



Is Adequate Sleep Becoming Outlandish Among Healthcare Professionals? - A Review on Its Toll on Their Health

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ABSTRACT

Sleep deprivation has been hinted to have a deleterious effect on health workers who are involved in multitude of life saving tasks, which often require more attention and concentration. The Centers for Disease Control and Prevention and the national health portal (Government of India) have now recognized sleep deprivation as a public health epidemic. The main effects of sleep deprivation include physical effects (sleepiness, fatigue, or hypertension), cognitive impairment (deterioration of performance, attention, concentration and intellectual capacity and increase of the likelihood of accidents) and mental health complications. Rotational night shift work is often accompanied by insufficient sleep and disruption of circadian phase, each related to repeated errors on task performance as a result of lapses in attention and increased reaction time. Maintaining good quality of sleep is vital for the establishment of positive health and physical/mental well-being; nonetheless, lifestyle and environmental factors are progressively causing hitches in sleeping. Individuals with shift work sleep disorders need a customized and comprehensive therapy that includes counselling, yoga/meditation and behavioural therapy along with requisite pharmacological management, as and when warranted.

Key words: Sleep deprivation, Sleep, Healthcare professional, Public health, Occupational health

INTRODUCTION

Sleep is a process of essence when considering human life. According to Merriam-Webster dictionary sleep is *"the natural, easily reversible periodic state of many living things that is marked by the absence of wakefulness and by the loss of consciousness of one's surroundings, is accompanied by a typical body posture (such as lying down with the eyes closed), the occurrence of dreaming, and changes in brain activity and physiological functioning, is made up of cycles of non-REM sleep and REM sleep, and is usually considered essential to the restoration and recovery of vital bodily and mental functions."*¹

Though outwardly an inert process, existing literature suggests an elevated brain activity throughout sleep in all likelihood.² It has also been suggested

that sleep helps to consolidate existing memories and to make new links which naturally enhances a variety of task performances.² As age goes, responsibilities and duties increase and one often feels that 24 hours is not enough. People often treat sleep as extra working hours, which is available in case you want to borrow an hour or four; and the increasing work pressure keeps gnawing at the hour of potential sleep.³ Along with nutrition and physical activity, sleep has been identified as a component of the 'Performance triad' which is aimed at accomplishing ideal physical, mental, and emotional health and wellbeing.^{4,5} With regard to the Performance Triad, sleep is possibly tougher to regulate than activity and nutrition. Good sleep practices and habits essentially contribute to high quality nighttime sleep and significant daytime alertness.⁶

How to cite this article: Nirupama AY, Vinoth Gnana Chellaiyan D, Ravivarman G. Is Adequate Sleep Becoming Outlandish Among Healthcare Professionals? - A Review on Its Toll on Their Health. Natl J Community Med 2021;12(12):444-448. DOI: 10.5455/njcm.20211215092244

Financial Support: None declared **Conflict of Interest:** None declared

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Date of Submission: 20-11-2021; **Date of Acceptance:** 16-12-2021; **Date of Publication:** 31-12-2021

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The practice of skipping sleep is cultivated from a very young age itself when students pull all-nighters for an assignment or an exam. In this era of 'all work and no play', in a desire to get ahead in their workplace, people are often undertaking new projects at the expense of good sleep giving rise to a 24-hour society with increasing prevalence of unusual work hours.³ The compromise on sleep is an even greater issue among the healthcare professionals. Starting from the college days to their professional days, sleep is more than often questioned by stress, anxiety, emotional disturbances and late working hours or night shifts.⁷

The extended hours that doctors work, and the quantity and quality of their sleep, has been shown to influence their health as well as the safety of patient care.⁷ Safety and efficiency are often compromised because of the effect of sleep deprivation on vigilance, precision and capability to learn. Inadequate sleep has been known to decrease vigilance and increase sleepiness, irritability, and fatigue. However, it's a little known fact that the effect of a single night of sleep deprivation on performance is equivalent to that of a blood alcohol level of 0.08-0.1%.⁸ Sleep deprived doctors were found to benefit from pharmacological enhancement in situations that require efficient information processing, flexible thinking, and decision making under time pressure on more than one occasion signifying the importance of sleep in healthcare practice.⁹ Irrespective of whether sleep deprivation was the upshot of shift work, extended working hours or stress at work, its impact on patient safety as well as health of the medical professionals is sizeable.⁸

