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Chinese Expert Consensus on Sleep Health and Rehabilitation Management for Community-Dwelling Older Adults (2025 Edition) Postprint

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Abstract

Poor sleep in older adults is closely associated with multiple health outcomes. If primary-level medical and health institutions strengthen sleep health and rehabilitation management based on existing elderly health management frameworks, it will help prevent and delay the onset and progression of numerous chronic diseases in older adults, thereby conserving substantial medical resources. However, primary-level medical and health institutions have not yet established a comprehensive sleep health and rehabilitation management system. To fill this gap, the Community Rehabilitation Working Committee of the Chinese Association of Rehabilitation Medicine took the lead in initiating and jointly formulated the *Chinese Expert Consensus on Sleep Health and Rehabilitation Management for Community-Dwelling Older Adults (2025 Edition)* with experts and scholars from multiple domestic institutions. This consensus is grounded in evidence-based medical evidence from sleep rehabilitation-related fields, combined with multidisciplinary experts' clinical practice experience, China's primary-level rehabilitation resources, and future development trends in primary-level healthcare, forming consensus opinions on aspects including age-related changes in sleep physiology, goals and requirements of primary-level sleep health and rehabilitation management, rehabilitation screening and assessment, rehabilitation management content, and rehabilitation management processes. The release of this consensus holds significant importance for promoting the standardized implementation of sleep health and rehabilitation management for older adults in primary-level medical and health institutions.

Full Text

Preamble

Sleep serves as a barometer of physical and mental health, with poor sleep adversely affecting multiple physiological systems including mental health, body composition, blood lipids, insulin resistance, bone density, liver, kidney, cardiovascular, immune, hematopoietic, gut microbiota, and metabolism [?]. In China, the prevalence of sleep disorders among adults aged 60 and above reaches 46.0%. According to the 2023 National Aging Development Bulletin, approximately 136 million older adults experience varying degrees of sleep problems [?]. Sleep disorders are closely associated with numerous adverse health outcomes in older adults, including cardiovascular and cerebrovascular diseases, neurodegenerative diseases, cognitive impairment, depression, and all-cause mortality [?]. Therefore, sleep health issues in older adults cannot be ignored, and timely screening, diagnosis, and intervention for sleep disorders are crucial for promoting healthy aging.

Primary healthcare institutions play a vital role in health management for older adults. In 2023, primary healthcare facilities provided health management services to over 130 million older adults. Strengthening sleep management within existing services could substantially prevent or delay the onset of many chronic diseases and conserve significant medical resources and costs [?]. In recent years, an increasing number of primary care physicians have recognized the severity of sleep problems among older adults, yet treatment often over-relies on pharmacotherapy. Given that older adults frequently have multiple coexisting diseases and polypharmacy, many sleep medications carry considerable adverse effects, necessitating consideration of comprehensive rehabilitation treatments and non-pharmacological alternatives [?].

To further assist and standardize sleep health and rehabilitation management for older adults in primary healthcare settings, the Community Rehabilitation Working Committee of the Chinese Rehabilitation Medical Association organized multidisciplinary experts and frontline practitioners in rehabilitation medicine, geriatrics, sleep medicine, general practice, nursing, and traditional Chinese medicine to develop this consensus based on evidence-based medicine and international clinical practice guidelines, taking into account current primary care conditions and future development trends.

1. Consensus Development Methods

This consensus was initiated by the Community Rehabilitation Working Committee of the Chinese Rehabilitation Medical Association in January 2025, with a five-month development period.

1.1 Target Users

This consensus is intended for general practitioners, rehabilitation physicians, therapists, nurses, and other health service providers engaged in health management and rehabilitation assessment and treatment in primary healthcare institutions. It aims to guide sleep health and rehabilitation management for community-dwelling older adults aged 65 and above, particularly those with sleep disorders or related health risk factors.

1.2 Consensus Development Working Group

The working group comprised senior experts and frontline practitioners from multiple disciplines including rehabilitation medicine, clinical medicine, geriatrics, sleep medicine, general practice, nursing, psychiatry, evidence-based medicine, and public health. The group was divided into a guidance expert panel and a drafting expert panel, with all members selected and confirmed by the Community Rehabilitation Working Committee. Drafting experts were required to hold associate senior professional titles or above, with research or clinical expertise in the aforementioned fields. Guidance experts were selected based on their leadership or core participation in developing national standards, group standards, expert consensus, or clinical guidelines, or their high academic authority and extensive clinical experience in sleep-related fields.

