift Work Disorder (SWD). DSWPD is marked by a biological sleep rhythm that prevents sleep at the desired bedtime and promotes sleep during a period later than the desired schedule. The pathophysiology of DSWPD may rely on an abnormal interaction between the endogenous circadian rhythm and the sleep homeostatic process that regulates sleep and wakefulness. Genetic factors such as polymorphism in the circadian clock gene hPer3 are associated with DSWPD. Environmental factors, such as decreased or increased exposure to light during the morning or evening may exacerbate the delayed circadian phase [2].

Shift Work Disorder is characterized by complaints of insomnia or excessive sleepiness that arise in association with work hours that occur, at least in part, during the usual sleep episode. These symptoms can affect both work and leisure time. The prevalence of shift work is approximately 20% of the workforce in industrialized countries. Depending on the type of shift, circadian preference may influence the ability to adjust to or tolerate shift work. Social pressures before and after a work shift also contribute to short sleep durations in shift workers [2].

Both disorders can be treated behaviorally and/or with

**Table 2:** Circadian rhythm sleep-wake phase disorders classification

| Circadian Rhythm Sleep-Wake Phase Disorders |
|---|
| Delayed Sleep-Wake Phase Disorder |
| Advanced Sleep-Wake Phase Disorder |
| Irregular Sleep-Wake Rhythm Disorder |
| Non-24-Hour Sleep-Wake Rhythm Disorder |
| Shift Work Disorder |
| Jet Lag Disorder |
| Circadian Sleep-Wake Disorder Not Otherwise Specified (NOS) |



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Bright Light Therapy (BLT) and Melatonin (MLT) to achieve better regulation of the sleep-wake pattern [46].

Chronotherapy, or scheduling sleep times, is a behavioral treatment that was developed to realign the biological and environmental sleep-wake schedules.

It consists of postponing or progressively anticipating bedtime by 2-3 hours per day or every two days until the desired sleep-wake time is reached. The established sleeping time must be followed rigorously to avoid the reappearance of symptoms. Chronotherapy takes advantage of the endogenous tendency of the circadian system to delay.

To achieve a better result and to improve the quality of life, it is mandatory to plan a daily adaptation of mealtimes, school/work, and social activities.

Chronotherapy has been demonstrated to successfully shift the timing of sleep from inappropriate hours to those that fit optimally with work/social needs even if, probably, mechanisms other than light-mediated circadian-phase shifting may underlie its efficacy so that, at present, results do not allow for discussion of outcome attributable to chronotherapy alone [47].

Chronotherapy requires a high level of compliance since it entails managing unusual sleep and wake-up times, and re-adjusting everyday activities and meals.

This approach should be integrated with bright-light therapy and the use of melatonin to accomplish the same goals for patients with DSWPD.

Light is the most powerful environmental influence on the human circadian timing system, and it is through regular light-dark exposure that the circadian timing system of humans is synchronized on a daily basis and is reset when traveling across time zones. For the entire animal kingdom, exposure to light in the evening postpones the biological clock, while morning exposure anticipates it. Many features of the light to which we are exposed determine the entrainment (synchronization of the endogenous circadian clock to the 24-hour clock) or the resetting of the process, including the spectral composition, intensity, duration, and timing.

Retinal cells are particularly sensitive to a blue-green light spectrum, so it is believed that this wavelength is mainly responsible for the effectiveness of therapy. Besides, the required light intensity is between 2,500 and 10,000 lux.

Ideally, there must be knowledge of the initial circadian phase, typically from a measurement of core body temperature and/or plasma or salivary melatonin under controlled conditions before initiating phototherapy. Indeed, the dim light melatonin onset (DLMO), which is the initial surge in melatonin release in the early part of the night under low light conditions, is a consistent and reliable measure of the intrinsic circadian phase.

BLT single session should last at least 30 minutes, at the desires time, for at least 1 month of therapy. The treatment should also involve attenuation of bright-light exposure after 4 PM. BLT allows for improving the level of daytime vigilance, necessary to allow the patient to resume school or work activities; it reduces drowsiness during the day and therefore the probability of falling asleep.

Even with limited results in studies with many methodological defects, the American Academy of Sleep Medicine has stated that phototherapy could be useful in the treatment of DSWPD [48].

There is compelling evidence to implicate endogenous melatonin as an important mediator in CRSWD pathophysiology [49]. A neural output signal, generated by the suprachiasmatic nuclei (SCN) of the hypothalamus, induces the synthesis of melatonin at night by the pineal gland. Light, in addition to tuning the SCN, acts to inhibit melatonin synthesis.