Sleep-deprived adults often exhibit moderated emotional resilience, irritability, obesity, and a greater risk for cardiovascular disease.⁸ Sleep deprivation is noted to be taking place parallel to the global upsurge in obesity and metabolic syndrome¹⁰ as well as escalations in depression, anxiety, and other mental health issues.^{11,12} Fascinatingly, a significant association between reduced sleep hours and a pro-inflammatory state has also been noted.¹³ Disturbances in circadian rhythm due sleep alteration has been reported to have a significant effect on selected endocrine parameters¹⁴ and metabolic pathways.¹⁵ Notably, insulin resistance and immunologic modifications have been noted as a result of poor sleep patterns, in terms of quantity and quality; whereas, depression, anxiety, and stress seems to interfere with sleep to form a vicious cycle.^{10,14,15} Controlling for most of the other influencing factors, sleeping deprivation has been significantly associated with a 40% increased chance of premature death.⁸

Rotational night shift work is often accompanied by insufficient sleep and disruption of circadian phase, each related to repeated errors on task performance as a result of lapses in attention and increased reaction time.¹⁶ Both physician and patient safety are apprehensions when dealing with a sleep-deprived healthcare professional. Time and again physicians

in training have pointed out incidents of dozing off while driving after a night of on-call duty. In this context, a group of anesthesiology residents at the University of Pennsylvania were perused and results published in the journal *Anaesthesia*.¹⁷ Seventeen percent of residents reported road traffic accidents during residency that transpired while they were returning home after a night of on-call duty. Seventy-two percent of the residents reported "near misses," while thirty three percent reported having 5 or more occurrences of near misses.¹⁸

SLEEP CRITERIA FOR NORMAL FUNCTION

A widely used definition for sleep deprivation is: "obtaining inadequate sleep to support adequate daytime alertness."¹⁹ The acceptable amount of sleep required for normal functioning depends on various factors, essentially age. The expert panel of the National sleep foundation newly released the revised sleep range recommendations for all age groups as the end result of a 2-year exhaustive study (Table 01).²⁰

Maintaining good quality of sleep is vital for the establishment of positive health and physical/mental well-being; nonetheless, lifestyle and environmental factors are progressively causing hitches in sleeping. Sleep is a basic human need and ample hours of sleep are crucial for maintaining a good quality of life and to perform well during the day. The following indicators can be used to describe sleep disturbance or sleep disorders:²¹ 1) Sleep latency 2) Number and duration of nocturnal awakenings; 3) The total sleep time 4) Modifications in amount and proper rhythms of particular sleep stages; 5) Rapid Eye Movement sleep (REM sleep) combined with any modifications in the autonomic functions (heart rate, blood pressure, respiratory rate, etc.); and 6) Repetitive nights of sleep disruption among one week or one month. Another commonly used indicator for describing sleep disturbance is self-reported sleep, which is a less objectively reliable but a more subjectively important indicator as it is perceived by the concerned individual self.

HARMFUL EFFECTS OF SLEEP DEPRIVATION

The main effects of sleep deprivation include physical effects (sleepiness, fatigue, or hypertension), cognitive impairment (deterioration of performance, attention, concentration and intellectual capacity and increase of the likelihood of accidents) and mental health complications. Inadequacy in hours of good quality sleep impairs the ability to think, to handle stress, to maintain a healthy immune system, and to moderate emotions.²¹ The consequences of a chronic reduction in hours of sleep or the disruption of the sleep cycle, may be similar to those of severe acute sleep deprivation.²² (Table 02) The changes in sleep time across the circadian pattern, such as during shift work or air travel (jet-lag syndrome resulting from changing time zones), prove to have deleterious