1.3 Consensus Registration

This consensus has been registered with the International Practice Guideline Registration and Transparency Platform (PREPARE, <https://www.guidelines-registry.org/>) under registration number PREPARE-2025CN774.

1.4 Literature Retrieval

Using keywords including “sleep,” “sleep disorders,” “sleep quality,” “sleep disturbance,” “aged,” “older adults,” “rehabilitation,” “assessment,” “therapy,” “primary healthcare,” and their Chinese equivalents, we searched PubMed, Web of Science, Cochrane Library, CNKI, Wanfang Data, VIP, and other Chinese and English databases, as well as professional websites such as the UK National Institute for Health and Care Excellence and the American Academy of Sleep Medicine. The search timeframe extended from database inception to April 30, 2025. Inclusion criteria were: (1) studies on screening, assessment, and management of sleep quality or sleep disorders in older adults (age ≥ 60 years); (2) studies involving primary healthcare, community rehabilitation service models, and management processes for sleep health; (3) high-evidence-level literature including expert consensus, clinical practice guidelines, meta-analyses, systematic reviews, randomized controlled trials (RCTs), and observational studies; (4) priority given to Chinese and English literature from the past 10 years, with earlier high-quality studies included when necessary. Exclusion criteria were:

(1) studies not involving sleep assessment, intervention, or long-term management; (2) low-quality studies such as case reports, conference abstracts, and non-peer-reviewed literature; (3) non-Chinese or non-English literature.

1.5 Consensus Development Process

Based on the retrieved evidence and considering China's clinical realities, rehabilitation resources, and primary healthcare experience, the drafting group prepared the initial draft. Given that this consensus primarily aims to propose management processes and guide primary care practice, we did not adopt the GRADE system for recommendation strength and evidence grading. Some recommendations were referenced from existing systematic reviews or clinical trials with appropriate citations, while others were formulated through multidisciplinary expert discussions. Between March and May 2025, the Community Rehabilitation Working Committee organized three plenary sessions where the drafting experts conducted repeated discussions and revisions, evidence-based medicine experts reviewed the methodology, and the guidance expert panel finalized the manuscript. For contentious issues, the working group engaged in thorough discussion and consultation, with consensus considered reached when over 75% of experts agreed. Content that failed to reach consensus after revision and re-evaluation was excluded from the final version.

1.6 Publication, Dissemination, and Update

To promote dissemination and clinical application, this consensus will be published in professional journals and subsequently promoted nationwide through academic conferences, training workshops, and online lectures. The consensus development working group will conduct regular literature searches, evidence updates, and evaluations, with plans to revise the consensus every five years.

2. Definitions

2.1 Sleep-Wake Cycle

Sleep comprises two physiological states: non-rapid eye movement (NREM) sleep and rapid eye movement (REM) sleep. NREM sleep is further divided into three stages based on electroencephalographic characteristics: N1 represents the transition from wakefulness to sleep, typically lasting several minutes; N2 is characterized by slowing heart rate and breathing, decreasing body temperature, and brain activity dominated by sleep spindles and K-complexes, lasting several tens of minutes; N3, also known as slow wave sleep (SWS), features the lowest heart rate, breathing, and blood pressure of the day, with brain activity dominated by delta waves, marking deep sleep [?]. REM sleep is a complex neurophysiological state currently considered the deepest sleep stage. Normal sleep consists of periodically alternating NREM and REM cycles, with each cycle lasting approximately 90 minutes and comprising 4-5 cycles per night [?].

2.2 Sleep Health

Sleep health is a positive, comprehensive framework encompassing multiple sleep characteristics including regularity, daytime functioning, duration, continuity, efficiency, satisfaction, and quality. It extends beyond individual symptoms and disorders and can be viewed as a continuous indicator measuring sleep status across populations, facilitating nuanced understanding and evaluation of individual sleep patterns and providing personalized guidance for sleep improvement [?].

2.3 Sleep Quality

Sleep quality represents one dimension of sleep health. The US National Sleep Foundation identifies 11 indicators for good sleep quality across three dimensions: (1) sleep continuity indicators including sleep onset latency, number of nighttime awakenings (each >5 minutes), wake-time after sleep onset (WASO), and sleep efficiency; (2) sleep architecture indicators including proportions of REM, N1, N2, and N3 sleep; and (3) nap-related indicators including number of naps within 24 hours, single nap duration, and weekly nap frequency [?]. Reference ranges for these indicators vary by age group (see Table 1). Generally, shorter sleep onset latency and WASO, fewer nighttime awakenings, and higher sleep efficiency are considered core manifestations of good sleep quality.