Because melatonin is metabolized rapidly, plasma melatonin levels are low during the day and high during the night [50]. The onset and offset of melatonin secretion are standardly used to determine the timing of an individual's biological night. The dim light melatonin onset (DLMO), which is the initial surge in melatonin release in the early part of the night under low light conditions, is a consistent and reliable measure of the intrinsic circadian phase [51].

Evidence has been reported that exogenous melatonin administration exerts phase-shifting properties and could be used repeatedly over many days to slowly lead to a circadian phase advance [46,52].

Even if the current evidence for the use of melatonin for circadian rhythm is controversial [53,54] there is clinical evidence indicating that melatonin effectively advances sleep onset and wake times of subjects with DSWPD to earlier hours and improves vigilance in these patients.

The effect of melatonin on sleep is believed to be a consequence of mechanisms that involve an increase in sleep propensity by enhancing the amplitude of circadian clock oscillations via MT1 receptors and the synchronization of the circadian clock via MT2 receptors [55]. Slow-release melatonin can be taken before bedtime as its profile substantially overlaps with that of endogenous melatonin. Anticipating the time of intake of melatonin by 30 minutes every 2 days will allow for reaching the desired time of sleep onset. No consensus is still present about the dosage (range from 0.5 to 5 mg).

The above-mentioned therapies can be combined to achieve a better result and to tailor the treatment to individual patients' needs.

## Central disorders of hypersomnolence

This is a group of disorders (listed in Table 3) in which the primary complaint is daytime sleepiness not caused by disturbed nocturnal sleep or misaligned circadian rhythms [2].

These disorders share the core feature of excessive daytime sleepiness (EDS) that occurs on a frequent and persistent basis despite adequate total sleep time.



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| Table 3: Central Disorders of Hypersomnolence classification. |
|---|
| **Central Disorders of Hypersomnolence** |
| Narcolepsy Type 1 |
| Narcolepsy Type 2 |
| Idiopathic Hypersomnia |
| Kleine-Levin |
| Hypersomnia Due to a Medical Disorder |
| Hypersomnia Due to a Medication or Substance |
| Hypersomnia Associated with a Psychiatric Disorder |
| Insufficient Sleep Syndrome |

Idiopathic Hypersomnia (IH) is characterized by excessive daytime sleepiness that occurs in the absence of cataplexy, is accompanied by no more than one sleep-onset REM period (SOREMP) on the multiple sleep latency test (MSLT) and preceding polysomnogram combined. A prolonged and severe form of sleep inertia is reported in 36% to 66% of patients with IH. The prevalence and incidence of IH are unknown [2].

Idiopathic Hypersomnia is a serious and debilitating condition that results in reduced functioning, depression, and anxiety, and is associated with an increased risk of work- and traffic-related accidents [56], sexual dysfunctions [57], neuropsychological alterations [58,59], and an overall significant reduction in the quality of life [60-62].

Narcolepsy type 1 is a disorder primarily characterized by excessive daytime sleepiness and signs of REM-sleep dissociation, the most specific of which is cataplexy. It is caused by a deficiency of hypothalamic hypocretin (orexin) signaling. Patients experience daily episodes of an irrepressible need to sleep, mostly in monotonous situations. Cataplexy, when occurs, can be triggered by laughter, or a variety of emotions. Although sleep onset is rarely a problem, an inability to maintain continuous sleep is very common. 33% to 80% of narcolepsy patients have hypnagogic hallucinations and/or sleep paralysis. Narcolepsy with cataplexy occurs in 0.02% to 0.18% of the United States and western European populations [2].

Narcolepsy type 2 is characterized by excessive daytime sleepiness and abnormal manifestations of REM sleep on polysomnography/multiple sleep latency test. Cataplexy is absent but sleep paralysis, hypnagogic hallucinations, or automatic behavior may be present. The exact prevalence of narcolepsy type 2 is uncertain. Cases of narcolepsy without cataplexy represent 15% to 25% of the clinic narcoleptic population [2].

Despite pharmacological approaches being considered the first line of treatment, non-pharmacological strategies can be used. Psychologists may assist with the provision of behavioral treatment, either as an adjunct to medication or as an alternative treatment [63]. Due to the multi-symptomatic manifestation of narcolepsy and the multiple effects on patients' quality of life, the cognitive behavioral therapy for narcolepsy (CBT-N) should be tailor-made and start from a clinical formulation based on symptoms and their effects on the patient's life [64].

It may include education about the disorder, coping skills training, emotion regulation regarding the perceived limitations of living with a chronic disease, and behavioral techniques using scheduled naps and good sleep hygiene.

