Published in final edited form as:

Acad Psychiatry. 2017 October ; 41(5): 674–678. doi:10.1007/s40596-016-0655-3.

Sleep Knowledge and Behaviors in Medical Students: Results of a Single Center Survey

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Abstract

Objective—There is little known about the demands of medical school on students' sleep behavior. The study's main goal was to examine the interplay between medical students' sleep knowledge, personal attitudes towards sleep, and their sleep habits.

Methods—An anonymous online survey was created and emailed to all students enrolled at a large metropolitan medical school. Data on demographics, sleep perception and habits in addition to self-reported measures of students sleep knowledge, beliefs and sleepiness were collected.

Results—There were 261, out of a possible 720, responses to the survey. While 71.5% of respondents believed that they needed >7 hours of sleep only 24.9% of respondents stated they average >7 hours of sleep. During the week of an examination only 15.3% of students stated they averaged >7 hours of sleep. A comparison of pre-clinical and clinical students revealed that reported median sleep during a school or rotation night was significantly lower in clinical students as compared to pre-clinical students while mean sleep during examination weeks between the two groups was not statistically different. In regards to sleep knowledge, clinical students were more knowledgeable (65.53% correct) than pre-clinical students (39.83% correct) ($t(1) = -8.9, p = .00$). However, there was no difference in the assessment of dysfunctional beliefs between the two groups (66.0 for preclinical students, 64.7 for clinical students ($t(1) = .37, p = .71$) while clinical students had a higher score of sleepiness compared to pre-clinical students (9.12 to 7.83, $t(1) = -2.3, p = .023$).

Conclusions—A majority of medical students are sleeping an inadequate amount of time during their four years and as they progress from the pre-clinical to the clinical years the amount of time they sleep decreases even though their knowledge about sleep increases. Increased awareness around sleep health is required beyond sleep education, as medical students appear to need help translating knowledge into strategies to improve their own sleep and well-being.

Keywords

Medical Students; Emotional Problems; Workforce

Medical school education is composed of various challenges and stresses that students must balance over the course of their education. Multiple competing responsibilities force

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On behalf of all authors, the corresponding author states there is no conflict of interest.

students to prioritize their time, often leading students to sleep less than the recommended minimum of 7 hours a night [1]. In medical residents, sleep deprivation has been shown to have negative effects on a variety of domains of professional performance, from cognitive disturbances to suffering from both psychiatric and medical health problems [2–5]. The consequences of sleep deprivation in residents is inline with an increase in the understanding of the negative consequence of fatigue in the general population [6–8]. The extent to which too little sleep is present and its sequelae among medical students is not known.

Medical school is an intensive challenging environment, by design. The first two years are predominantly ‘pre-clinical’ with students quickly covering new material with frequent assessments of their knowledge. The latter two years are characterized by increased clinical exposure where students must balance the demands of clinical rotations and written examinations. Goldin et al [9] found that during an eight-week surgery clerkship students experienced a significant decrease in sleep with a decreased quality of life. Wolf et al (10) found that students that slept less than 7 hrs per night and presented with signs of pathological level of sleepiness had higher rates of burnout. These students were at a higher risk for clinical depression, anxiety and alcohol abuse. In addition, daytime sleepiness from decreased sleep has been associated with decreased motivation for learning and in turn can present decreased dedication to medical school. [11].

Medical students and residents have been shown to have limited knowledge of sleep medicine [5], but it is not known if and how sleep knowledge, habits and perceptions are altered as medical students progress through the years of medical school [12]. In this study we sought to survey SUNY Downstate Medical School students about their sleep knowledge, personal attitude towards sleep and their sleep habits. We anticipated generally high rates of sleep knowledge, but little translation of that knowledge to their personal sleep behaviors. We also predicted that students in their clinical rotations would experience less sleep and more sleepiness.

Methods

This study was approved by the SUNY Downstate Medical Center Institutional Review Board. All 720 students enrolled in the medical school received an email request from an anonymous email address, specifically set up for the purposes of collecting unbiased survey data, with a request to complete an online survey. All students received an initial request to complete the survey and access to the survey remained open for 4 weeks. All students received additional requests to complete the survey weekly for 3 weeks, regardless of their participation at that point. Information is only available about students who participated in the survey., To minimize the likelihood of a single person posting multiple responses, each individualized link was only able to be used once.

Demographics

Respondents were asked to provide non-identifiable demographic data about themselves. This information included current year in medical school, age, gender, race/ethnicity, on campus vs. off campus living situation, and presence of children in household.

Sleep Perceptions and Habits

The survey respondents were asked to provide information about their perception of sleep needs as well as their actual sleep habits. Students were queried about their sleep habits during typical and examination weeks. Respondents were asked to estimate how often they used sleep medication, over the counter sleep aids and behavioral sleep strategies. The choices provided were “Often (several times a week)”, “Occasionally (at least monthly)”, “Rarely (less than monthly)” and “Never”.