2.4 Sleep Disorders

Based on the harmful dysfunction framework, sleep disorders are defined as syndromes in which individuals experience clinically significant disturbances in sleep quality, quantity, rhythm, or wake-sleep cycles due to dysregulation of the brain' s dynamic functional sleep-wake control mechanisms or abnormalities in other physiological, developmental, and behavioral regulatory systems during sleep [?]. According to the International Classification of Sleep Disorders (Third Edition), sleep disorders comprise seven core categories: insomnia, sleep-related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, sleep movement disorders, parasomnias, and other sleep disorders, each containing specific diseases or symptom clusters [?]. The National Patriotic Health Campaign Office' s “Core Information and Interpretation on Sleep Health”clarifies that sleep disorders include over 90 conditions categorized into three major types: “difficulty falling asleep,” “difficulty staying awake,” and “poor sleep quality” [?].

2.5 Sleep Rehabilitation

Currently, no unified, authoritative definition of “sleep rehabilitation” exists in domestic or international literature and guidelines. Based on the whole-cycle rehabilitation concept, this consensus proposes that sleep rehabilitation is a process of whole-cycle rehabilitation management for sleep health across all populations, with sleep function as the core target and non-pharmacological therapies

as the primary intervention, combined with specialized treatment when necessary. It aims to maintain and improve sleep function, promote overall health, delay functional decline, and enhance individual quality of life. Unlike previous connotations of sleep disorder treatment, sleep rehabilitation emphasizes continuous management of sleep as a health function, with management targets including not only individuals diagnosed with sleep disorders but also those with declining sleep function and those without apparent sleep problems but with relevant risk factors.

3. Physiological Changes in Sleep Among Older Adults

Sleep problems in older adults are not entirely natural consequences of aging, necessitating differentiation between normal and abnormal sleep changes. With natural aging, sleep undergoes a series of physiological changes that, while not entirely pathological, may lead to decreased sleep quality and affect daily functioning and health status [?].

3.1 Sleep Duration

Meta-analyses show that for every 10-year increase in age, total sleep duration decreases by 10.1 minutes in healthy adults. This decline is more pronounced in middle-aged and young populations, stabilizing after age 60 [?].

3.2 Sleep Patterns

Changes in sleep patterns among older adults include advanced sleep phase, reduced ability to initiate and maintain sleep, shortened nocturnal sleep duration, increased frequency of daytime naps, and more frequent and prolonged nighttime awakenings.

3.3 Sleep Architecture

Structural changes in older adults' sleep primarily manifest as prolonged sleep onset latency, decreased sleep efficiency, reduced proportions of SWS and REM sleep, increased proportions of N1 and N2 sleep, lowered sleep arousal threshold, and sleep fragmentation due to multiple awakenings.

3.4 Circadian Rhythm Changes

With aging, the stability of circadian rhythms declines, affecting sleep quality and regularity. Specific changes include advanced sleep-wake cycle phase, earlier secretion of key hormones such as melatonin and cortisol, reduced amplitude of circadian-regulated physiological processes, and diminished capacity to adapt to phase changes, requiring more time to recover stable rhythms after transmeridian travel or shift work [?].

3.5 Endocrine Changes

Aging brings significant changes in the secretion of multiple hormones related to sleep regulation, affecting sleep structure and quality. These include: (1) Growth hormone: Reduced nocturnal secretion in older adults may directly or indirectly lead to decreased SWS proportion; (2) Cortisol: Older adults are prone to elevated nocturnal cortisol levels and advanced rhythm phase, potentially causing reduced SWS and frequent nighttime awakenings; (3) Prolactin: Normally increases after sleep onset, but reduced SWS or sleep fragmentation limits its nocturnal secretion, with older adults showing significantly lower nocturnal prolactin levels than younger individuals; (4) Thyroid-stimulating hormone: Total secretion decreases in older adults, though circadian rhythm phase characteristics remain largely unchanged; (5) Melatonin: Nocturnal secretion significantly decreases in older adults while daytime baseline levels remain unchanged; (6) Sex hormones: Male testosterone levels continuously decline after age 30, with older men potentially losing circadian rhythmicity and experiencing further suppression due to sleep fragmentation. In postmenopausal women, estradiol significantly decreases with elevated follicle-stimulating hormone, potentially causing difficulty falling asleep and sleep maintenance problems. Reduced progesterone may also increase the risk of sleep-disordered breathing in postmenopausal women [?].

