

SEXUAL MEDICINE REVIEWS

The Relationship Between Shift Work and Men's Health

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ABSTRACT

Background: More than 21 million Americans and nearly 20% of the U.S. workforce are shift workers. Non-standard shift work, defined as work that falls outside of 6 AM–6 PM, can lead to poor diet, exercise, and sleep habits that lead to decreased productivity, increased workplace accidents, and a variety of negative health outcomes.

Aim: To investigate the associations between shift work exposure and chronic medical conditions such as metabolic syndromes, cardiovascular disease, gastrointestinal disturbances, and depression as well as urologic complications including hypogonadism, male infertility, lower urinary tract symptoms, and prostate cancer with a focus on the effects of shift work sleep disorder (SWSD) on the severity of these negative health outcomes.

Methods: We reviewed the literature examining effects of shift work and SWSD on general and urologic health.

Outcomes: We produced a summary of effects of shift work on health with focus on the increased risk of negative health outcomes in non-standard shift workers, particularly those with SWSD, when compared to daytime workers or workers without SWSD.

Results: Studies have associated non-standard shift work schedules and poor health outcomes, including increased risks of diabetes mellitus, dyslipidemia, hypertension, heart disease, peptic ulcer disease, and depression, in shift workers. However, few studies have focused on the role that shift work plays in men's urologic health. Current evidence supports associations between non-standard shift work and increased hypogonadal symptoms, poor semen parameters, decreased fertility, lower urinary tract symptoms, and prostate cancer. These associations are strengthened by the presence of SWSD, which affects up to 20% of shift workers. Unfortunately, interventions, such as planned naps, timed light exposure, melatonin, and sedative hypnotics, aimed at alleviating excessive nighttime sleepiness and daytime insomnia in non-standard shift workers experiencing SWSD, are limited and lack strong evidence to support their efficacy.

Conclusions: Non-standard shift work has been associated with a variety of negative health outcomes and urologic complications, especially with concurrent SWSD. Recognition of these increased risks among shift workers can potentially aid in more effective screening of chronic health and urologic conditions. Non-pharmacologic treatment of SWSD focuses on behavioral therapy and sleep hygiene while melatonin, hypnotics, and stimulants are used to alleviate insomnia and excessive sleepiness of SWSD. Further research into both pharmacologic and non-pharmacologic therapies for SWSD is needed to establish more definitive guidelines in the treatment of SWSD in order to increase productivity, minimize workplace accidents, and improve quality of life for shift workers. **Deng N, Kohn TP, Lipshultz LI, et al. The Relationship Between Shift Work and Men's Health. Sex Med Rev 2018;XX:XXX–XXX.**

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Key Words: Shift work; shift work sleep disorder; sperm; hypogonadism; male infertility; lower urinary tract symptoms; erectile function; male health

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INTRODUCTION

It is estimated that more than 21 million Americans, or 17.7% of the U.S. labor force, are non-standard shift workers whose work schedules fall outside of the hours of 6 AM–6 PM.¹ A non-standard shift work schedule interrupts the natural sleep-wake cycle, leading to decreased duration and quality of sleep. Akerstedt and Wright² showed that sleep deprivation from working non-standard shifts can lead to a circadian rhythm sleep disorder, shift work sleep disorder (SWSD). SWSD is defined by the third

edition of the *International Classification of Sleep Disorders* as insomnia or excessive sleepiness due to decreased total sleep time as a result of work schedule for a minimum of 3 months causing significant distress or impairment in mental, physical, or social functioning.^{2–4} Affecting up to 20% of shift workers, SWSD has been associated with several detrimental behavioral and health outcomes including increased risk of gastric ulcers, sleep-related accidents, absenteeism, and depression.^{5,6}

Shift work has also been linked to urologic health problems in men. While infertility and shift work has been extensively studied in females, there are few studies examining the effects of shift work on male reproductive health.⁷ Non-standard shift workers have higher rates of lower urinary tract symptoms (LUTS), elevated prostate-specific antigen levels, hypogonadal symptoms, and sexual dysfunction.^{8–10} Since urologists are often the point of entry into the health care system for men, it is important to recognize shift work as a risk factor for various urologic and non-urologic health issues. In this review, we explore the impact of shift work on general men's health and specifically urological complications. We also examine the impact of SWSD on these health issues, review current treatment options, and suggest future directions for research into the impact of shift work on men's health.

