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978-0-521-89670-2 - Principles and Practice of Geriatric Sleep Medicine

S. R. Pandi-Perumal, Jaime M. Monti and Andrew A. Monjan

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Principles and Practice of Geriatric Sleep Medicine

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Dedicated to our wives and families for making our lives special and
all our efforts worthwhile

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Foreword

There is no question that we live in a world increasingly filled with multiple, contradictory, and rapidly changing stimuli. The invention of artificial lighting in the nineteenth century improved and transformed the lives of millions, as well as the later inventions of television, the personal computer, and the Internet, all serving as risk factors leading to decreased sleep. We now have the high-intensity, 24/7 world. It is becoming evident that the great technological and social changes that now characterize modern life have contributed also, at least somewhat, to the increasing incidence of sleep disorders.

In the last 30 years sleep medicine has begun to flourish, with greater interest being shown by clinicians in sleep disorders and increasingly larger numbers of research grants being given to study them. These developments have greatly enhanced our understanding of the reciprocal causal relationship that exists between disease and sleep.

At the same time, population aging and longevity have increased. In the twentieth century people living in the developed world gained some 30 additional years of life, a sudden extension of the human lifespan, which was greater than had been attained during the preceding 5000 years of human history. As people have begun to live longer, especially after

50 years of age, the problems of achieving restorative or even minimally adequate sleep has become an important life concern. As individuals age they increasingly face problems related to getting to sleep, staying asleep, achieving deep, restful sleep, and waking up at normal times. The problem of disrupted sleep and its sequelae for overall health has now led to the development of the new field of geriatric sleep medicine.

This book *The Principles and Practice of Geriatric Sleep Medicine* provides an overview of this important and complex subject with contributions from authors from around the world. It begins with a review of the important changes in circadian rhythm in aging. It places into context the significance of the middle-age transition to old age and the impact of Alzheimer's disease. The volume has also attempted to address practical issues that inevitably come to the attention of clinicians but which also have a broader social impact, namely, life adjustment issues and traffic safety of older persons. It covers major diseases of old age in nursing home residents. It ends with important therapeutic considerations.

Robert N. Butler
New York

Preface

Sleep is essential to our well-being and occupies about a third of our lives. When deprived of an adequate amount of sleep, individuals are subject to fatigue, clouded thinking, and possible metabolic dysregulation leading to diabetes and obesity, and to a diminished quality of life. For older people, these symptoms can be more than a matter of discomfort; they can lead to more serious complications. Falls resulting from fatigue and confusion, for example, can result in debilitating, costly injuries in this vulnerable population. The importance of recognizing and treating age-associated health problems, such as sleep disorders, takes on a new meaning as the nation's elderly population grows to record numbers. Despite the widely held view that sleep difficulties are a normal accompaniment of the aging process there are, in fact, many healthy older adults who report few or no sleep problems. Sleep patterns change with age, but disturbed sleep and waking up tired every day are not part of normal aging. For many among the older population, the root causes of disturbed sleep are the various underlying medical and social problems that also tend to increase as people grow older. Apart from the symptomatic effects of illness or life stressors on sleep, there are nevertheless normal developmental changes in sleep that occur with advancing age. An understanding of these changes will hopefully lead to advances in current techniques for preventing or reducing the economic and social impact of these changes in the older population.

The Institute of Medicine report ("Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem"), issued in 2006, estimated that 50 to 70 million Americans chronically suffer from sleep disorders that interfere with their daily functioning and adversely impact their health and quality of life (QoL). These often go unrecognized and/or are treated inappropriately. It has been estimated that over 50% of older Americans have some chronic sleep problem. The American population aged 65 years and older now constitute about 13% of the

population and is projected to increase to over 20% of the population by the middle of the twenty-first century. The increase in the older populations is seen world-wide and reflects the "squaring" of the population distribution. In fact, the World Health Organization projects that by 2015, the proportion of people 65 years and older in the world will exceed those younger than 5 years of age.

