Are Sleepy Providers Keeping Patients Asleep?

*Time for a wake-up call?*

The National Sleep Study of Nurse Anesthetists

C Biddle  CRNA, PhD
Virginia Commonwealth University
Roller-ball model of patient safety

Equipment & Technology

Standard of Practice

Expertise & Proficiency

Clinical Judgment

= adverse event

Negative Patient Outcome
The effect of *fatigue* on the roller-ball model

Equipment & Technology

Standard of Practice

Expertise & Proficiency

Clinical Judgment

Negative Patient Outcome

禋 = adverse event
Putting a ‘Face’ on Patient Safety
In Denver, an 8-year-old boy died during routine ear surgery when his anesthesia provider fell asleep and failed to monitor the boy's status. The provider fell asleep during surgeries numerous times before but was never adequately disciplined.
In May 2009 XXX was convicted of manslaughter in the death of a toddler, sentenced to 8 years in prison. YYY was 3 when she died during strabismus surgery after XXX induced general anesthesia and intentionally disabled all alarm monitors. The Judge stated, "The defendant effectively went to sleep during the surgery without concern."
DOCTORS, nurses fighting fatigue

MOONLIGHTING doctors are so exhausted from excessive workloads they are risking patients' lives, experts say.

Sleep expert Professor Drew Dawson says doctors and nurses often work extra shifts and their fatigue is not being monitored or managed adequately.

Australian Medical Association state president Dr Andrew Lavender agreed there was an ongoing concern about doctors potentially compromising patients' care.

Healthcare workers can work at their workplace and can switch between different hospitals for the money, or because workloads are heavier elsewhere.

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DOCTOR FALLS ASLEEP DURING SURGERY

Board Revokes License

POSTED: 5:44 am EDT July 26, 2007
UPDATED: 9:49 am EDT July 26, 2007

BOSTON -- A former (name deleted) who fell asleep in the operating room must prove he's clean before practicing medicine again.

He admitted to falling asleep during surgery in December 2005 after taking a prescribed medication. He admitted that he "was under a great deal of personal stress," the state said in its complaint against him.

He also said he inhaled Isoflurane, an anesthetic, during his lunch break in January 2006 because he was having a panic attack and "felt he was going to die."
Why do we sleep?

Restorative:  Body rejuvenates
  Growth hormone released
  Melatonin released
  Immune system boosted
  Memory organization

Sleep is absolutely vital to biology & psychology

Deprivation $\rightarrow$ significant global impairment

Deprivation $\rightarrow$ immune system effects
Dr. W.C. Dement: "Father of Modern Sleep Research"

50+ years of work
Co-discoverer REM sleep
EEG study sleep
Pioneered Dx/Rx sleep disorders

When asked, why do we sleep?

“As far as I know the only solid reason we need to sleep is because we get sleepy.”

“Drowsiness is a red flag!!”
Sleep-related fatigue

Global cognitive dysfunction

Impaired vigilance

Decay in problem solving ability

Decrement in memory retrieval

Eroded motivation
We miss it, if we don’t have it

No matter how hard we try to resist it, it conquers us in the end
Ventrolateral preoptic nucleus: triggered by adenosine accumulation
Waking up: multiple signals can initiate response

Suprachiasmatic nucleus: responds to cues, signals the VLPO to stop firing → arousal
The circadian “clock”

- Suprachiasmatic nucleus (hypothalamus)

Dysfunction

Shift work
Call responsibilities
Trans-time zone travel
Insomnia
Drugs & alcohol
Chemical modulators of wakefulness & sleep

- Acetylcholine
- Adenosine
- Dopamine
- Orexin A & B
- GABA
- Melatonin
- Norepinephrine
- Histamine
- Pituitary hormones
- Serotonin
- Glutamate
- Nitric oxide
- Cortisol

Many of us have abnormal expression of these modulators
March 3, 2009  National Sleep Survey Research Report

1/3 report falling asleep or severely sleepy at work

Average sleep / night = 6 hours, 40 minutes

Average wake up time: 5:35 am
Average bedtime: 10:53 pm
At age 70 you have spent ~ 25 years sleeping!!

Although many of us are shortchanging ourselves!
No epidemiological studies describe the sleep-related behaviors of anesthesia providers.
Examples of formal work hour rules

Aviation
Long-haul trucking
Rail/road/ocean travel industries
Nuclear power
Healthcare education
Interstate Passenger Carrying Driver’s Guide to Hours of Service

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<th>2003 ACGME Duty-Hour Limits</th>
<th>IOM Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum hr of work per wk</td>
<td>80 hr, averaged over 4 wk</td>
<td>No change</td>
</tr>
<tr>
<td>Maximum shift length</td>
<td>30 hr (admitting patients up to 24 hr, then 6 additional hr for transitional and educational activities)</td>
<td>30 hr (admitting patients for up to 16 hr, plus 5-hr protected sleep period between 10 p.m. and 8 a.m., with the remaining hours for transitional and educational activities)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 hr with no protected sleep period</td>
</tr>
<tr>
<td>Maximum in-hospital on-call frequency</td>
<td>Every third night, on average</td>
<td>Every third night, no averaging</td>
</tr>
<tr>
<td>Minimum time off between scheduled shifts</td>
<td>10 hr after shift</td>
<td>10 hr after day shift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 hr after night shift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 hr after any extended duty period of 30 hr, not returning until 6 a.m. of next day</td>
</tr>
<tr>
<td>Maximum frequency of in-hospital night shifts</td>
<td>Not addressed</td>
<td>48 hr off after 3 or 4 nights of consecutive duty</td>
</tr>
<tr>
<td>Mandatory time off</td>
<td>4 days per mo</td>
<td>5 days per mo</td>
</tr>
<tr>
<td></td>
<td>1 day (24 hr) per wk, averaged over 4 wk</td>
<td>1 day (24 hr) per wk, no averaging</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One 48-hr period per month</td>
</tr>
<tr>
<td>Moonlighting</td>
<td>Internal moonlighting counted against 80-hr weekly limit</td>
<td>Internal and external moonlighting counted against 80-hr weekly limit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other duty-hour limits apply to moonlighting in combination with scheduled work</td>
</tr>
<tr>
<td>Limit on hours for exceptions</td>
<td>88 hr for select programs with a sound educational rationale</td>
<td>No change</td>
</tr>
<tr>
<td>Emergency room limits</td>
<td>12-hr shift limit, at least an equivalent period of time off between shifts; 60-hr workweek with additional 12 hr for education</td>
<td>No change</td>
</tr>
</tbody>
</table>
The National Study of Sleep-related Behaviors of Nurse Anesthetists: Personal and Professional Implications
The study’s origins