4. Objectives and Basic Requirements for Sleep Health and Rehabilitation Management in Community-Dwelling Older Adults

Recommendation 1: All older adults receiving health management services in primary healthcare institutions should be included in sleep health and rehabilitation management, with family doctor contract teams serving as the core to establish sleep rehabilitation management teams for older adults. These teams should be staffed according to actual conditions, ideally including general practitioners, rehabilitation physicians, traditional Chinese medicine physicians, psychiatrists, endocrinologists, orthopedic surgeons, nutritionists, rehabilitation therapists, psychotherapists, and nurses, while establishing a complete “two-way referral” mechanism to effectively improve sleep problems in community-dwelling older adults.

4.1 Management Target

Older adults aged 65 and above receiving health management services in primary healthcare institutions.

4.2 Management Objectives

Primary healthcare institutions provide health services to over half of China's older adult population and possess unique advantages in sleep rehabilitation

management, enabling earlier and more timely attention to older adults with sleep problems and intervention at early stages to reduce risks of various physical and mental diseases derived from sleep disorders. Therefore, management objectives include: (1) Regular screening and follow-up of sleep disorders; (2) Sleep health education to improve older adults' awareness and knowledge of maintaining sleep health; (3) Expanded psychosocial support for older adults with sleep disorders; (4) Identification and effective management of major physical diseases and depression that may affect sleep; (5) Provision of rehabilitation therapy to improve sleep disorders when conditions permit; (6) Referral to psychiatrists and sleep specialists when necessary [?].

4.3 Sleep Rehabilitation Management Team Responsibilities

Sleep disorders in older adults involve not only sleep itself but also multiple factors including pain, medical diseases, psychiatric conditions, medication effects, social participation, and lifestyle/environmental changes, requiring multidisciplinary team collaboration and multi-level intervention based on preventive healthcare [?].

Family Doctor/General Practitioner: As the primary responsible person for sleep rehabilitation management, the family doctor should coordinate with chronic disease health management, mainly responsible for screening, assessment, and tiered management of older adults' sleep status, identifying potential risk factors for sleep disorders, developing preliminary intervention plans based on individual conditions, referring to higher-level hospitals when necessary, and participating in follow-up and intervention effect evaluation.

Nurse: Responsible for individualized sleep health education and daily follow-up for older adults, assisting in sleep health screening and health record management, and cooperating in follow-up and home guidance.

Rehabilitation Therapist: Responsible for detailed sleep health assessment, providing safe and appropriate exercise intervention guidance, muscle relaxation training, breathing training, and non-pharmacological interventions such as neuromodulation, regularly evaluating sleep improvement, and timely adjusting rehabilitation content.

Psychotherapist: Responsible for providing psychological support and counseling for older adults with anxiety, depression, or loneliness, providing cognitive behavioral therapy (CBT) or other psychological treatments when necessary, assisting in screening for severe psychological disorders, and guiding referral processes.

5. Rehabilitation Screening and Assessment

5.1 Basic Data Collection

Recommendation 2: General practitioners should systematically collect basic sleep-related information during initial assessment, including subjective sleep

symptoms, medical history, mental status, physical examination findings, and medication use, to preliminarily differentiate primary from secondary sleep disorders and inform subsequent intervention decisions and tiered management.

Sleep History: Inquire with older adults or their caregivers about sleep disorder-related symptoms and triggers, daytime functional impairment, sleep habits, sleep duration, sleep quality, sleep environment, history of mental disorders or cognitive dysfunction, and evaluate the impact of environmental noise, light, sleep schedule changes, and nocturnal thirst on sleep [?].

Physical Examination: Combine basic physical examination with common chronic disease assessment to preliminarily determine whether older adults have comorbidities related to sleep disorders, focusing on evaluating the impact of hypertension, diabetes, respiratory diseases (such as chronic obstructive pulmonary disease), cardiovascular disease, and neurological disease treatment and care on sleep.

Medication Use: Understand older adults' medication use, particularly drugs that may affect sleep such as diuretics, glucocorticoids, sedative-hypnotics, antidepressants, and antipsychotics.

5.2 Subjective Assessment

Recommendation 3: Primary healthcare providers may use simple, feasible scales to assess older adults' sleep status, covering sleep quality evaluation, sleep disorder screening, sleep health level, sleep hygiene behaviors, and related psychological states. For older adults with cognitive impairment or who cannot cooperate with assessment, relevant information may be obtained from family members or caregivers.