Sleep disorders become increasingly common in later life, and are often co-morbid with other age-related health problems. Complaints about sleep in general increase with age, as do specific complaints of insomnia. Estimates of the prevalence of insomnia in the elderly vary widely depending upon the definition of insomnia and the method of assessment used. In one study conducted by the National Institute on Aging (NIA) on over 10 000 older adults living in the USA, 28% of the respondents reported difficulty falling asleep, and 42% reported both difficulty falling asleep and difficulty staying asleep, and it has been estimated that over 50% of people 65 years and older had at least one chronic sleep complaint (Foley *et al.*, 1995). At a 3-year follow-up, 15% of the individuals with sleep complaints at the initial interview did not report sleep difficulties, and 5% of those without sleep complaints at the initial interview complained of difficulties 3 years later (Foley *et al.*, 1999). Further analyses of these data showed that only 5.8% of individuals without risk factors for insomnia, identified as medical, psychosocial or psychiatric difficulties, at the initial visit, reported new insomnia at follow-up. These data suggest that sleep complaints are generally quite common in older adults, that developing new difficulties with sleep is associated with poor health or psychological factors, and that resolving sleep difficulty is related to better health quality. The result of 1000 telephone interviews of randomly selected adults in the USA indicated that the prevalence of occasional insomnia did not change with age; however, the prevalence of chronic insomnia was highest (20%) in adults age 65 and over (Ancoli-Israel and Roth, 1999). This

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Preface

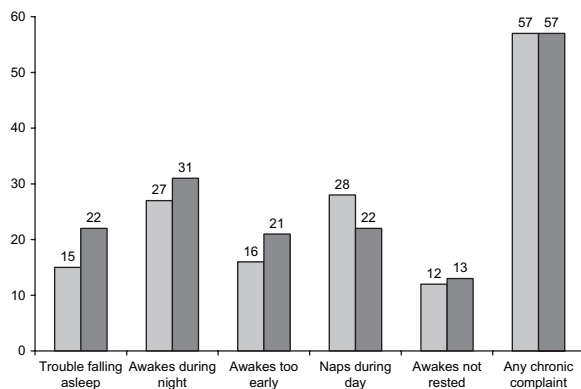


Figure 1. Percent distribution of sleep complaints (Foley *et al.*, 1995). Left bars are men and right bars are women.

suggests that, although occasional sleep complaints may not be associated with age, older adults experience chronic sleep difficulties more often than younger adults.

Older individuals usually take multiple medications, some of which may interfere with their sleep, and often use hypnotics and over-the-counter drugs to deal with their sleep problems. Further, with advancing age the body undergoes a number of physiological changes and associated stresses. Among these are changes in homeostatic and circadian processes, responses to drugs and their metabolism, changes in their hormonal levels, cardiovascular and metabolic diseases, and sensory changes, all of which can adversely affect sleep. The proportion of commonly reported sleep problems also changes as people age. Several sleep disorders that are more prevalent in the older population include co-morbid insomnia, sleep disordered breathing, restless legs syndrome, advanced sleep phase syndrome, and disordered sleep associated with neurodegenerative diseases such as Alzheimer's disease and Parkinson's disease.

Several therapeutic strategies have been employed in treating sleep disorders, particularly insomnia. These include but are not limited to pharmacological strategies using recently introduced melatonergic agonists such as Ramelteon as well as chronotherapeutic interventions involving the delivery of drugs at strategic times. Much work remains to be done in testing the safety and efficacy among older subjects of these recently introduced

pharmaceuticals. Other non-pharmacological alternative and cognitive behavioral therapies, such as bed restriction, behavioral modification, sleep hygiene, etc., can also play critical roles in the treatment and management of age-related sleep disorders. The evidence reviewed in this volume supports the conclusion that sleep disorders are closely linked to overall health and that efforts aimed at reducing these disorders can reduce the severity of other health problems. This evidence further supports the inference that the prevention and treatment of sleep difficulties in the elderly has significant implications not only for the affected individuals, but also for care-givers and for the nation's public health concerns generally.

The editors of the present volume have assembled chapters that summarize and review some of the latest discoveries concerning basic and clinical aspects of geriatric sleep medicine. To this end a number of outstanding contributions have been sought from acknowledged experts in their respective fields. This volume also recognizes that a broad range of factors influence sleep in the elderly. The editors' goal therefore has been to present the more recent developments in the fields of sleep and geriatrics, and to provide a context for considering them both in depth and from a multidisciplinary perspective. This volume thus brings together the expertise of clinicians and basic researchers representing a range of interests in neuroscience, neuropharmacology, sleep physiology, and biological rhythms.

