

The National Study of Sleep-Related Behaviors of Nurse Anesthetists: Personal and Professional Implications

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This study quantifies the sleep activity of a national sample of Certified Registered Nurse Anesthetists (CRNAs). An anonymous survey was mailed to 10% of active CRNAs; 1,284 (41%) completed surveys were returned. The survey revealed that 50% of CRNAs go to bed after 10 PM each night, 25% have significantly fragmented sleep, 59% awaken prematurely, 47% have difficulty falling asleep, 24% use medications to generate sleep, 18.4% have restless legs syndrome, 56.2% snore, 68% are excessively tired during the day, 0.4% use stimulants (other than caffeine) to maintain wakefulness, 15.7% have experienced sleep-related behavior during a surgical case, and 48.8% have witnessed a colleague asleep during a case. Subgroup analysis revealed no relationship between age and reported

sleep issues. Perturbations in sleep are common and multifactorial.

The issues concerning postgraduate provider rest and work hours represent an opportunity to study CRNAs' roles, responsibilities, and work-life balance. Patient safety is at the core of the mission statements of both the American Association of Nurse Anesthetists and the American Society of Anesthesiologists. We urge further study and full transparency on the part of both professional groups in proactive management of anesthesia provider workplace fatigue.

Keywords: Fatigue, patient safety, provider regulation, sleep, sleep dysfunction.

In the United States, 40 million or more anesthetics are administered for surgical, interventional, and uncomfortable diagnostic procedures each year, although this number likely represents a significant underestimation because a large number of facilities do not report services rendered.¹ Patients are monitored according to standards published by both the American Society of Anesthesiologists (ASA) and the American Association of Nurse Anesthetists (AANA).^{2,3} These standards detail the required, expected activities of the attendant providers that ensure appropriate and safe patient care. Vital to this process is the constant presence of a vigilant anesthesia provider.

The fact that sleep is essential to human biology and neurocognitive function is well appreciated. Factors that disrupt or otherwise deny sleep are known to degrade both psychomotor and mental-task performance. The requisite sleep requirement is the basis for mandated sleep/rest/work hour requirements in a variety of industries such as commercial aviation, long-haul trucking, commercial land transit transportation, and healthcare education/training. Fatigue caused by lack of adequate sleep results in diminished cognitive function, impaired vigilance, decay in problem-solving ability, degradation in memory, and eroded motivation.⁴

Concerns regarding sleep-related fatigue are well studied in domains in which human behavior has im-

mediate or potentially negative consequential impact on others, such as long-haul trucking, aviation, and the military.⁵⁻⁷ The impact of sleep-related fatigue on the anesthetic care of patients is detailed in 7 articles published in the *Anesthesia Patient Safety Foundation Newsletter*.⁸ These diverse industries share in the defining attribute that a high degree of vigilance and performance is required; if degraded, a significant threat of collateral damage (imperiling the lives of others) could occur.

Certified Registered Nurse Anesthetists (CRNAs) act as either sole providers or in a team role with an anesthesiologist as the hands-on providers of care in more than 32 million anesthetic procedures delivered in the United States each year.³ This figure likely is lower than the true number because many facilities do not formally report procedures. During their education and training, both anesthesiologists and nurse anesthetists must comply with work-hour rules that promote the attainment of proper off-duty rest and sleep. However, after the training period is completed for both groups of providers, no standards or mandates define work hours. Socioeconomics, local customs, facility-specific guidelines, workplace pressure, peers, and self-governance prevail as the only moderating forces.

Sleep impairment or deprivation results in a progressive loss of vigilance that can markedly degrade the quality of anesthesia care.⁹⁻¹¹ Negative effects include

events such as failure to recognize changes in patient hemodynamics and errors in drug administration. On-task wakefulness for 24 continuous hours produces a cognitive impairment equivalent to a blood alcohol level of 0.1%, an amount considered “drunk” in the context of domestic motor vehicle laws that establish inebriation at 0.08%.^{12,13} The body of research that has emerged in the broad domain of sleep research is the basis for work-hour rules in a variety of disciplines, including the education and training periods of anesthesia providers.