Sleep Quality Assessment: The Pittsburgh Sleep Quality Index (PSQI) is recommended for evaluating overall sleep quality in older adults. PSQI is a reliable and valid tool for assessing subjective sleep quality in older adults, comprising 7 dimensions: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, daytime dysfunction, sleep disturbances, and sleep medication use, with 9 items total, requiring 5-10 minutes to complete and scoring 0-21 points [?]. Based on PSQI scores, corresponding interventions are recommended (Table 2).

Sleep Disorder Screening: For older adults with suspected or confirmed sleep disorders, appropriate scales should be selected for screening or severity assessment. The Insomnia Severity Index can be used for insomnia assessment; STOP-BANG, Berlin Questionnaire, or OSA-50 screening questionnaire for obstructive sleep apnea (OSA) risk screening; Epworth Sleepiness Scale for daytime sleepiness assessment (though it poses certain difficulties for older adults, particularly those with cognitive impairment, and its reliability and validity require further research); Sleep Functional Outcome Questionnaire for assessing the impact of daytime sleepiness on daily activities and quality of life; and In-

ternational Restless Legs Syndrome Scale for evaluating restless legs syndrome (RLS) symptom intensity, frequency, sleep problems, and impact on mood and daily life [?].

Sleep Health Assessment: The Regular-Satisfaction-Alertness-Timing-Efficiency-Duration (RU-SATED) scale can be used for sleep health assessment. This 6-item scale uses a 0-2 Likert 3-point scoring system, with total scores ranging 0-12, where higher scores indicate better sleep health. The scale has been translated into Chinese and validated across cultures, demonstrating good reliability, with assessment requiring 1-2 minutes [?].

Sleep Hygiene Assessment: The Sleep Hygiene Awareness and Practice Scale (SHAPS) can objectively assess the degree to which environment and personal behaviors affect sleep, helping identify poor sleep hygiene habits. The Chinese version of SHAPS demonstrates high test-retest reliability with a Cronbach's α coefficient of 0.71 [?]. Although no large-scale studies have investigated sleep hygiene in older adults using SHAPS, primary healthcare providers are recommended to use this scale to assess older adults' sleep hygiene and provide behavioral guidance based on results.

Psychological Assessment: The Geriatric Depression Scale and Geriatric Anxiety Scale can be used to evaluate older adults' mental status.

5.3 Objective Assessment

Recommendation 4: Primary healthcare institutions with available resources should prioritize equipping and using simple, accessible tools such as wrist actigraphy, clinically validated millimeter-wave radar sleep monitors/mattresses, and other wearable sleep monitoring devices for objective sleep assessment in older adults, combined with portable polysomnography (PSG) for further diagnosis when necessary.

Objective sleep monitoring mainly includes PSG, portable PSG, wrist actigraphy, multiple sleep latency test, and wearable/non-contact sleep monitoring devices. Different objective assessment methods offer distinct advantages in indications, accuracy, and accessibility (Table 3), requiring rational selection based on assessment purpose, individual circumstances, and resource conditions.

6. Sleep Rehabilitation Management Content

6.1 Health Records

Recommendation 5: Based on the existing Resident Health Records required by the National Basic Public Health Service Standards, sleep-related content should be added for older adults, including sleep history, sleep disorder assessment results, medication use, psychological status, comorbidities, and use of sleep assistive devices and activities of daily living.

6.2 Sleep Rehabilitation Management Principles

Recommendation 6: Primary healthcare institutions should develop differentiated sleep rehabilitation management strategies based on older adults' sleep status and health risks. For those without apparent sleep disorders, the focus should be on promoting healthy sleep and preventive intervention. For those with primary sleep disorders, initial rehabilitation management should prioritize non-pharmacological interventions. For secondary sleep disorders, priority should be given to identifying and intervening in relevant underlying diseases, medications, and psychological factors, with referral to higher-level medical institutions when necessary.

6.3 Sleep Health Education

Recommendation 7: All older adults should receive sleep health education to inform them about normal physiological changes in sleep with aging, avoid excessive worry, assist in creating a good sleep environment, establish regular sleep schedules, receive adequate natural light exposure, engage in appropriate daytime exercise, and receive pre-sleep behavioral guidance.