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Credits and acknowledgments

This volume owes its final shape and form to the assistance and hard work of many talented people. Creating a book, which surveys a broadly interdisciplinary field such as sleep and geriatric medicine, involves the collaborative scholarship of many individuals. We express our profound gratitude to the many people who have helped and also to some who have contributed without realizing just how helpful they have been.

Our sincere appreciation goes to Dr. Butler, who graciously agreed to write the Foreword. We wish to express our appreciation for his contribution.

The editors wish to express their sincere appreciation and owe endless gratitude to all our distinguished contributors for their scholarly contributions that facilitated the development of this volume. Our largest debt obviously goes to our outstanding authors who, regardless of how busy they were, managed to find time for this project. They, in a most diligent and thoughtful way, have brought a wide range of interests and disciplines to this volume entitled *Principles and Practice of Geriatric Sleep Medicine*. They accepted our submission deadlines and tolerated with great patience our repeated requests on special formatting requirements, our frequent phone calls, and our bombardment with high-priority email messages.

It is of course a pleasure to thank our many colleagues who commented on individual chapters and have provided invaluable suggestions: we are indebted to them all. A very special debt of gratitude and appreciation is owed to the several reviewers who made numerous helpful suggestions. Their candid comments and insights were invaluable.

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The editors would also like to acknowledge the close co-operation we have received from each other. We think we made a good team, even if we say it ourselves!

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Credits and Acknowledgments

this process could have been incomplete. Thus, if any copyrights have been overlooked, the publisher will ensure correction at the first opportunity for subsequent reprint of this volume.

Last, but certainly not least, we are most grateful to our wonderful wives and families, who provided love and support too valuable to measure. We owe everything to them. Their understanding and patience, wisdom, creativity, constant support, and encouragement while the book was being developed are immeasurably appreciated. Without the love and support of our families and friends, we could not have completed this project. Being able to spend more time with them is our chief reward for finishing. They saw the work through from the conception of an idea to the completion of an interesting project with unwavering

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Without a whole host of dedicated individuals, thus, this volume would have never come to completion. All of the above experts made this volume possible. We recognize them individually and collectively for their contribution. To all these people goes our sincere gratitude. To all the people who contributed to this project we want to say “thank you!” Their willingness to contribute their time and expertise made this work possible, and it is to them that the greatest thanks are due. They made our work possible and pleasurable.

For this, and for so much else, we are ever grateful.

Organization of the first edition

Users of this first edition of this volume will find that it is divided into four major sections: Part 1: Sleep and normal aging; Part 2: Neuroendocrine and homeostatic changes in the elderly; Part 3: Sleep disorders in the elderly; and Part 4: Treatment of sleep disorders in the elderly.

In its 41 chapters, this volume covers a broad range of abnormalities that are associated with sleep in the elderly. Many of the topics relate to problems encountered in clinical practice, while others deal with the more basic foundations of sleep disorders as these are viewed from the perspectives of neuropharmacology and neuropsychology. The volume begins with a review of various practical matters such as sleep complaints and sleepiness. An extensive section deals with one of the most common groups of disorders seen at all levels of medical care, namely, the insomnias. Following this, the therapeutic efficacies of a wide range of pharmacological agents as well as the major approaches to sleep therapy are overviewed.

Part 1 comprises of an overview of the circadian timing system in the elderly: in it are reviewed the age-related changes occurring in the pharyngeal structure and function in normal versus apneic subjects, gender-related sleep issues such as menopause transition and post-menopausal conditions, sleep and memory, and sleep in middle-aged subjects.

Part 2 addresses the neuroendocrine and homeostatic changes associated with advanced aging. This section also addresses the role of melatonin in aging and Alzheimer's disease.