Patients with narcolepsy have been shown to benefit from different approaches (Table 4) such as modified sleep habits, scheduled naps, exercise, diet, and counseling [65].

Some clinical guidelines in Europe and the USA [73-75] suggest the application of cognitive and behavioral actions, as complementary therapies, to reduce the negative effects that follow the disease and gain a better adherence to medications. Several studies have described the effectiveness of a multicomponent CBT for narcolepsy in improving objective and subjective EDS and the quality of life [76-78].

## Obstructive sleep apnea syndrome

Obstructive Sleep Apnea Syndrome (OSAS) is one of the most frequent sleep disorders affecting 3% - 9% of the general population [79,80] and is characterized by repeated episodes of obstruction of the upper airways that causes patients to temporarily stop or decrease their breathing repeatedly during sleep, associated with oxyhemoglobin desaturations. This results in fragmented, non-restful sleep that can lead to symptoms such as morning headache and daytime sleepiness, snoring, and witnessed apneas. Pathogenesis varies; predisposing factors include a small upper airway lumen, unstable respiratory control, low arousal threshold, small lung

| Table 4: Non-pharmacological approaches for narcolepsy. |
|---|
| **Structured nocturnal sleep habits[66,63].** |
| • Avoid sleep deprivation and changes in sleep time; maintain a regular schedule of nocturnal sleep, despite the quality or continuity of nocturnal sleep |
| • Sleep satiation technique: scheduled extension of nocturnal sleep for 2 weeks (i.e. nocturnal sleep period: 10:00 pm to 6:00 am) and daytime naps with no light-dark cues |
| **Scheduled naps** [67,68] |
| • Sleep times during the day |
| • Strategically timed |
| • fifteen-minute naps at 12:30 pm and 5:00 pm or many short naps could be beneficial, but some patients require longer naps (ranging from 15min to 1h) |
| **Physical activities** [69,70] |
| • Physical exercise is recommended on a daily basis to improve wakefulness and lower cataplexy |
| **Diet** |
| • Over-the-counter stimulants should only be used on a planned schedule and according to doctor's recommendations |
| • Healthy eating habits are useful to ensure sleep hygiene |
| • Sweets and carbohydrates should be avoided from the time of awakening in the morning until 12:00 pm |
| • Breakfast one to two hours after awakening |
| • A snack before bedtime |
| • Lunch and dinner should be offered at equal intervals after breakfast |
| **Counseling** [71-72] |
| • Lifestyle reorganization |
| • Type of work |
| • Programming the mental alertness required by everyday activities |
| • Professional support for office workers |
| **Cognitive therapy** [67] |
| • Identify and modify the dysfunctional cognitions of a patient using different techniques, highlighting the negative effect that symptoms have on the daily life, emotions, and other functional areas of patients with narcolepsy |



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volume, and dysfunctional upper airway dilator muscles [81]. There are many health conditions associated with obstructive sleep apnea, including hypertension, coronary artery disease, cardiac arrhythmias, and depression [81].

Untreated OSAS increases the risk for stroke [82-84], metabolic syndromes [85-86], depression [87], reduced quality of life [88], cognitive dysfunction [89], premature death [90] and increases health care utilization and costs [91,92].

Current medical treatment options are positive airway pressure devices, surgery, neurostimulation therapy, oral appliances, positional therapy, and weight loss. To date, the treatment of choice for OSAS is night ventilation under continuous positive airways pressure (CPAP) by which positive pressure is applied to the upper airways through a mask during the night [93]. The air pressure acts as an internal "pneumatic support" that prevents the collapse of the upper airways at the pharyngeal level, responsible for apneas. The American Academy of Sleep Medicine recommends CPAP as the first-line and gold-standard treatment for OSAS [93].

CPAP devices need to be calibrated on each subject during an assisted in-laboratory or at-home titration, to determine the effective pressure needed to significantly reduce or eliminate apneas.

The home procedure allows for titration based on multiple nights: the patient is instructed to use the CPAP device with automatic pressure regulation over three to five days. The Auto-CPAP records apneas and hypopneas and adjusts the pressure accordingly. The advantages of this method, as well as being economical, are also reflected in the compliance of the patient, who can more easily get used to managing the device in his/her home environment. Moreover, the extended titration for several nights allows for the establishment of a more reliable pressure value.

Factors including socio-demographic/economic characteristics, disease severity, psychological factors, and side-effects are thought to affect CPAP adherence in OSAS patients [94].