There are no national epidemiological studies on sleep-related behaviors of CRNAs or anesthesiologists despite the critical role they play in the healthcare delivery system and the universally acknowledged importance of being vigilant and cognitively capable during the anesthetic care of patients. A recent analysis by the venerable anesthesiologist William Clayton Petty, MD, observed that, “Fatigue can induce a state in anesthesia providers that will cause more medical errors. It is time we stop giving lip service to this problem and take positive steps towards solving it.”¹⁴

Before an informed dialogue can occur, definitive metrics regarding the nature of the perceived problem must be obtained. The purpose of the National Study of Sleep-Related Behaviors of Nurse Anesthetists (NSBNA) was to quantify and elucidate the sleep activity of a large, national, random sample of nurse anesthetists and obtain insight into the data’s professional implications.

Materials and Methods

After receiving institutional review board approval at Virginia Commonwealth University, a computer generated random sample of 10% of the current active, recertified, and nonrecertified AANA members was obtained. The AANA membership is divided across 7 regions throughout the continental United States, including Hawaii and Puerto Rico. A uniquely designed survey instrument (Figure) with an enclosed postage-paid, pre-addressed return envelope was mailed to the randomly generated sample, which was proportionately stratified to the 7 geographical regions to ensure a representative sampling by living and working environments. The process was designed to ensure the complete anonymity of all participants.

The survey instrument is a hybrid composite of several previously published epidemiological surveys used to study general sleep behaviors in diverse population samples.¹⁵⁻¹⁷ Our survey instrument was modified to prompt input specifically relevant to the practice domain of the nurse anesthetist and allowed for optional input by participants in response to open-ended questions. The survey instrument was initially circulated to 3 academic nurse anesthetists and 3 academic anesthesiologists in different geographic locales to solicit their input. Their suggestions were incorporated into the instrument and

recirculated using 2 successive rounds of a Delphi technique. After the final instrument was prepared, it was resent to the same set of reviewers, resulting in unanimous consensus that the instrument had high face validity (see Figure).

The survey instrument included questions that were both closed- and open-ended, allowing for both quantitative and qualitative analysis. Descriptive statistics were employed in displaying the results of the closed-ended questions. A qualitative methodology was used to capture and organize emerging themes that described participant responses to the open-ended questions; each survey containing handwritten responses was analyzed employing content analysis.^{18,19} These comments were transformed into nominal-level data and grouped as common themes and categories emerged. Developing this taxonomy continued until the existing database was described by all-inclusive yet mutually exclusive categorical descriptors.

Results

• *Quantitative Component.* Of 3,170 surveys randomly mailed to CRNAs nationwide, 1,284 (41%) complete surveys were received and entered into the database. Of the 1,284 returned surveys, 60.8% were from women, 39.2% were from men, and 85.2% of respondents reported full-time employment. The age range of respondents was captured by unique cohorts, with the majority of respondents ranging in age between 30 and 59 years. Table 1 displays the demographics of the respondents. Subgroup analysis revealed there was no relationship between advancing age and rate of reported sleep-related issues.

Table 2 displays the study’s major quantitative findings. The results suggest that perturbations in sleep occur frequently for CRNAs and they are multifactorial in nature. Furthermore, inadequate sleep leads to a high rate of excessive daytime sleepiness, including sleepiness experienced during time spent in the workplace. Many respondents (47%) reported difficulty falling asleep at night. Individuals who struggle with sleep initiation or maintaining sleep may seek nonpharmacological or pharmacological aids. Table 3 lists the reported non-pharmacological and pharmacological sleep aids used by respondents. CRNAs who have difficulty maintaining wakefulness may also seek pharmacological aids. Table 4 lists the reported wakefulness aids used by respondents.

• *Qualitative Component.* Content analysis produced a taxonomy of 4 categories that organized and delineated responses into discrete (but sometimes context-sensitive overlapping) themes. The emergent categories were:

- Issues provoking or exacerbating loss of sleep
- Issues indicating concern for patient and personal safety
- Suggestions for dealing with the problem of sleep-related fatigue

Dear Anesthesia Colleague,

We invite you to participate in a National Sleep Study of anesthetists, the first of its kind. Sleep is crucial to personal and professional well-being and your participation in this study will help us assess the overall nature of sleep and associated behaviors in nurse anesthetists.