Currently, no unified standard exists for sleep health education content, with definitions and components varying across studies. Synthesizing existing research, it can be defined as a comprehensive management strategy to promote healthy sleep through establishing regular schedules, optimizing sleep environment, and adjusting daily behaviors. Its core components include three dimensions: (1) Behavioral regulation, including management of caffeine and alcohol intake, timing of exercise/physical activity, maintaining sleep duration/regularity, napping, smoking, pre-sleep relaxation, stimulus control, eating, sleep restriction, and rational use of sleep medications and other substances; (2) Environmental optimization, including adjustment of physical space elements such as light regulation, noise control, temperature regulation, and comfortable bedding; (3) Regulation of psychological factors affecting sleep such as stress [?].

6.4 Psychotherapy

Recommendation 8: Primary healthcare institutions with available resources may provide psychotherapy services including CBT, mindfulness therapy, group psychotherapy, and digital intervention methods to improve sleep quality in older adults.

Multiple meta-analyses and RCTs have demonstrated that psychotherapy can effectively improve sleep quality and insomnia symptoms in older adults. CBT is the first-line treatment for chronic insomnia, with RCTs and pre-post studies showing it most significantly reduces insomnia severity in older adults while improving sleep efficiency, shortening sleep onset latency, reducing WASO, and decreasing hypnotic medication use [?]. Digital CBT can serve as an effective alternative when primary healthcare resources are limited, providing efficient, remote insomnia intervention for older adults. Meta-analyses show digital CBT,

as a scalable and widely accessible treatment, can effectively improve insomnia, anxiety, and depression symptoms in adults aged 65 and older [?]. Mindfulness therapy is an intervention that enhances sleep experience and reduces sleep maintenance difficulties through meditation and mindfulness practices. An RCT of 127 older adults showed mindfulness therapy effectively reduced PSQI and Insomnia Severity Index scores and improved objective sleep indicators including sleep onset latency and WASO compared to traditional sleep hygiene combined with exercise intervention [?].

6.5 Rehabilitation Therapy

Recommendation 9: Primary healthcare institutions may adopt multiple rehabilitation approaches to improve sleep problems based on resource availability and older adults' specific conditions, prioritizing safe, evidence-based interventions such as individualized exercise therapy, music therapy, and light therapy. With professional equipment and personnel, emerging technologies such as repetitive transcranial magnetic stimulation (rTMS), transcutaneous auricular vagal nerve stimulation (ta-VNS), and virtual reality (VR) therapy may be implemented.

Exercise Therapy: A meta-analysis of 3,937 older adults showed exercise interventions positively affected sleep quality, significantly improving sleep quality, reducing insomnia severity, increasing sleep efficiency, and decreasing WASO, though no significant effects were found for daytime sleepiness, sleep onset latency, or nighttime awakenings [?]. Among exercise types, aerobic exercise was most effective for improving PSQI total scores, while yoga showed better effects on sleep disturbances, sleep efficiency, sleep duration, and daytime dysfunction [?].

rTMS: Systematic reviews indicate rTMS stimulation of bilateral dorsolateral prefrontal cortex (DLPFC), right parietal cortex, and dominant primary motor cortex (M1) can treat primary insomnia, while stimulation of bilateral M1 leg areas, left primary somatosensory cortex, and left M1 can improve RLS subjective symptoms and severity, with effects lasting several weeks. However, no efficacy was observed for OSA or narcolepsy (Table 4) [?]. RCT studies show that 1 Hz rTMS applied to the right DLPFC can enhance the effect of Tai Chi on improving PSQI scores in older adults with mild cognitive impairment and comorbid sleep disorders [?].

Transcranial Direct Current Stimulation (tDCS): An RCT of 14 older adults with chronic pain and subjective sleep problems showed tDCS improved pain scores but not sleep compared to sham stimulation [?]. A study of depressed patients with comorbid insomnia showed tDCS improved sleep efficiency and PSQI total scores [?]. Other research indicates tDCS applied to the sensorimotor area had no significant effect on drug-naïve RLS patients [?]. Therefore, the efficacy of tDCS for improving sleep disorders in older adults requires further investigation.

ta-VNS: RCT studies show a two-week ta-VNS course can improve PSQI scores in community residents [?]. Other studies demonstrate ta-VNS can significantly improve sleep quality and relieve anxiety in older medical staff while reducing symptom severity in severe drug-resistant RLS patients [?].

VR Therapy: An RCT of 63 chronic insomnia patients showed VR therapy improved sleep quality, reduced depression and anxiety symptoms, and simultaneously improved cognitive and autonomic functions [?].