The rate of CPAP adherence has been highlighted persistently low over twenty years worth of reported data [95]. Patients' tolerance to the device may be poor due to different issues. Nose and throat discomfort, claustrophobia, chronic use, noise, bed partner, psychological non-acceptance factors.

Problems related to the practical use of the device can be easily solved with measures such as the choice of a different type of device or mask, the use of a heated humidifier, and the use of topical products for skin issues. The most difficult problem to solve is the psychological acceptance of the device.

The need to create educational and support groups for the use of the CPAP derives from clinical observations that have highlighted that, although the therapeutic value of the CPAP for subjects with OSAS undeniable, the percentage of compliant patients is still relatively low. Despite the important technological improvement of the devices and masks including quieter pumps, softer masks, and improved portability, adherence to CPAP continues to be a major problem as adherence rates generally range from 30% to 60% [96].

Moreover, the use of the ventilator significantly decreases over 12 months. This decline can be predicted by early patient experiences with CPAP (i.e., adherence and side effects at 1 month), raising the possibility that intensive early interventions could improve long-term compliance to CPAP in patients [97].

The idea of being addicted chronically to a device is relevant. Some patients perceive this situation as a sign of disability and this, combined with the fact that often patients' perception of the severity of their disease is generally underestimated, can lead to a refusal of the treatment. CPAP therapy to be effective needs patients to be actively committed to the treatment and to using the device every night as well as report and correct any side effects.

Finally, the continuity of use may affect compliance. When used as prescribed, CPAP reduces daytime sleepiness, normalizes sleep architecture, and improves numerous OSA-specific health outcomes [98]. In order to have good therapeutic efficacy on daytime sleepiness and to reduce the cardiovascular risk associated with OSA, regular CPAP use is mandatory (every night for at least 4 hours per night [99,100]). A discontinuity in its use is reflected in a reduced amelioration of symptoms, therefore in a lesser benefit and consequently in a scarce perception of the uselessness of the treatment.

The literature to date suggests a dose-response relationship between CPAP usage and a range of outcomes, including sleepiness, functional status, and blood pressure; the data also suggest that the optimal adherence level differs depending on the outcome evaluated [97].

What strategies could be implemented to optimize adherence in clinical settings? Intervention studies suggested that augmented support/education, cognitive and behavioral therapy, telemedicine, and technological interventions may improve CPAP adherence [96]. Over the years, the most successful interventions for optimizing adherence have been behavioral in nature [101]. A detailed explanation regarding the sleep disorder, the therapy and the functioning of the equipment, the simultaneous use of a humidifier and/or nasal decongestants, the choice of a mask suitable for anatomical dimensions and device pressure, psychological consultations, and a careful follow-up of the patient are the main elements that can make a difference in compliance [102].

## Technological strategies

These strategies consist of the choice, when possible, of the best-suited device and nasal mask. Although CPAP was originally applied with a nasal mask, various interfaces are currently available. Over time, there have been significant improvements in mask technology with a variety of different interfaces available: nasal cushions, nasal pillows, nasal, oral, and full-face masks. There is not a universally accepted mask interface that will fit every patient [103] but, in general, there is no consistent evidence that nasal pillows and oral masks



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alter OSAS treatment effectiveness or adherence. In contrast, oronasal masks are more often associated with higher CPAP levels and leaks [104,105] and lower CPAP adherence compared to nasal masks [106]. Humidification reduces side effects, such as dry mouth, throat, or nose [107]. Finally, it is important to remember that a pressure ramp helps to prevent claustrophobia both at the beginning of the night or during nocturnal awakenings. Pressure modifications such as flexible pressure and auto-adjusting pressure may promote better comfort and adherence. If there is a marked intolerance to high therapeutic pressures, it may be indicated, for the first period, the use of a suboptimal pressure (some $H_2O$ cm lower), and to move to the optimal pressure when a greater comfort and tolerance to the device is achieved.

## Telemedicine interventions and telemonitoring

Telecommunication technologies (i.e. phone calls, wireless telemonitoring) may be useful in CPAP adherence, decrease time to diagnosis and improve initial care access and treatment outcomes [108,109]. The new CPAP devices with a web-based tracking system can send real-time information on CPAP use. These data, including information on mask leaks and residual apneas/hypopneas, are used by the provider and/or medical staff to evaluate the effectiveness of treatment and allow them to promptly intervene to correct problems therefore adherence has improved [110].