Thank you very much for completing the following questionnaire.

| | | | | | | |
|--|--------------|---------------|----------------------|------------|-------------|----------------|
| 1. My age is: | 21-29 | 30-39 | 40-49 | 50-59 | 60+ | |
| My gender is: | Male | | Female | | | |
| I have been a CRNA for: | < 5 years | | 5-10 years | | > 10 years | |
| I work primarily in what state: | _____ | | | | | |
| I work: | Full Time | | Part Time | | | |
| 2. When do you go to bed on the average weekday? | Before 8 pm | 8-9 pm | 9-10 pm | 10-11 pm | 11-midnight | After midnight |
| 3. How long does it usually take you to fall asleep? | 5 minutes | 5-10 minutes | 10-30 minutes | 30 minutes | > 1 hour | |
| 4. How many times do you usually wake up during the night? | 0 | 1-2 | 3-4 | 5-6 | > 7 | |
| 5. If you take daytime naps, how long are they? | 5-10 minutes | 15-30 minutes | 30 minutes to 1 hour | > 1 hour | | |
| 6. How do you evaluate your overall sleep quality? | Excellent | good | satisfactory | poor | very poor | |
| 7. How do you evaluate your sleep quality before the average work day? | Excellent | good | satisfactory | poor | very poor | |

For questions #8–23, please use the following rating scale

| | How often during the week: | | |
|--|---|---------------------|-----------------|
| | 1: never or almost never | 2: sometimes | 3: often |
| 8. Do you go to bed at an unusual time (later than usually) at night? | 1 | 2 | 3 |
| 9. Do you have difficulty getting to sleep at night? | 1 | 2 | 3 |
| 10. Do you drink coffee late in the evening? | 1 | 2 | 3 |
| 11. Do you use sleeping aids? If so, please list what you use: _____ | 1 | 2 | 3 |
| 12. Do you wake up because of hunger or because you feel compelled to eat? | 1 | 2 | 3 |
| 13. Do you wake up because of nightmares? | 1 | 2 | 3 |
| 14. Do you wake up because of talking during sleep? | 1 | 2 | 3 |
| 15. Do you wake up because of walking during sleep? | 1 | 2 | 3 |
| 16. Do you wake up because of leg movements or disagreeable leg sensations? | 1 | 2 | 3 |
| 17. Do you snore? | 1 | 2 | 3 |
| 18. Do you grind your teeth while asleep? | 1 | 2 | 3 |
| 19. Do you wake up too early and have difficulty in getting back to sleep? | 1 | 2 | 3 |
| 20. Do you feel excessively tired when waking up? | 1 | 2 | 3 |
| 21. Do you feel sleepy during the day? | 1 | 2 | 3 |
| 22. Do you feel sleepy during your normal work hours? | 1 | 2 | 3 |
| 23. Do you feel sleepy in during your non-working hours, free time? | 1 | 2 | 3 |
| 24. Do you ever use any medications to help you stay awake during the day? If yes, what do you use? _____ | | Yes | No |
| 25. Have you seen or considered seeing a sleep medicine specialist for a sleep related disorder? | | Yes | No |
| 26. Is your sleep regularly disrupted due to childcare issues (such as breastfeeding, bedwetting, nightmares)? | | Yes | No |
| 27. Open-ended questions: please feel free to elaborate. | | | |
| a) Have you ever fallen asleep during a case in progress? | c) Have you witnessed a colleague who has fallen asleep during a surgical case in progress? | | |
| b) After a long day or a call shift, have you or a colleague you know been involved in or nearly had a motor vehicle accident that was attributed to sleepiness? | d) Do you have any comments of a personal or professional nature regarding the issue of sleep that you would like to share? | | |
| 28. Are there any other sleep personal or professional related comments that you would like to share? | | | |

Figure. Questionnaire for the National Study of Sleep-Related Behaviors of Nurse Anesthetists

| Gender | Respondent age | | | | |
|-----------------------|----------------|-------|-------|-------|------|
| | ≤ 29 | 30-39 | 40-49 | 50-59 | 60+ |
| Male (%) N = 488 | 2.9 | 25.2 | 21.3 | 35.5 | 15.1 |
| Female (%) N = 759 | 4.2 | 23.0 | 29.7 | 28.6 | 14.5 |