consequences as well.^{23,24}

IMPACT ON HEALTHCARE PROFESSIONALS

The working group most affected by sleep deprivation and altered circadian rhythm disorders is healthcare professionals. The main reasons for this being work related stress and rotational night shift work. Nurses and other paramedical staff who are continuously engaged in night shifts often experience a disruption in their circadian rhythm which is almost always associated with reduced hours of sleep. Along with this, longer shift durations or repeated shifts reduce the opportunity for sleep and shorten recovery time in nurses, thus endangering their safety and health as well as the quality of care and patients' safety.¹⁷

DUTY HOURS AND WORK PATTERN

As in any other part of the globe, working hours for healthcare professionals in India, particularly the residents, had always been directly or indirectly under the influence of patient load and staff shortage. In this regard, MoHFW, Government of India had instructed all states and union territories to execute a Uniform Central Residency Scheme in accordance to the Supreme Court in its judgment dt. 25.9.87: *"Continuous active duty for resident doctors will not normally exceed 12 hours per day. Subject to exigencies of work the resident doctors will be allowed one weekly holiday by rotation. The resident doctors will also require to be on call duty not exceeding 12 hours at a time. The junior Residents should ordinarily work for 48 hours per week and not more than 12 hours at a stretch subject to the condition that the working hours will be flexible as may be decided by the Medical Superintendents concerned keeping in view the workload and availability of doctors for clinical work."*²⁶

IMPLICATIONS:

1. COGNITION:

According to Oxford press, Cognition can be defined as "the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses."¹⁸ The main cognitive domains include: learning and memory, complex attention, language, executive functioning, visuospatial and perceptual function and social cognition.¹⁹ According to a brain cross-training program developed by Yale neuroscientists, there are 8 core cognitive capacities which determines our overall cognitive function²⁰ and work performance. These include: (1) Sustained attention, (2) Response inhibition, (3) Speed of information processing, (4) Cognitive flexibility, (5) Multiple simultaneous attention, (6) Working memory, (7) Category formation and (8) Pattern recognition and inductive thinking.

The deleterious effects of sleep deprivation on cognitive performance appear to emerge from interaction

between the task environment and specific degradations in components of cognitive functioning.¹² the impact of sleep deprivation on cognitive function has been an important area of research, especially among healthcare professionals. Effect of sleep deprivation on cognition has been showed to vary with the duration of sleep deprivation and extent of sleep deprivation. While Anderson S et al² observed no significant correlation in the amount of sleep received with basic cognitive function and Patrick Y et al²⁷ observed that acute sleep deprivation of 1 night can have an impact on physical health but not on the cognitive ability of young healthy university students; Stefánsdóttir M²⁸ reported significantly lower scores in Stroop attention test with declining quality of sleep. Hoermann et al²⁹ and Alhola et al³⁰ observed that under the influence of total sleep deprivation impairment in cognitive function was worse when compared to the effect of partial sleep deprivation.

Apart from duration and quality of sleep, type and time of shift work, affecting the circadian rhythm, was also observed to have a significant effect on the cognitive function. Kaliyaperumal D et al¹⁹ reported that cognitive performance was found to be lesser among night shift staff when compared to those working day shifts. Separately, the effect of on-call nights (partial sleep deprivation) on cognitive function was studied by Halbach M et al³¹ and Robbins J et al³² where they reported significant cognitive impairment post on-call nights. Robbins J et al³² went further to comment that Even physicians acclimated to sleep deprivation on a regular, every-third-or-fourth-night basis showed functional impairment.

2. MENTAL HEALTH STATUS INCLUDING DEPRESSION & STRESS

Safeguarding mental welfare at work necessitates the identification of general stressors and the percentage of workers suffering from psychological stress reactions to adopt suitable corrective and preventive measures.³³ Angerer. P. et. al.³⁴ study on night work and the risk of depression yielded evidence of an elevated risk of depression after several years of nighttime shift work, but not in any uniform pattern. Stefánsdóttir M²⁸ also reported that an increase in depression symptoms was noted with worsening of the quality of sleep. Estryn-Behar M et al³³ inferred that sleep impairment was mostly associated with shift-work and strain due to the rotating hours of schedule. All other pointers of mental health deterioration were significantly associated with the levels of job stress, mental load, and strain due to schedule.