Even if improvement in adherence to treatment when CPAP is used in telemedicine mode still needs to be confirmed, so far, telemedicine-based education showed no significant improvement in CPAP adherence [111,112]. Telemedicine can be used to reinforce CPAP adherence by sending digital images via email, fax machines, telephone, and videoconferencing, monitoring CPAP use, and detecting any potential problems and treating them with the appropriate intervention [113,114]. Probably, to be effective, telemedicine needs to incorporate a more comprehensive health monitoring and lifestyle coaching support program.

The use of new applications, which includes video and motivational instructions for better CPAP use, is associated with enhanced adherence to the therapy. Although this conclusion is based only on two small trials and predominantly observational studies and therefore should be tested in larger prospective trials (inexpensive and use low health care resources) [115].

## Educational support

Education is aimed at increasing patients' awareness of their illness and the need for treatment addressing underlying health beliefs. Additional educational videos and written material have the advantage of being portable to a spouse or family unable to attend outpatients' appointments. Essential educational intervention includes:

- Inclusion of partners in the diagnosis and the preparation of CPAP
- Individual mask fitting (poor fitting can result in skin erosion, pain, inadequate therapeutic pressure, and excessive noise).
- CPAP demonstration/acclimatization has the dual function of assuring the adequacy of the CPAP mask interface and creating a supported rehearsal for the CPAP titration study. The demonstration and practical instructions can improve the patient's self-efficacy.
- Sensitivity to each patient. An increased risk of CPAP discontinuation is higher in patients who are younger, thinner, depressed, or of the female gender, with lower AHI and symptom complaints, and those with lesser self-efficacy, health value, and internal locus of control. From a psychosocial perspective, such "at-risk" patients may experience cognitive dissonance between the perceived costs and benefits of CPAP, potentially modifiable through education or other interventions.

A therapeutic educational program should highlight the potential benefits of CPAP, the function and effects of the device, and ways to eliminate side effects. The purpose of the educational support is to minimize cases of non-use of the machine through in-person sessions about correct and complete information on the use of the CPAP and OSAS, real and practical demonstrations of use, discussion and resolution of practical problems, and the elaboration of psychological issues related to acceptance. Video sessions, addressing misconceptions about OSAS and barriers to CPAP, may also be beneficial [116].

## Cognitive and behavioral intervention

There is growing evidence that behavioral interventions, in addition to education, are a promising approach to attaining better adherence. Behavioral interventions include the use of cognitive-behavioral therapy and motivational enhancement therapy (MET) designed to increase patients' self-efficacy.

Both one-to-one and group sessions of combined cognitive-behavioral therapy, motivational enhancement therapy, and behavioral interventions have shown to be promising [117]. Through the conversational exchange, the goal of CBT is to correct the patients' beliefs that are incorrect or unfounded and to change behaviors [118]. Motivational enhancement therapy applies motivational interviewing to elicit the patients' thought processes, reinforcing their motivating statements through directed interview questions [119].

Ideally, a comprehensive program should be multifactorial and should include intervention by different specialists such as physicians, technologists, nurses, psychologists, and partners or caregivers. As the pattern of adherence is evident within the first week of CPAP treatment, it suggests that patients have already formed the perception regarding the seriousness of OSAS and the benefit of treatment, and thus these cognitions influence adherence [120]. For this reason, patient's likely approach CPAP therapy with opinions regarding the diagnosis and value of treatment before therapy is initiated. The patient needs to have a positive experience with CPAP within the first days of treatment because this predicts future CPAP adherence [121]. During initial CPAP use, patients need to understand the benefits of using the device, be motivated to use CPAP,



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and understand its side effects. Constant support should be provided by trained technicians, sleep psychologists, and all the sleep medicine center teams. Addressing problems with CPAP, together with support for solving problems and supportive interventions may increase adherence [101].

The group therapy, combining technical assistance, and educational and cognitive-behavioral treatments, may consist of about 6-8 OSAS patients with a CPAP prescription. The program may be structured in 3-4 sessions of about 60 minutes each, before, during, and after the beginning of therapy with additional two meetings respectively, 3 and 12 months after the beginning of the treatment. It is planned to use technical, but easy-to-understand, paper-based, and video information materials on the use of CPAP and obstructive sleep apnea syndrome. Assessment scales administered, before and during therapy, and at follow-up, can also be used to measure the quality of life and the subjective quantity/quality of sleep.

Topics discussed during sessions

- General principles on pathology and treatment with CPAP
- How a CPAP works (practical demonstration): ramp, pressure, mask, humidifier...
- OSAS and its impact on general health
- Predisposition to consider a behavior change (sleep hygiene, weight control, change in night habits...)
- Understanding the need for change and the start of treatment
- How to follow a plan and treatment with long-term change planning
- How to solve practical issues with CPAP
- Short-term follow-up
- Long-term follow-up

Scale and questionnaires can be used: The Epworth Sleepiness Scale (ESS), the Nottingham Health Profile (NHP) and the Index Quality of life index (QL).