Table 1. Respondent Gender and Age

Mailed and returned surveys were proportionately stratified to the 7 geographical membership regions of the AANA to ensure a representative sample of living/working environments. Of 1,284 completed and returned surveys, 1,247 indicated age cohort.

| Question | Response | Response | Response |
|--|---------------------|-------------------------------------|----------------|
| Average time to bed | Before 10 PM 51.1% | After 10 PM 48.9% | |
| How long to sleep onset | ≤ 10 min 56.1% | > 10 min 43.9% (30-90 min 11.9%) | |
| Awakenings during sleep | < 3/night 76.1% | ≥ 3/night 23.9% | |
| Daytime naps (duration) | 5-30 min 49.7% | 30-60 min 34% | > 60 min 16.3% |
| Overall sleep quality | Good 49.7% | Okay 35% | Poor 15.3% |
| Difficulty falling asleep | Rare 53% | Sometimes 37.8% | Often 9.2% |
| Use of sleep medications | Never or rare 75.6% | Sometimes 16% | Often 8.4% |
| Nightmares → awakening | Rare 84.5% | Sometimes 15.7% | Often 0.8% |
| Sleep walking | Never 98.5% | Sometimes 1.3% | Often 0.2% |
| Restless legs syndrome | Never 81.6% | Common 15.4% | Often 3.0% |
| Snoring | Never or rare 43.8% | Sometimes 41.7% | Often 14.5% |
| Teeth grinding | Never or rare 63.8% | Sometimes 27.3% | Often 3.9% |
| Wake up too early | Never or rare 40.5% | Sometimes 46.3% | Often 13.2% |
| Wake up excessively tired | Never or rare 32% | Sometimes 56.5% | Often 11.5% |
| Sleepy during work day | Never or rare 22.9% | Sometimes 65.5% | Often 11.6% |
| Sleep disrupted—child care | Yes = 10.6% | No = 89.4% | |
| Self-Rx to stay awake ^a | Yes = 0.4% | No = 99.6% | |
| Consider seeing sleep doc ^b | Yes = 10.3% | No = 89.7% | |

Table 2. Responses to Major Quantitative Questions

^a Use of medication/stimulants (other than caffeinated coffee).

^b Consultation with a sleep medicine specialist.

• Miscellaneous criticisms of the study intent and design

Table 5 lists themes expressed by the respondents that fell into each of the above 4 categories. With respect to question 27, which invited input regarding respondents engaging in sleep-related behaviors during patient care, 15.7% of respondents reported experiencing sleep-related behavior (head nodding, eyelid closure) during a surgical case. An examination of the accompanying open-ended questions (NSBNA questions 27 b, c, and d; see Figure) revealed that sleep-related behaviors occurred during long surgical cases that did not allow opportunity for periodic breaks from patient care. These behaviors also occurred during prolonged surgical cases in darkened rooms in the middle of the afternoon or in the middle of the night during a continuous work period of 16 to 24 hours. Further content analysis revealed the delineation

of fatigue countermeasures that should be employed in the workplace:

- Improvement in clinical scheduling
- Need for frequent breaks from clinical responsibility during long surgical cases
- Use of social interaction in the operating theater to decrease sleepiness

Discussion

Healthcare safety is a topic of major interest to patients, providers, policy makers, and researchers. Patient safety issues become even more important when they are directly affected by workplace behavior. While there are many examples of factors that influence safety in health-care delivery such as availability of resources, staff education/training, staffing patterns, and leadership, there may be no better example of a direct link between workplace

