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Call Schedule and Sleep Patterns of Urology Residents Following the 2011 ACGME Reforms

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Abstract

Introduction: In response to the 2011 Accreditation Council for Graduate Medical Education duty hour restrictions, many residency programs adopted a night float system. Due to concerns regarding the effects of night float on sleep and, subsequently, on patient care, we examined sleep patterns of residents on different call schedules.

Methods: Urology residents assigned to day shift (Monday to Friday, 6 am to 6 pm), night float (Sunday to Friday, 6 pm to 6 am) or 24-hour home call as well as attending physicians were monitored for 2-week periods using actigraphy bands. Total sleep time, light vs deep sleep time, sleep latency and number of sleep disruptions were measured. Comparative statistics and logistic regression were used to compare call systems and to determine predictors of sleep metrics.

Results: When comparing day shift, night float and 24-hour home call, the only significant difference was in sleep latency. All sleep variables except sleep latency were significantly different among residents of various levels (junior, senior, research year). Compared to residents, attendings had a shorter sleep latency and were woken less frequently. Being a research year resident was the only significant univariate predictor of total sleep. Age and being a research year resident were significant univariate predictors of sleep latency.

Conclusions: This pilot study demonstrates the feasibility of actigraphy in measuring sleep patterns of urology house officers. It also suggests that night float does not significantly impact total sleep or quality of sleep. Further research is needed to confirm these findings, and to determine the effects of night float rotations on resident quality of life and patient safety.

Key Words: sleep; education, medical, graduate; actigraphy

Abbreviations and Acronyms

ACGME = Accreditation Council for Graduate Medical Education

PGY = postgraduate year

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The ACGME released new duty hour standards which took effect in 2011. These standards include a 16-hour maximum shift limit for interns and a 24-hour shift limit with an additional 4 hours for handoffs for residents in their second year or above.[1] In response to these duty hour restrictions, residency programs have adopted various strategies, but a commonly encountered change is implementation of a night float system in which 1 resident covers the medical or surgical service overnight for multiple nights in a row. This system allows the remaining residents to be present during the day when rates of clinical and operative activities are high. This structure also allows for greater compliance with work hour restrictions as shifts for day and night residents average 12 to 13 hours in duration and 24-hour call shifts during the week are eliminated.

The benefits of decreasing shift lengths in terms of resident well-being have been demonstrated throughout the medical literature. Residents working 12 to 16-hour shifts rather than 24 to 30-hour shifts show improvements in mood, decreased depression scores, decreased percutaneous exposures, and a lower rate of automobile accidents and near miss accidents after shifts.[2–4] Data on the effect of decreased work hours on patient safety are limited, but it appears that patient related outcomes may be slightly improved and are not worsened by work hour limitations.[5]

To accommodate these new work hour restrictions many residency programs, including the Johns Hopkins Department of Urology, transitioned from a 24-hour call schedule to a night float system. While the night float system seemingly allows for the benefits of shorter shift durations, it has been associated with depressive feelings, sleep loss and increased fatigue due to misaligned circadian rhythms that result from working during typical hours of sleep.[6] Much like chronic night shift workers who incur a significant sleep debt after several nights of work, residents on a night float system have demonstrated more fatigue than residents on daytime shifts,[7] and surgical residents on night float performed significantly worse on cognitive and psychomotor tasks compared to day shift residents.[8]

The primary sleep determinant of performance is total sleep during each 24-hour period, regardless of whether it is obtained in 1 or multiple sessions.[9] To better understand the effects of night float on resident sleep, we performed a pilot study examining sleep metrics in residents assigned to day shift, night float or a 24-hour home call schedule. Similar data were obtained from attending physicians for comparison. Measured sleep metrics were total sleep duration, length of light and deep sleep, sleep onset latency and number of sleep disruptions during each sleep session.

Clinically, sleep onset latency is measured using the multiple sleep latency test, which was developed by Drs. William Dement and Mary Carskadon in the 1970s. These physicians demonstrated that sleep deprivation caused shorter sleep onset latency, which would lengthen after the restoration of sleep.[10] The multiple sleep latency test measures the time from which the subject starts a daytime nap to when he or she actually falls asleep. A sleep onset latency time of 0 to 5 minutes is indicative of severe sleepiness, 5 to 10 minutes is scored as troublesome sleepiness, 10 to 15 minutes is considered manageable and 15 to 20 minutes is graded as excellent. Of note, in this study sleep latency was only measured before nighttime sleep or daytime sleep after a night shift. In contrast, the multiple sleep latency test evaluates subjects at the time of daytime naps.

Methods

In this institutional review board approved study 12 urology residents and 4 urology attending physicians working in a tertiary care health system volunteered to participate. The resident group consisted of 3 individuals from each postgraduate year of 2, 3, 4 and 5. PGY-2 and 3 residents are "junior residents" who rotate through day shift, night float and 24-hour call schedules throughout the year. PGY-4 residents spend their year conducting research and have no clinical or call responsibilities. PGY-5 residents do not take in-hospital call but serve as second call for the junior residents. This group consisted of 10 men and 2 women with a mean $\pm$ SD age of 31.7 $\pm$ 2.1 years. The mean age for women was 32.5 $\pm$ 3.5 years and the mean age for men was 31.5 $\pm$ 2 years. The difference in age between the 2 groups was not statistically significant ($p=0.8$). The attending physician group consisted of 2 junior faculty and 2 senior faculty members who were all men, with a mean age of 49.3 $\pm$ 12 years.

As part of the normal rotation schedule, junior residents alternate through day shift, night float and 24-hour home call rotations. Day shift and night float rotations are in-house at the main teaching hospital while 24-hour call rotations are at a second smaller hospital where call is taken from home. While on day shift, residents work from 6:00 am to 6:00 pm each day then hand off care to the night float resident who then works from 6:00 pm to 6:00 am the following day. Day shift rotations are typically 4 weeks in duration but can vary from 2 to 8 weeks. The night float rotation occurs in 2-week blocks with a single resident covering the night float shift from Sunday evening until Friday morning. Weekend coverage occurs via 2, 24-hour weekend call shifts distributed among day shift residents. Residents on the 24-hour

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