Adherence to CPAP treatment for OSA is essential to achieve the highest potential quality of life and cognitive processing outcomes, decrease accidents and reduce comorbidities [120].

Intending to change patient views on CPAP, cognitive-behavioral intervention and educational support appears to be effective interventions to promote adherence. Telemonitoring and telehealth enable early intervention, create additional opportunities to interface with a provider, and reduce the direct access of patients to healthcare facilities. Spousal involvement is also beneficial.

## Restless leg syndrome

Restless Leg Syndrome (RLS) is a sensorimotor disorder characterized by a complaint of a strong, nearly irresistible urge to move the limb. The RLS sensations are worse at rest, and better with movement, and the predominant occurrence is in the evening or night [2]. The overall prevalence of RLS has been estimated at 5% to 10% in European and North American population-based studies. Generally, it affects women more than men, and prevalence is also higher with advancing age [122]. RLS is usually accompanied by clinically relevant psychosocial impairment. The diagnosis is made by clinical history. RLS can be idiopathic or secondary. In its idiopathic form, most patients will have a family history. Secondary restless legs syndrome most often has a later onset course and is associated with various neurological disorders (eg, multiple sclerosis, Parkinson's disease), iron deficiency (low ferritin level), or pregnancy. Also, Periodic Limb Movement (PLM) of Sleep frequently co-occurs; the latter is present in 80% to 90% of patients with RLS [123]. In these subjects is always recommended the evaluation of the iron level is. Patients with low iron stores should be given appropriate iron supplementation [124].

Pharmacological treatment of restless legs syndrome may start with either dopamine agonists or gabapentin or gabapentin enacarbil [125]. Levodopa, ropinirole, pramipexole, cabergoline, and pergolide are all considered efficacious together with pregabalin, and rotigotine.

Limited evidence has been found for non-pharmacologic treatment options [126]. Psychological support is intended as counseling in order to implement non-pharmacological, behavioral strategies.

In 2008, Hornyak and colleagues developed a psychologically-based group therapy approach tailored to the specific aspects of the disorders, with the aim of improving coping strategies and the quality of life of patients with RLS (the RELEGS, Restless Leg Skills Program).

The program integrates cognitive-behavioral elements and acceptance-based mindfulness approaches. The study demonstrated an improvement in RLS-specific aspects of quality of life, mental health status, and sleep quality as well as less anxiety at the end of the course [127].

Non-pharmacological interventions involve reassurance and lifestyle changes (eg avoid high intake of caffeine or alcohol before bedtime) and sleep hygiene (eg sleep in a quiet, comfortable, cool environment, and keeping regular bed and wake hours). Furthermore, advice for behavioral strategies during an attack may enable a patient to cope with the RLS symptoms, eg walking and stretching, massaging the affected limbs, bathing in hot or cold water, relaxation exercises (biofeedback or yoga), and distracting the mind [128].

In addition, stretching before and after exercise, adequate hydration, and correction of electrolyte disturbances may be effective and safe means of prophylaxis [129].

Treatment depends on the severity and frequency of RLS symptoms, comprises non-pharmacological and pharmacological interventions to relieve symptoms only, and needs to be tailored to the patient, taking into account age, comorbidities, and co-medication [128].



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## Parasomnias

Parasomnias are undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousal from sleep [2], they are abnormal behaviors that can be associated, in particular during adulthood, with impaired sleep quality and daytime dysfunction [130] and can be grouped by type of behavior seen, or based on sleep stage from which they occur. Parasomnias are clinical disorders because of the resulting injuries, sleep disruption, adverse health effects, and untoward psychosocial effects [2].

Distinguishing between NREM and REM parasomnias (Table 5) is important because the epidemiological and clinical features, treatment, and prognosis are different.

Non-REM Parasomnias are characterized by a wide variety of behaviors and mostly occur from slow-wave sleep. They most commonly manifest with directed behaviors, not stereotypic, and with a variable duration. Upon awakening, the patient does not have any vivid recall.

Their lifetime prevalence may vary from 1% to 18%, depending on the disorders, they are especially prevalent among children and adults younger than 35 years, and are most often evaluated in terms of predisposing, priming and precipitating (triggering) factors.

NREM Parasomnias can involve normal behaviors that are inappropriate only regarding their timing, or inappropriate or dangerous behaviors. Self-injury or injuries may occur. Such inappropriate and antisocial behaviors may have legal and forensic implications [2].