| | | | | | |
|-----------------------------|------------------------|-----------|------------------------------|----------------|-------------------------------------|
| Pharmacological aids | Clonazepam | I | Morphine | St John's Wort | Valarian |
| A | D | Ibuprofen | N | Sominex | Vistaril |
| Alcohol | Dramamine | K | Nyquil Nighttime Cough Syrup | Sudafed | Valium |
| Advil PM | E | Klonopin | R | T | X |
| Aleve | Excedrin | L | Requip | Tylenol PM | Xanax |
| Ambien | Excedrin PM | Lunasom | Rapid Sleep PM | Trazadone | Z |
| Aspirin | Extra Strength Tylenol | Lunesta | Restoril | Tempzepam | Zanaflex |
| Ativan | Tylenol | Lyrica | S | Triazolam | Mechanistic aids |
| "Antihistamines" | Extrovent PMS | M | Sominex | Tryptophan | Continuous positive airway pressure |
| B | Elavil | Marijuana | Simply Sleep | Tramadol | Bilevel positive airway pressure |
| Benadryl | H | Melatonin | Seroquel | U | Earplugs |
| C | Halcion | Mirapex | Sonata | Unisom | Reading |
| Calms Forté | Herbal OTC | Motrin | | V | |

Table 3. Reported Pharmacological and Mechanistic "Sleep Aids"

Abbreviation: OTC indicates over the counter.

behavior and safety than the issue of worker fatigue. While some may discount the analogy, we believe that valuable lessons in the data are emerging from the National Transportation Safety Board studies of trucking fatalities. According to these studies, crashes involving the trucking industry result in more than 10,000 deaths and many tens of thousands of nonfatal injuries each year; it is estimated that 31% of all truck driver fatalities and 58% of all single-truck crashes are fatigue-related due to deficient sleep.^{7,20} Additionally, the number of "near-misses" or "near-accidents" that is attributable to sleep-related problems of commercial truckers is unknown. This situation is analogous to not knowing the extent of "critical incidents" and "near misses" in anesthesia care as the result of pervasive underreporting.

Sleep deprivation and fatigue became such an enormous public health and safety concern that a series of federal laws governing the driving behavior of commercial motor-vehicle drivers was enacted. These laws generally fall under the rubric "hours-of-service regulations."²¹ According to these laws, drivers may operate their vehicles for up to 10 hours, but only after a mandatory 8-hour off-duty period, with restrictions of 70 hours of driving over an 8-day period (by law, the 70 hours can be achieved in 5 days, however). Drivers who fail to abide by these regulations are more likely to be involved in fatal and nonfatal accidents.²² Physician resident duty-hour rules vary somewhat from this schedule, but likewise mandate work-hour maximums and off-duty minimums; these rules continually are subject to reconsideration and revision based on available best evidence.²³

Large-scale population sampling reveals that more than 35% of adults experience acute or chronic sleep disturbances during any given year; underreporting is believed to diminish the magnitude of the problem.²⁴ Long work hours and a host of behavioral and health factors have been proposed as contributors to sleep-related problems.^{25,26} An indirect metric of the extent of

| |
|---|
| Adderall |
| Caffeine (coffee, soft drinks) |
| Caffeinated drinks (Red Bull, NOS, Stacker) |
| Caffeine tablets (NoDoz) |
| Herbal tea |
| Provigil (eg, Equip) |
| Ritalin |
| Vivarin |
| Vyvanse |

Table 4. Reported Drugs Used to Maintain Wakefulness

sleep-related problems in the general population is the widespread promotion of over-the-counter (OTC) and prescription sleep aids in American newspaper, magazine, radio, Internet, and television advertisements. The most recent economic analysis of sleep aid use notes the US sleep market was worth \$23.7 billion in 2007, with 8.8% annual growth projected; the companies producing prescription sleep aids spent \$620 million on advertising, producing nearly \$3 billion in sales.²⁷

A review of this article's results section and Tables 1-5 will help readers formulate their own conclusions regarding the sleep behaviors of CRNAs. Two findings will be discussed here. First, this study reveals that approximately 25% of respondents reported using sleep aids to achieve and/or maintain sleep; both OTC and prescription drugs were used, often in combination and sometimes in concert with alcohol. No regulations govern the use of these medications or alcohol by anesthesia providers. This is in marked contrast to expectations for commercial airline pilots, who work under strict regulations that prohibit alcohol consumption within 8 hours of working.²⁸ The real or potential effects of the reported sleep aids used by CRNAs on the quality of anesthetic care delivered were not directly assessed in this survey.