Standardized Measures

Assessment of Sleep Knowledge in Medical Education (ASKME)

The ASKME [13] survey is a self reported questionnaire that is a measure to assess sleep knowledge. A modified version of the questionnaire was used in this study. Each item is presented with the choices of “true”, “false” or “I don’t know”. It is a reliable and well-validated measure of assessing sleep knowledge in medical students and has been used in medical student populations.

Dysfunctional Beliefs About Sleep (DBAS)

The DBAS-16 [14] is a validated 16-item self-reported questionnaire that is a measure of sleep health and common habits. Respondents are presented with statements that reflect people’s beliefs and attitudes towards sleep. The respondents are then asked to indicate to what extent that they agree. A scale is presented from 0 (strongly disagree) to 10 (strongly agree).”. A score over 64 is indicative of significant dysfunctional beliefs.

Epworth Sleepiness Scale (ESS)

The ESS [15] is a validated 8 item self-administered questionnaire that provides a measure of average sleepiness in daily life. Respondents are provided with various scenarios in which they are asked to answer the question “How likely are you to doze off or fall asleep in the following situations?” The respondents are provided the choices “No chance of dozing off or falling asleep”, “Slight chance of dozing off or falling asleep”, “Moderate chance of dozing off or falling asleep”, “High chance of dozing off or falling asleep”. Higher scores on the ESS are correlated with increased average sleepiness.

Data Analysis

All data were analyzed using the computer based statistical software package SPSS version 23.0. Descriptive statistics were calculated for respondents and group differences for continuous variables were compared with a t-test. Non-parametric tests were used to compare median differences and group distributions for ordinal data. The alpha level for tests of significance was set at 0.05.

Results

Demographics

A total of 261 students participated in the study survey, yielding a response rate of 36.25% (see Table 1). The study sample consisted of 52.1% female, 47.5% male with 70.5% of the sample 25 years old or younger. The distribution of the study sample for gender and age is similar to admissions data of the overall student body. 57.8% of the students who participated in the survey were in the pre-clinical years of medical school (MS1 and MS2) while 42.2% were in the clinical years of medical school (MS3 and MS4).

General Sleep Habits and Beliefs

Of respondents, 71.5% stated that they believed that they needed at least 7 hours of sleep to function at an optimal level. However, nights where pre-clinical students had educational activities scheduled or clinical students participated in rotations only 24.9% of students stated they were able to sleep 7 or more hours. In addition, during the week of an examination only 15.3% of students were able to sleep 7 or more hours with 41.7% of students sleeping less than an average of 6 hours per night during the week of an examination. Furthermore, 57.9% of students stated that their decreased sleep was in part due to not having adequate time to study while 33.7% reported difficulty sleeping due to test anxiety.

Use of OTC sleep aids correlated with increased use of prescription sleep medication ($r=.52$, $p<.05$), behavioral sleep strategies ($r=.46$, $p<.05$) and an increased score of the dysfunctional beliefs about sleep (DBAS) scale ($r=.37$, $p<.05$).

Pre-Clinical vs. Clinical Students

A majority of students in both the pre-clinical and clinical groups believed that they needed at least 7 hours of sleep in order to function optimally (see Table 2). When asked about their actual average sleep only 32.2% of pre-clinical students and 18.4% of clinical students stated they were sleeping 7 or more hours during an average school or rotation night. Furthermore, during the week of an examination only 15.0% of pre-clinical students slept 7 or more hours with 18.6% of clinical students sleeping 7 or more hours. Reported median sleep during a school or rotation night was significantly lower in clinical students as compared to pre-clinical students (Mann-Whitney $p=.013$) while median sleep during examination weeks between the two groups was universally reduced and not statistically different (Mann-Whitney $p>.05$).

Results of the Assessment of Sleep Knowledge in Medical Education (ASKME) Survey revealed that clinical students were more knowledgeable (65.53% correct) than pre-clinical students (39.83% correct) ($t(1) = -8.9$, $p = .00$). However, in an assessment of the students Dysfunctional Beliefs Scale (DBAS) scores, there was no difference in mean scores between the two groups (66.0 for preclinical students, 64.7 for clinical students, $t(1) = .37$, $p = .71$). When comparing the two groups on the Epworth Sleepiness Scale, clinical students had significantly more sleepiness than preclinical students (9.12 to 7.83, $t(1) = -2.3$, $p = .023$).

Clinical students reported an increased use of prescription sleep medication (Mann-Whitney $p = .027$), over the counter sleep aids (Mann-Whitney $p = .00$), and behavioral strategies (Mann-Whitney $p = .00$) as compared to pre-clinical students.

Gender Differences

The sample consisted of 124 males (47.5%) and 136 females (52.1%). There were no significant gender differences in regards to ASKME percent correct, DBAS scores, Epworth scores, OTC sleep aid use, behavioral sleep strategies or use of sleep medications ($p > .05$, all cases). Female students identified a higher amount of requisite sleep to function at an optimal level as compared to male students (Mann-Whitney $p = .024$) and on average reported sleeping more during a school or rotation night (Mann-Whitney $p = .024$). However, there were no gender differences reported in the amount of sleep during an examination week (Mann-Whitney $p > .05$), with all students sleeping less during the examination week.