Pharmacological treatment may involve benzodiazepines (clonazepam), or in some cases, tricyclic antidepressants [131].

Non-pharmacological therapy includes measures to maximize sleep stability such as improving general sleep hygiene, avoiding centrally-acting medications or drugs, and preventing sleep deprivation. Attarian and colleagues suggested that scheduled awakenings (setting the alarm for 1 hr after sleep onset) could be helpful [132]. Safety precautions are also recommended for individuals with parasomnia, as the disorder can be exacerbated by sleep deprivation and various other factors [133] (Table 6).

Cognitive-Behavioral Treatment (CBT) and Mindfulness-Based Stress Reduction Programs (MBSR) seem to be promising new treatments [135]. In a recent study, O'Regan and colleagues have developed a novel, group-based, Cognitive Behavioral Therapy for NREM Parasomnias (CBT-NREMP) program. Their program targets factors that may trigger and maintain parasomnias over time, by incorporating and building-on core principles from CBT-I. The protocol includes a comprehensive program that covers psycho-education on the etiology of NREM parasomnias, sleep hygiene, sleeps rescheduling to optimize homeostatic regulation, stimulus control to re-establish an association between the bed/bedroom and sleep, and specified body-based and cognitive relaxation techniques, specifically designed to target priming and precipitating factors which cause parasomnias to persist over time [136].

REM Parasomnias have been more extensively studied, in particular, REM Behavior Disorder (RBD). REM parasomnias are present in late adult life and are associated with degenerative brain diseases. Their prevalence has been estimated from 0.5% (RBD) to 1% - 40% (sleep paralysis) [134].

RBD is considered an admixture of REM sleep coupled with waking or NREM sleep levels of tonic EMG activity [2]. The resulting dream enactment behavior derives from the loss of the normal muscle atonia seen during this sleep stage. It consists of a wide variety of motor activity that appears to be related to a dream. The type of behavior that most commonly brings the patient to medical attention is often violent, such as screaming, punching, kicking, or other such movements; however, nonviolent activity can be seen as well. The patient's recalled dream is consistent with the behavior exhibited [123].

The most commonly used pharmacologic treatment for Rapid Eye Movement Behavior Disorder is clonazepam [137] which has to be used with caution in patients with dementia and may lead to excessive sedation. An inexpensive and safer option is melatonin [138-140]. Alternative second- and third-line therapies with anecdotal efficacy include temazepam,

**Table 5:** Parasomnias.

| NREM Related Parasomnias |
|---|
| Disorders of arousal |
| Confusional arousals |
| Sleepwalking |
| Sleep Terrors |
| Sleep-Related Eating Disorders |
| **REM Related Parasomnias** |
| REM Sleep Behavior Disorder |
| Recurrent Isolated Sleep Paralysis |
| Nightmare Disorders |
| **Other Parasomnias** |
| Exploding Head Syndrome |
| Sleep-Related Hallucinations |
| Sleep Enuresis |
| Parasomnia Due to Medical Disorders |
| Parasomnia Due to a Medication or Substance |
| Parasomnia, Unspecified |

**Table 6:** Suggestions for parasomnias patients.

| Sleep Hygiene Rules and Safety Precautions |
|---|
| • Identify, then reduce or eliminate known precipitating factors |
| • Avoid sleep deprivation: maintain a regular sleep-wake schedule with a constant waking time |
| • Maximize the safety of the sleeping environment |
| - Sleep on the lowest floor in the house |
| - Use a mattress on the floor |
| - Sleep solo or use two queen-sized mattresses pushed together for co-sleeping |
| - Minimize or pad bedside furniture |
| - Secure bedside light above the bed but out of reach |
| - Use plastic cups or bottles, if bedside water is required |
| - Consider child-proof door knobs, door wedges, or alarms |
| Remove or lock dangerous household items |
| Adapted from: Fleetham, 2014. [134]. |



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lorazepam, zolpidem, zopiclone, pramipexole, donepezil, ramelteon, agomelatine, cannabinoids, and sodium oxybate [141].

Non-pharmacological therapy includes avoiding sleep deprivation, irregular sleep-wake schedules, and stress as predisposing factors, and it is useful to prevent sleep paralysis.

Imagery rehearsal [142], where the patient chooses a repetitive nightmare, changes its storyline to make it less distressing or brings its story to a safe conclusion, and then mentally rehearses the changed dream imagery, can be used in the psychological treatment of nightmare disorders [134].