Issues provoking or exacerbating loss of sleep

Menopause, frequent need to urinate, aging worsens the problem
Shift work, swing shifts, call back from home
Anxiety over caseload, challenging case, case that went poorly
Snoring bed partner
Obstructive sleep apnea syndrome, restless legs syndrome
Nightmares
Domestic issues: child care, care of ill spouse or parent, lack of partner help
Medical-legal, financial, relationship, workplace problems
A vicious cycle of poor sleep, stress, worsening sleep ensuing over and over

Issues indicating concern for patient and personal safety

Personally falling asleep during anesthetic care
Feeling "at risk" of falling asleep during anesthetic care
Aware of colleagues engaging in sleep behaviors during anesthetic care
Making error of omission; making error of commission
Falling asleep while driving after a long shift
Generalized cognitive impairment from sleep-fatigue
Chronic sleep loss is deleterious to my health
In denial about nature and extent of problem

Suggestions for dealing with sleep-related fatigue

Regulation needed—work-hour restrictions like airline pilots
Improved, scheduled breaks during work hours
Sleep aid education needed: medications are a 2-edged sword
Start cases later in the day
Feel safe in admitting the problem. Seek professional help if the problem persists.

Miscellaneous criticisms of the study intent and design

Worthless study—sleep-related issues are not a problem in today's practice
Timely study to provoke much-needed discussion about sleep/fatigue in the workplace
Does reading or listening to books on tape help or hurt the problem?

Table 5. Major Categories/Themes Emerging From Open-Ended Questions

Second, we found that 15.7% of respondents reported falling asleep during the anesthetic care of a patient, and 48.8% of respondents reported observing a colleague engaged in sleep-related behavior during care delivery. This is a matter of grave concern because situational awareness is absent during sleep behavior. This finding should stimulate a discussion regarding the scheduling traditions of clinical care, most notably the "24-hour on-call." Respondents often reported sleep-related behaviors

during long surgical cases in darkened rooms, occurring most frequently in the middle of the night after more than 16 hours of continuous clinical responsibilities. Respondents used a variety of fatigue countermeasures, including standing and walking about, interacting socially with the surgical team, engaging in nonanesthesia care activity such as reading lay-oriented literature, and asking for a break from clinical care. Interestingly and perhaps somewhat counterintuitively, there was no relationship between advancing age and the rate of reported sleep-related issues.

There are numerous well-described catastrophes in which sleep loss or the combination of sleep loss and circadian rhythm disturbances (eg, attributable to unusual working hours) represent antecedents in the chain of accident evolution. The Exxon Valdez marine grounding and oil spill, Prince William Sound, Alaska (1989); the Chernobyl disaster at the nuclear power plant near Chernobyl, Ukraine (1986); and Three Mile Island Nuclear Generating Facility accident, Dauphin County, Pennsylvania (1979); and countless National Transportation Safety Board reports serve as testimonials to the effects of sleep-related fatigue on subsequent accident genesis. Of relevance to the current study is a report from the National Sleep Foundation revealing that 60% of Americans have operated a motor vehicle while feeling drowsy within a 1-year period, and 37% of respondents reported nodding off or falling asleep while driving.²⁹

A recent study investigated complication risk of elective surgery performed by experienced surgeons who had opportunities for 6 or more hours of sleep vs risk from surgeries performed by those who had opportunity for fewer than 6 hours of sleep as the result of on-call surgical emergencies the night before the scheduled elective surgery.³⁰ In this study, 919 surgical and 957 obstetrical postnighttime procedures were matched with 3,552 and 3,945 control procedures, respectively, with 86 surgeons and 134 obstetricians/gynecologists participating. Surgeons who had limited opportunity for sleep had significantly higher rates of complications than those who had a longer sleep opportunity (odds ratio 1.72; 95% CI 1.02-2.89). This finding is the latest addition to the growing literature that suggests attending physicians, just like resident physicians and registered nurses, are at increased risk of making cognitive and psychomotor errors when sleep deprived or working extended shifts.^{31,32}

Self-medication using caffeine (coffee, tea, soft drinks) is very common. The use of OTC and prescription medication to prevent, induce, or adjust sleep behavior is at an all-time high.³³ Caffeine is the agent most commonly reported to combat sleep, but consumption must be timed to increase alertness. Many OTC medications contain powerful hypnotics which, when combined with alcohol, can produce serious and sustained central nervous system depression as illustrated in Table 6. OTC sleep aids are