METHODS

To conduct this review, a search of MEDLINE was performed for all English-language literature published on or before November 2017 using the following search terms and their combinations: men's health, disease, urologic conditions, shift work, and SWSD. Articles were included if they assessed the impact of shift work or SWSD on men's health with a special focus placed on urologic diseases. Abstracts were excluded from this review.

SHIFT WORK AND OVERALL HEALTH

Shift workers more often experience insomnia, poor sleep quality, and daytime sleepiness compared to their non-shift worker colleagues.^{11,12} In a study of 1,280 Italian police officers, signs of sleep disorders were linked to a greater incidence of workplace accidents among shift workers.¹³ In the realm of health care, where extended work hours and shift work are a necessity to provide around-the-clock care of patients, shift work may contribute to the growing number of medical errors each year.¹⁴ Nurses who worked shifts longer than 12.5 hours experienced decreased vigilance and were more likely to experience occupational injuries such as a needle stick.¹⁵ Similarly, medical trainees who worked shifts longer than 24 hours were 36% more likely to commit a serious medical error and 300% more likely to commit a fatigue-related error resulting in patient death when compared with their colleagues who worked 16-hour shifts.¹⁵ In a review of 5 studies on shift workers of various professions, the

risk of accident or injury increased by 18.3% for afternoon shifts and 30.4% for night shifts when compared with morning shifts.¹⁶ These statistics underscore the greater risk of physical injury among shift workers.

Recent research has suggested that lack of sleep due to shift work may contribute to increased work absenteeism, which can lead to loss of productivity. A study conducted on 464 police officers from the Buffalo, NY Cardio-Metabolic Occupational Police Stress cohort found that those who worked night shifts had a higher incidence of sick leave, defined as missing 3 or more consecutive workdays, compared to those who worked day or afternoon shifts with this difference being more prominent in overweight or obese officers (body mass index ≥ 25).¹⁷ A separate study of Brazilian petroleum company employees found that workers who missed more than 5% of potential working days over a 2-year period were 2.2 times more likely to report abnormal sleep compared to workers who missed less than 5% of potential working days.¹⁸ Natti et al¹⁹ demonstrated a relationship between decreased work-time control and increased rates of sick days and suggested that the increased absenteeism seen in shift workers may be due to decreased work-time control inherent to shift work. In contrast, a 5-year historic cohort study examining 7,562 ground staff employees of an airline company revealed that shift work was negatively associated with more sickness absence episodes and that night shifts were not significantly associated with long-term sickness absence.²⁰ Interestingly, significant increase in long-term sickness absence, defined as 7 or more consecutive sickness absence days, was seen only in employees who switched into a 3-shift schedule (morning/day, evening, and night) from day work (no shift) or 2-shift schedule (morning/day and evening) with this difference being most prominent in workers whose marital statuses were single and had no children.²⁰ These results suggest that shift work may be just one of many factors that contribute to decreased productivity due to work absenteeism and that further work is needed to elucidate the contribution of shift work to long-term sickness absence.

While the economic impact of shift work and its associated disorders is not well studied, estimates from the economic consequences of excessive sleepiness and insomnia, 2 symptoms of SWSD, are available.²¹ Estimates of financial losses from accidents as a direct result of excessive sleepiness amount to \$71–93 billion annually while a worker with insomnia can add an additional \$1,253 in costs compared with a worker without insomnia over a 6-month period due to hospital bills, work absenteeism, and use of disability programs.^{22,23} These figures suggest that the harm of shift work is not limited to individual workers but also affects organizations on a larger scale.

CHRONIC DISEASES ASSOCIATED WITH SHIFT WORK

In addition to altered circadian rhythms, poor diet and lifestyle habits have been implicated in the increased mental and physical

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