Music Therapy: Meta-analyses show listening to soft or sedative music can effectively improve sleep quality in older adults without cognitive impairment or hearing loss, with sedative music (characterized by slow tempo of 60-80 beats per minute and smooth melodies) showing better effects than rhythmic music, and interventions lasting more than four weeks being more effective than shorter durations, though study quality is variable and evidence is limited [?, ?].

Light Therapy: A meta-analysis showed light therapy effectively improved sleep efficiency (from 73% to 86%) and sleep-wake cycles in older adults living in long-term care facilities, though efficacy may be influenced by light exposure duration, intensity, and equipment, requiring further research to optimize treatment parameters [?]. Light therapy can be delivered through morning bright light exposure, evening or nighttime dim light exposure, natural light exposure, wearable light therapy devices, and light environment modification. Common parameters include exposure between 7:00-12:00, duration of 30-120 minutes, intervention lasting 1 week to several months, and intensity typically 2,500-10,000 lux. Based on exposure intensity and duration, strategies can be categorized as short-term (30-60 minutes) high-intensity exposure ($\$ 10,000lux$), *relatively long-term* (1-2 hours) moderate-intensity exposure (2,500 - 10,000 lux), and long-term (1-4 hours or all-day) low-intensity exposure ($\$ 2,500 lux$), all reported to improve sleep efficiency and subjective sleep indicators in older adults.

6.6 Traditional Chinese Medicine Care

Recommendation 10: Primary healthcare institutions should expand the application of traditional Chinese medicine in sleep health management for older adults according to local resources and service capacity, using approaches such as acupuncture, herbal medicine, traditional exercise, and auricular therapy.

Traditional Chinese medicine demonstrates certain efficacy in treating sleep disorders with broad public acceptance and feasibility for primary healthcare application. Given the extensive content, varying evidence levels, and need for standardized clinical pathways, this consensus does not prioritize traditional Chinese medicine interventions but lists commonly used methods for clinical reference.

Acupuncture: Data mining studies exploring acupuncture point selection patterns for geriatric sleep disorders indicate that conditions can be differentiated

into heart-spleen deficiency, liver depression transforming into fire, heart-kidney non-interaction, stomach qi disharmony, heart-gallbladder qi deficiency, and yin deficiency with fire effulgence patterns. Acupuncture treatment should follow principles of harmonizing yin-yang and calming the heart to tranquilize the spirit, emphasizing spirit and qi regulation, with core point combinations including Shenmen (HT7), Baihui (GV20), Sanyinjiao (SP6), Neiguan (PC6), and Sishencong (EX-HN1), with point selection adapted according to pattern differentiation [?].

Herbal Medicine: According to the “Clinical Practice Guidelines for Integrated Traditional Chinese and Western Medicine Rehabilitation for Insomnia,” insomnia patients may be treated with Chinese patent medicines such as Zaoren Anshen Capsule, Shumian Capsule, Wuling Capsule, and Tianmeng Oral Liquid to relieve corresponding symptoms, or with herbal formulas such as Suanzaoren Decoction and Chaihu Longgu Muli Decoction combined with conventional Western medicine treatment [?]. However, when combining Chinese and Western medicine for sleep disorders in older adults, special attention must be paid to drug interactions, individual pharmacokinetic characteristics, and effects of comorbidities. Family doctors should conduct regular medication reviews and strengthen monitoring of sleep, blood pressure, blood glucose, and fall risk after medication.

Traditional Exercise: Meta-analyses show that traditional exercise training three times per week or more and aerobic exercise both significantly improve overall sleep quality in older adults, with traditional exercise showing greater advantages, and qigong demonstrating greater intervention effects than Tai Chi [?]. Another meta-analysis showed that Baduanjin practice for more than 12 weeks can improve insomnia severity in older adults as an effective complementary therapy [?].

Auricular Therapy: RCT studies show that compared with using vaccaria seeds, magnetic bead auricular point pressing at seven ear points including Shenmen, Heart, Kidney, Liver, Spleen, Occiput, and Subcortex for three weeks can further improve sleep quality in older adults and maintain long-term effects [?].

7. Sleep Rehabilitation Management Process for Community-Dwelling Older Adults

Recommendation 11: Primary healthcare institutions may develop sleep rehabilitation management processes for older adults in their jurisdictions based on the flowchart provided in this consensus (Figure 1 [Figure 1: see original paper]), which should include key stages of initial screening and record establishment, assessment and tiered management, and dynamic follow-up and effect evaluation.

7.1 Initial Screening and Record Establishment

7.1.1 Obtain subjective sleep status information by asking older adults or their caregivers, and use PSQI for preliminary assessment of those with sleep complaints or previous sleep disorder history.