Vicks NyQuil

Analgesic/antipyretic: Acetaminophen 500 mg/15 mL

Cough suppressant: Dextromethorphan 15 mg/15 mL

Antihistamine/hypnotic: Doxylamine 6.25 mg/15 mL

Doxylamine is an ethanolamine-class antihistamine with anticholinergic properties

Rivals diphenhydramine as an antihistamine

Hypnotic dose is 6.25 to 25 mg

Half-life is 6 to 12 hours with hepatic elimination

Nytol

Contains diphenhydramine

Regular strength: 25 mg/tablet

Extra strength: 50 mg/tablet

Half-life is 4 to 8 hours, hypnotic effect lasts about 6 hours

Tolerance usually develops after a few days of use

Significant and additive effect with alcohol and other hypnotics

Paradoxical effect in some, particularly in the elderly

Table 6. Examples of Over-the-Counter Sleep Aids and Their Associated Pharmacology

widely used but have not been well-studied in the general population; likewise, prescription agents are widely marketed, often directly to the consumer, and evidence-based use is not consistently followed.³³ Anesthesia providers who use or abuse OTC sleep aids, prescription sleep aids, or alcohol to regulate their sleep may experience lingering or otherwise untoward responses that may affect the nature of subsequently rendered patient care.

It is beyond the scope and intent of this study to estimate the extent to which CRNAs are likely to experience work overload, functional impairment, or other professional-impact issues related to sleep patterns and behaviors. It must be stressed that it has long been appreciated that underreporting of sensitive issues is very common in survey research, whether conducted by mail or direct interview.³⁴ What is clear is that the scope of practice of the CRNA is time- and performance-sensitive, with many CRNAs obtaining insufficient restful sleep between work epochs and frequently self-medicating to both generate sleep and maintain arousal during work hours.

Conclusion

This study is the first to report on a national sampling of the sleep-related behaviors of CRNAs and the attendant professional implications, revealing that large numbers of CRNAs experience sleep disturbances, regularly self-medicate to produce sleep, medicate within proximity to patient contact, have daytime somnolence and fatigue, and report a wide range of workplace and personal misadventures that may be linked to inadequate off-duty sleep. Examples of the latter include falling asleep during patient

care, fighting the urge to sleep during patient care, experiencing cognitive impairment as a result of sleep fatigue, expressing concern about personal health as a result of chronic sleep perturbation, and getting into motor vehicle accidents in the immediate aftermath of a long or unusually timed period of work. It is our hope that this study will energize and inform a dialogue among clinicians, researchers, administrators, and policy makers.

For more in-depth information about the role of fatigue and anesthesia safety, readers are encouraged to examine the excellent treatise by Nevarez and Howard,³⁵ whose work proved inspirational to the current study. Furthermore, a recent report from the Centers for Disease Control and Prevention discussed in a 2011 issue of *The Journal of the American Medical Association* observed in a large, observational study of US residents that at least one-third of our population fails to get enough sleep on a regular basis, functionally impairing the ability to perform daily tasks.³⁶ The recent numerous and highly publicized concerns related to air traffic controllers falling asleep on the job have served to remind us that sleep issues are matters of national safety importance and deserve our aggressive attention.³⁷ Of interest is that some countries, notably Japan and Germany, permit sleep breaks for their controllers in quiet rooms.

We believe the issues concerning postgraduate anesthesia provider rest and work hours represent an opportunity to study in greater detail CRNA roles, responsibilities, and work-life balance. Patient safety is at the core of the mission statements of both AANA and ASA. We urge further study and full transparency on behalf of both professional groups in proactively managing the issue of anesthesia provider workplace fatigue.

Addendum

Issues surrounding CRNA worker fatigue have been of concern to our professional association for some time, representing matters that have been and continue to be addressed through the AANA's Wellness Program, through which more information can be obtained. Readers who wish to seek additional information may find it at <http://www.aana.com/Resources.aspx?id=6088&linkidentifier=id&itemid=6088>.

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