A novel alarm system for patients unresponsive to medications has been described recently, by Howell and colleagues, for the treatment of RBD. Since patients can often be verbally redirected during dream enactment behavior, a customized bed alarm that works through a pressure-sensing pad placed underneath the shoulders of a sleeping patient has been created. When the patient arises from the bed or moves enough during the night to pull the cord from its magnetic seal, a recorded voice emanates from a bedside speaker on a repeating loop until the patient returns to lying down on the pressure pad and/or replaces the magnetic tether. All patients in the study demonstrated a reduction in sleep-related injury events and RBD symptoms after initiating bed alarm therapy [143].

### Neuropsychological assessment

Sleep disorders are a major feature of neuropsychological conditions contributing to the pattern of cognitive impairment. There is rapidly accumulating evidence of a close relationship between sleep loss and cognition and a bad sleep quality or quantity may affect performance on cognitive tasks in otherwise healthy people [144].

OSAS-related cognitive dysfunction has been shown in a variety of domains including attention, executive functioning, motor efficiency, working memory, and long-term episodic memory [90]. Impaired cognitive function may be related to excessive daytime sleepiness and nocturnal hypoxemia. [145].

It appears that the cognitive dysfunction of OSAS can be, at least, partially reverted with precocious and continuous use of CPAP [146] and long-term CPAP therapy can also have a protective effect on cognitive performance [147].

Also, insomnias can lead to attention, concentration, executive functions, and memory impairment in both objective and subjective cognitive measurements so treating insomnia may potentially improve cognitive outcomes [148,149].

Sleep-wake rhythm disorders are associated with cognitive dysfunctions, too. In particular, shift work is associated with an increased occurrence of metabolic disorders, and it has been implicated in weight gain and cognitive impairment [150].

Both idiopathic hypersomnia and narcolepsy are often associated with cognitive dysfunction. Memory problems are reported by 79% of IH patients and attention problems by 55% [151].

Children who develop narcolepsy are at significant cognitive and psychological risk. Narcolepsy puts children and adolescents at particular risk of cognitive impairment in at least one domain even if a narcolepsy-specific cognitive profile has not been yet established [152].

Overall, neuropsychologists must be alert to sleep problems in their clients, so that sleep interventions, or referrals, are recommended in the rehabilitation plan of individuals with cognitive dysfunctions. Conversely, a comprehensive neuropsychological assessment may be useful to all patients affected by sleep disorders to better define, prevent and treat cognitive impairment.

## Conclusion

Sleep medicine centers should have a multidisciplinary approach to attain a complete sleep assessment and develop an individualized treatment plan for each patient. The multidisciplinary team should include board-certified sleep specialists to evaluate and treat sleep disorders. After taking a complete sleep history to reach a correct differential diagnosis, the tailored educational and psychological treatment, when indicated, should be chosen by the psychologist either in combination with medications or alone. It should be adapted to the patients also according to their compliance, needs, and expectations.

Non-pharmacological treatments are indicated for people resistant to pharmacological therapies and are useful in the process of withdrawal from drugs in cases of tolerance. They can also be used with excellent results in combination with medications: it is quite common in clinical practice that patients are first prescribed a pharmacological treatment by the physician and, subsequently, referred to the psychologist for behavioral therapy [153,154]. In this situation, however, medications may reduce the patient's motivation to change ill-adaptive behavioral patterns and dysfunctional beliefs. Indeed, the advantage of non-pharmacological treatments, which include educational, cognitive-behavioral, and rehabilitative aspects, lies in the correction of patients' beliefs and attitudes that, alone or together with some behavioral habits, cause and/or perpetuate insomnia.

Overall, the effectiveness of non-pharmacological treatments is based on four principles. They facilitate and improve sleep by treating disorders and changing situations that interfere with good sleep. They teach the individual to sleep through certain conditioning mechanisms. They improve sleep by promoting the central mechanisms of maintenance and induction of sleep and sleep-wake rhythm and they mitigate the consequences of sleep disorders by reducing excessive sleep-related concerns.

These therapies, however, are not without disadvantages: the therapeutic path requires the direct and constant commitment of the patient, and results are usually achieved in more prolonged times than pharmacological treatment, the motivational support, together with continuous patient monitoring, plays a fundamental role, in obtaining long-lasting results.



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The perception, expectations, and ideas that patients have about their sleep are extremely important in determining their quality of life.

For these reasons, patients' care should always be personalized and the interaction between all the professionals involved in the different stages of the diagnostic-therapeutic path of the subject such as physicians, psychologists, technicians and nurses should always be provided.

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