



Postoperative Sleep Disturbances

Understanding and Emerging Therapies

David R. Hillman, MBBS, FANZCA

Department of Pulmonary Physiology and Sleep Medicine, Sir Charles Gairdner Hospital, Centre for Sleep Science, University of Western Australia, Perth, Australia

Keywords

• Anesthesia • Sleep • Sleep disorders • Postoperative management

Key points

- Sleep is disturbed during hospitalization.
- Disturbed sleep impairs health and recovery from illness and surgery.
- Processes adversely affected by sleep loss include cognition, pain perception, psychomotor function, mood, cardiovascular function, metabolism, catabolism, inflammatory responses, and immunity.
- Related problems become evident with very few days of sleep loss.
- Patients with preexisting sleep disorders are at increased risk of these consequences.

INTRODUCTION

Adequate sleep is a necessity for physical and psychological well-being. Even modest sleep loss results in measurable disturbances in cognition, memory, mood, metabolic function, and inflammatory responses. These changes can be seen after several nights of sleep restriction to 5 hours a night in healthy adults, in whom the recommended daily sleep duration is 7 to 8 hours [1]. Inadequate sleep can occur from a variety of sources: insufficient sleep duration; sleep taken out of synchrony with the circadian night/day sleep-wake cycle; or disturbed sleep because of environmental factors, physical discomfort, or the presence of a specific sleep disorder.

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E-mail address: David.Hillman@health.wa.gov.au

Hospitals challenge the sleep of their occupants, both patients and staff, because they are replete with the factors described previously. The postoperative period provides a good example, given the pain and other physical challenges that may be initiated by surgery. These disturb sleep generally, with patients having preexisting insomnia at increased risk of perioperative sleep problems [2]. Surgery in the upper airway may, at least temporarily, aggravate obstructive sleep apnea (OSA) as a result of postoperative edema and persistent impairment of neuromotor responses [3,4]. Thoracic, upper abdominal, head and neck, and neurosurgery may cause or aggravate hypoventilation during sleep through their effects on ventilatory capacity, with patients predisposed to it (eg, those with advanced chronic obstructive pulmonary disease, respiratory neuromuscular disease, or obesity hypoventilation) at particular risk [5,6]. Furthermore, opioid or sedative drugs administered to minimize pain, alleviate anxiety, or aid sleep can also exacerbate preexisting OSA or sleep hypoventilation through depression of ventilatory drive, muscle activation, and arousal responses [7–9].

Poor postoperative sleep has many potentially adverse effects, including cognitive impairment (such as delirium), altered pain perception, mood disturbances, metabolic derangements, and proinflammatory changes [10–15]. Improving sleep perioperatively is likely to be associated with improved well-being, surgical outcomes, and patient safety.

NORMAL SLEEP

The nature of sleep

Sleep is a natural, readily reversible state of decreased awareness and responsiveness that is necessary for recuperation following prolonged periods of wakefulness. During wakefulness, heavily used neural pathways become exhausted. Neural energy stores become depleted and downregulation of synaptic transmission occurs, such that signal-to-noise ratios decrease and information processing becomes impaired [16]. It is thought that some of the sleepiness that accompanies these processes is the result of accumulation of adenosine in the brain because of breakdown of intracellular adenosine triphosphate. Adenosine has an inhibitory effect on neural function. Interestingly, caffeine exerts its stimulant effects by competing for adenosine receptors, blocking adenosine's inhibiting effects. With sleep, there is a decrease in utilization of these heavily trafficked neural circuits, allowing recovery through restoration of synaptic strength and cellular homeostasis [16,17].

However, although a basic purpose of sleep is to rest and recover through decreased utilization of overworked circuits, parts of the brain are quite active, undertaking information processing and memory consolidation from the day's activities and monitoring well-being. This processing function appears to involve building associations between new information and old. A commonly experienced manifestation of this is that problems that are "slept on" are sometimes solved overnight. Memory is consolidated, with useful material retained and nonuseful information cleared, although traumatic memories tend to

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