Part 3 addresses the sleep disorders that are commonly present in the elderly population. This section starts with the epidemiology and assessment of the autonomic dysregulation that occurs during sleep among the elderly. Readers should also find useful the in-depth coverage of topics such as circadian rhythm dysregulation in the elderly, and the roles played in its etiology by advanced sleep phase syndrome (ASPS), shift work, and Alzheimer's disease. Other sleep-related disorders such as nocturia,

co-morbid medical conditions such as fibromyalgia, obesity, pain, stroke, and cardiovascular complications, and mental conditions such as anxiety and depression are also covered.

Topics such as sleep and Parkinson's disease, insomnia, narcolepsy, movement disorders, rapid eye movement (REM) sleep behavior disorder, sleep apnea and sleep disordered breathing, sleep in the institutionalized elderly, and sleep in care-givers are reviewed.

Special attention is also given to the effects of fatigue and sleepiness in the elderly and how such risk factors can be managed effectively. This section also discusses the importance of sleep, sleepiness, and their effects on traffic safety in elderly subjects. Other topics include the relationship between sleep and falls and dreaming disorders in the elderly population.

Part 4 includes the treatment of sleep disorders in the elderly; readers are given an overview of geriatric psychopharmacology as well the pharmacological treatment of elderly patients. The risks and benefits of benzodiazepine (BZD) use in the elderly population are considered. Non-pharmacological (cognitive-behavioral) and self-help treatments of primary and co-morbid insomnia in the elderly are also reviewed. Also covered in this part are the epidemiology and use of various medications, including complementary and alternative medicine (CAM) therapies, and their effects on sleep along with the therapeutic benefits of naps and light therapy in the aging population. Finally, this section addresses the role of neuroimaging as an adjunctive tool for treating sleep disorders in the elderly.

The editors of this volume have been fortunate to obtain commitments from leading experts in geriatric sleep medicine to contribute detailed reviews on their topics of expertise, backed up by extensive bibliographies. Inevitably there has been an overlap of information in some of the reviewed material, and occasionally a few gapshave remained despite the

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substantial contributions made by experts in each field. The people we approached are by definition busy people, and we are wholeheartedly grateful to them for giving up so much time to contribute.

It is our hope that this effort has succeeded in its goal of providing a thoughtful balance of basic experimental and clinical viewpoints, and further that it will serve as a foundation for understanding and ultimately treating sleep disorders in the elderly.

It has been our goal to provide a concise yet comprehensive review of the expanding and increasingly multidisciplinary area of geriatric sleep medicine. Inasmuch as we envision continuing updates of this volume, readers are also encouraged to contact us with any thoughts and suggestions for topics to be included in future editions. We welcome communication from our readers concerning this volume and its organization, and especially concerning any inaccuracies or omissions that remain. We take full responsibility for

any such inaccuracies, and we appreciate having them drawn to our attention.

In summary, this volume addresses sleep disorders in the elderly from multiple perspectives. Because this volume is primarily written for clinicians and medical students, it emphasizes the clinical features of the various sleep disorders and therapeutic options that have been developed to treat them.

It is our hope that this volume will enable interested scientific and medical researchers to develop a better understanding of the scope in the science and practice of geriatric sleep medicine. We also hope that this volume will generate new ideas that lead to improvements in the care of geriatric patients who suffer from sleep disorders.

S. R. Pandi-Perumal
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About the editors

S. R. Pandi-Perumal, MSc is the President and Chief Executive Officer of Somnogen Inc, a New York Corporation. An internationally recognized sleep researcher, his interest focuses on sleep and biological rhythms research.

Jaime M. Monti, MD has won many awards for his research, including the Claude Bernard Award (Clinical Sleep Research) from the Government of France, and the Schering Award for Basic Sleep Research, in Germany. He is a member of the International College of Neuropsychopharmacology, Sleep Research Society (USA), European Sleep Research Society, and the Argentinian Society of Sleep Medicine.

Andrew A. Monjan, PhD, MPH was the Chief of the Neurobiology of Aging Branch of the Division of Neuroscience within the National Institute on Aging prior to his retirement. His duties included the development and monitoring of research on brain-behavior interactions in the aging process and their underlying cellular and molecular processes. Sleep research was an important priority within this program, and Dr. Monjan has served as the Executive Secretary of the National Commission on Sleep Disorders Research. He has received a number of NIH Directors' Awards for his meritorious service, and a special recognition award from the Sleep Research Society for his work in furthering research into sleep and aging.