7.1.2 Older adults with PSQI total score ≥ 5 , or self-reported insomnia ≥ 3 times per week for ≥ 3 months, should be included in the community sleep health key management population, with detailed sleep history, physical examination findings, comorbidities, and medication history collected to establish health records.

7.2 Assessment and Tiered Management

7.2.1 Sleep Disorder Type Preliminary Determination and Assessment Methods: Combine chief complaints and comorbidities to preliminarily determine sleep disorder type, including primary insomnia, OSA, circadian rhythm sleep-wake disorders, and insomnia comorbid with chronic diseases or mood disorders. Use corresponding standardized assessment scales (e.g., Insomnia Severity Index, OSA-50) to evaluate severity. Primary healthcare institutions with available resources may combine objective assessment methods such as wrist actigraphy, portable PSG, or smart sleep monitoring devices. Develop individualized tiered management plans based on comprehensive assessment results.

7.2.2 Intervention Measures and Referral Recommendations: For older adults assessed with mild sleep disorders, prioritize non-pharmacological interventions including sleep health education, aerobic exercise intervention, CBT, transcranial magnetic stimulation, and traditional Chinese medicine care, with an initial intervention cycle of 4-8 weeks. Studies show that one-year community-based non-pharmacological therapy can significantly improve sleep disorders in older adults [?]. For those with severe symptoms, suspected severe OSA, or complex physical/psychiatric comorbidities, timely referral to sleep specialists or relevant departments in higher-level medical institutions is recommended, with follow-up and management maintained. Pharmacological intervention may be used under professional guidance when necessary, following principles of low dose, short course, and individualized medication to ensure safety and effectiveness.

7.3 Dynamic Follow-up and Effect Evaluation

For older adults with good sleep quality and no apparent sleep disorder symptoms, routine follow-up every 6 months is recommended. For those in the sleep health key management population, follow-up every 1-3 months is recommended based on individual conditions. Follow-up content includes patient feedback, subjective scale assessments, and wearable device monitoring data. For those with good follow-up results, original plans may be continued or intervention frequency reduced until complete recovery. For those with poor follow-up results

or worsening symptoms, intervention methods should be adjusted and referral to higher-level medical institutions for further evaluation and treatment should be considered when necessary.

As China's population structure gradually moves toward deep aging, sleep problems in older adults have become increasingly prominent, representing an important public health issue affecting their quality of life and health outcomes. Primary healthcare institutions, as the first line of defense in health management for older adults, should play a crucial role in sleep health and rehabilitation management. This consensus, based on current domestic and international research evidence and clinical practice experience, considers community feasibility and provides specific recommendations on key aspects including sleep rehabilitation management requirements, screening and assessment, tiered interventions, and follow-up management, emphasizing a comprehensive management strategy primarily based on non-pharmacological interventions supplemented by pharmacological interventions, and advocating the concept of "whole-cycle rehabilitation."

The innovation of this consensus lies primarily in: (1) Proposing, for the first time within China's older adult health management framework, the concept and connotation of "sleep rehabilitation," emphasizing function-oriented and long-term management; (2) Unlike previous sleep disorder guidelines focusing on clinical diagnosis and treatment, this consensus is practice-oriented for primary care, using PSQI as the core tool to construct an operational screening-intervention-follow-up pathway and providing a community-applicable flowchart. However, this consensus also has limitations: (1) Recommendations are based on expert experience and existing evidence, with some content still lacking high-quality, multi-center RCT support and requiring improved evidence levels; (2) China's primary healthcare resource allocation shows significant regional and urban-rural disparities. The management process proposed in this consensus represents an ideal pathway framework, primarily targeting primary healthcare institutions with preliminary rehabilitation capabilities and relatively complete older adult health service systems. Specific implementation should be advanced according to local resources, staffing, and older adult characteristics, avoiding mechanical copying. In summary, this consensus is applicable for guiding practice in sleep health and rehabilitation management for older adults in China's primary healthcare institutions, suitable for managing mild-to-moderate sleep disorders and at-risk populations. For severe symptoms or complex comorbidities, timely referral should follow the process, avoiding direct equivalence of this consensus content with specialized diagnosis and treatment pathways. Future efforts should focus on continuous high-quality community intervention research, improving tiered management strategies and assessment tool systems, enhancing primary healthcare providers' professional capabilities, and jointly promoting the standardization and systematization of sleep rehabilitation services for older adults in China.

Consensus Development Group for the Chinese Expert Consensus

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