Discussion

The purpose of this study was to assess the interplay between medical student sleep knowledge, attitude and behavior. We found that while a majority of the participants believed that they needed seven hours or more of sleep in order to function at an optimal level, only a quarter of students stated that they averaged this amount during the academic year. Furthermore, when reporting on sleep habits during the week of an examination even fewer students slept the requisite seven hours and over forty percent of students slept less than 6 hours. Students most commonly responded that inadequate time to study and test anxiety were the main reasons for their decreased sleep. These data illustrate that while students are aware of the importance of sleep, their implementation of proper sleep habits is poor. This is of particular concern because sleeping less than seven hours per night has been known to impair cognition, alter mood and judgment, increase risk for workplace errors, decrease quality of life and result in deficits in behavioral alertness and attention in the general population[16].

Comparisons of sleep knowledge and habits between pre-clinical and clinical students revealed that less than a third of pre-clinical students averaged at least seven hours of sleep and this further decreased in clinical students. Average sleep was lower in clinical students compared to pre-clinical students on a school or rotation night, however mean sleep during a week of an examination between the two groups was not statistically different. This is an indication that while clinical students consistently have lowered amounts of sleep, they do not alter their habits closer to an end of rotation examination in the way that pre-clinical students do. This may be due “cramming” for the high stakes tests and represent a pattern of increasing preparations closer to the exam date. A possible intervention may be to emphasize the need to space the preparation for examinations at a consistent pace in order to reduce the sharp decrease in mean sleep during the week of an examination.

Clinical students scored significantly higher on the test of sleep knowledge (ASKME) as compared to pre-clinical students, which indicates that, as predicted, as students progressed through medical school they acquired more knowledge about sleep. However, there was no commensurate meaningful difference in attitude toward sleep health, as measured by the

Dysfunctional Beliefs Scale. The results of the ASKME, DBAS and Epworth surveys are an indication that while students acquired knowledge about sleep during their time during medical school the moderate changes observed in the use of sleep strategies did not meaningfully impact their personal sleep health behaviors.

Clinical students had a statistically significant higher score on the ESS as compared to pre-clinical students. It is also of note that nearly one third of the sample reports using OTC sleep aids or prescription sleep medication at least occasionally, with increased use in the clinical years. The impact of these drugs on sleep quality, student performance, and student safety are largely unknown, and may be of particular concern for neophyte physicians undergoing their first clinical responsibilities.

This study expands the literature of medical student sleep habits and knowledge, although some caution in its interpretation is warranted. Survey responses were recorded for only slightly more than a third of the students, and it is unclear if there is a systematic bias in the responses (better or worse sleepers were more likely to respond). Furthermore all of the data was collected through self-report. While standardized measurement would have been more objective, it was not logistically feasible. Despite these limitations, this study adds to the knowledge gap on sleep health in medical students. We found that a majority of medical students are sleeping an inadequate amount of time during their four years and as they progress from the pre-clinical to the clinical years the amount of time they sleep decreases even though their knowledge about sleep increases. It is important to increase awareness around sleep health and not only teach students the factual information about sleep, but to help them translate the knowledge into meaningful strategies to improve their sleep and well-being.

Acknowledgments

Partially supported by a NIH grant to Dr. Cukor (MD006875).

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Table 1

Sample Descriptive Information (mean +/- standard deviation or percent) N=261

Variable	mean +/- SD or percent
Age (years)	
21–25	70.5%
26–30	24.1%
31–35	3.4%
36–39	.8%
>40	.8%
Percent Female	52.1%
Year of Medical School	
Year 1	31.4%
Year 2	26.4%
Year 3	18.8%
Year 4	23.4%
Living situation	
Have Children	4.2%
Live on campus	26.1%
Sleep Values	
ASKME (percent correct)	50.5%
Epworth Sleepiness Scale	8.4 +/- 4.1
DBAS	65.4 +/- 25.0
How many hours do you think you need to function optimally?	
< 6 hours (5%) 6–7 hours (22%) 7–8 hours (52%) >8 hours (16%)	
Average number of hours actually slept on a school night.	
< 6 hours (29%) 6–7 hours (40%) 7–8 hours (25%) >8 hours (2%)	
Average number of hours actually slept in exam week	
< 6 hours (44%) 6–7 hours (33%) 7–8 hours (14%) >8 hours (2%)	
Sleep Behaviors	
How often do you use prescription sleep medication?	
Often/daily (2%) Occasional/monthly (3%) Rarely (8%) Never (80%)	
How often do you use OTC sleep aids?	
Often/daily (7%) Occasional/monthly (11%) Rarely (10%) Never (67%)	
How often do you use behavioral sleep strategies?	
Often/daily (13%) Occasional/monthly (14%) Rarely (17%) Never (48%)	

Table 2

A comparison of preclinical and clinical students across sleep and behavioral variables.

	Pre-Clinical n= 151	Clinical n = 110	Inferential Statistic
ASKME Percent Correct	39.83%	65.53%	t(203) = -8.9, p =.00
Dysfunctional Belief Scale Mean Score	65.99	64.69	t(205) = .37, p =.71
Epworth Mean Score	7.83	9.12	t(209) =-2.3, p = .023