3. PATIENT CARE SAFETY, SELF-PROTECTION AND OTHERS

Sleep deprivation can result in marred perception, hitches in retaining concentration, visual disturbances, sluggish reactions, as well as the appearance of micro-episodes of sleep during wakefulness which

lead to slashed efficiency of task performance and to amplified number of errors. Johnson A et al³⁵ observed that more than half of the sample population reported being sleep deprived and the group of sleep-deprived nurses reported a significantly greater number of patient care errors. Similarly, Kaliyaperumal D et al¹⁹ inferred that more patient care errors were made during night shifts. In addition, more mathematical errors-like drug dose calculations- were also made during night shifts showing significant relation between sleep deprivation and patient care errors.

Apart from patient care, Gold D et al³⁶ observed that healthcare workers on rotational night shifts had twice the odds of nodding off while driving to or from work and twice the odds of a reported accident or error related to sleepiness, thereby questioning the safety of the person involved. Lockley. S. W. et al.³⁷ studied the effects of health care provider work hours and sleep deprivation on safety and performance and reported that rapid change in work schedules from days to nights or from days off to nights often place many providers in a permanent state of "jet lag" as they attempt to remain awake and work. Nurses working longer shifts were at a significantly high risk of inattentiveness, suffering an occupational injury, or making a medical error. Physicians-in-training working >24-hour on-call shifts were more prone to occupational sharps injury or a motor vehicle crash. They also report making more fatigue-related medical errors that lead to a patient's death.

There is ample of literature available from 1990 to 2017 suggesting a deleterious effect of sleep disturbances on health professionals' mental health as a whole, in turn affecting the quality of patient care; thus, calling for an immediate need in policy change and health promotive and therapeutic support to the healthcare professionals.

WAY FORWARD

Changes need to be incorporated in the existing work environment assigning equal priority for the work concerned and to the health of the staff involved. The responsibility of creating a conducive environment should be taken care of in harmony by the individual and the administration. An equal participation from the individual and the administration is warranted to improve the sleep health of the healthcare workforce.

Essential modifications, in the existing work policies will definitely be a welcome change to maintain a healthy work force: For example: inclusion of compulsory day off after a rotation of night shift and nap-breaks during night shift work wherever possible has been suggested as an effective strategy to decrease fatigue and enhance performance.³⁸

Setting up of sleep hygiene counselling³⁹ for all employees involved in shift work should be a human re-

source development priority with establishment of mandatory sleep counselling centers for employees on shift work. Peer-group counselling may also be suggested as an effective measure.

Having a regular sleep pattern (with 7 or more hours of sleep), healthy diet (with at least 2-3 servings of vegetables and fruits per day, decreased caffeine intake), reduction in use of mobile phones during 'sleep time', healthy relationships, exercise and meditation practices may help improve your quality of life.

CONCLUSION

There is abundant evidence suggesting that a huge burden of sleep deprivation is noted among health care providers working rotational night shifts; suggesting an immediate need to draw attention towards a problem which warrants immediate attention. Conditions of prolonged sleep deprivation can result in increased fatigue or stress of healthcare providers, decreasing their vigilance thereby leading to implications on patient care. The problem at hand calls for further prospective, longitudinal studies to establish a causal relationship and to have a better understanding of the aetiology for developing adequate measures to improve the sleep health of workforce.

Individuals with shift work sleep disorders need a customized and comprehensive therapy that includes counselling, yoga/meditation and behavioral therapy along with requisite pharmacological management, as and when warranted. In accordance with the 'Global Plan of Action on Workers' health 2008-2017' implemented by WHO, new policies have to be devised taking into consideration the impact of sleep on health and prioritize workers' health at the administrative level.

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