- Personal experiences
- Conversations with providers
- Reports from other domains
- Simulation studies
- Radio, TV, newspaper reports
- Sense of professional responsibility
Methodology

• IRB approved

• 10% of active AANA members surveyed – 7 regions

• Instrument reliability and validity established

• Random mailing  Anonymous, postage paid return

• Closed & open ended questions

• Quantitative & qualitative analysis
Quantitative Findings
(42% return rate, 61% female)

- 80% go to bed after 10pm each night
- 72% awake before 5:30am
- 25% awaken ≥ 3x/night → fragmented sleep
- 59% premature awakening → can’t regain sleep
- 56% daytime napping; 16% naps ≥ 60 minutes
- 47% routinely have difficulty falling asleep at night
Quantitative Findings

- 24% use of sleep medications to generate sleep
- 18.4% report restless legs syndrome
- 16.5% frequently have nightmares \( \rightarrow \) arousal from sleep
- 56.2% have issues with snoring during sleep
- 68% report excessively tiredness during the work day
Reported sleep aides used by respondents

A – Alcohol
Advil PM
Aleve
Ambien & Ambien CR
Aspirin
Ativan
“Antihistamines”
B – Benadryl
BIPAP
C- CPAP
Cough syrup
D – Dramamine
E- Excedrin, Excedrin pm
Ext Strength Tylenol
Extrovent pm
Ear plugs
Elavil
H – Halcion
Herbal OTC
I – Ibuprofen
K – Klonopin
L – Lunasom
Lunesta
Lyrica
M – Marijuana
Melatonin
Mirapex
Motrin
Morphine
N – Nyquil, Nytol
Nitetime cough syrup
R – Requip / Rozerem
Rapid sleep pm
Restoril
S- Sominex
Simple sleep
Seroquel
Sonata
St John’s Wart
Sominex
Sudafed
T-Tylenol pm
Trazadone
Tempzepam
Triazolam
Tryptophan
Tramadol
U - Unisom
V - Valarian
Vistaril
Valium
X - Xanax
Z – Zanaflex
Zaleplon
Zolpidem

Analgesic / antipyretic: Acetaminophen 500 mg / 15 mL
Cough suppressant: Dextromethorphan 15 mg / 15 mL
Antihistamine / hypnotic: Doxylamine 6.25 mg / 15 mL
contains diphenhydramine
+ regular strength 25 mg / tablet
+ extra strength 50 mg / tablet

Sominex, Sleepinal, Twilite, Unisom, etc.

• Half-life 4-8 hours: hypnotic effect lasts ~ 6 hours
• Tolerance usually develops after a few days of use
• Significant and additive effects with alcohol, hypnotics, etc.
• Paradoxical effects in some, particularly the elderly
Rebound insomnia

Psychological addiction

Low efficacy if abnormal neurotransmitters
2007 & 2008 & 2009: FDA orders stronger warnings for sleep aides

- Ambien, Lunesta & 11 other common sleep aides
- Risk of bizarre and paradoxical behaviors
  - Sleepwalking  Hallucination  Violent outbursts
  - Nocturnal binge eating  Abnormal sex drive  Driving while asleep

Sales for Ambien & Lunesta alone > $5 billion (2008)
Quantitative Findings

• 0.4% use stimulants (besides caffeine) to maintain wakefulness during workday
• 10.6% have sleep regularly disrupted due to child care issues
• 10.3% see or are considering seeing a sleep specialist
• 15.7% report having fallen asleep during an anesthetic
• 48.8% have witnessed a colleague asleep during a surgical case
Adderall
Caffeine (coffee, soft drinks)
Caffeinated drinks (Red Bull, NOS, Stacker, 5-Hour Energy ™)
Caffeine tablets (Nodoz™)
Herbal tea
Ephedra
Provigil (Cephalon, Equip)™
CX717 (investigational drug similar to Provigil)
Primatine mist nasal spray
Ritalin
Vivarin™
Vyvanse™

Wakefulness promoters reportedly used by respondents
<table>
<thead>
<tr>
<th>Beverage</th>
<th>Caffeine Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hershey’s Chocolate Kiss</td>
<td>1mg</td>
</tr>
<tr>
<td>12 oz. Snapple Tea</td>
<td>32mg</td>
</tr>
<tr>
<td>12 oz. Coca-Cola Classic</td>
<td>34mg</td>
</tr>
<tr>
<td>12 oz. Dr. Pepper</td>
<td>41mg</td>
</tr>
<tr>
<td>12 oz. Mountain Dew</td>
<td>55mg</td>
</tr>
<tr>
<td>8.5 oz. Red Bull</td>
<td>80mg</td>
</tr>
<tr>
<td>8 oz. Coffee</td>
<td>135mg (variable)</td>
</tr>
<tr>
<td>1 Vivarin™ caffeine pill</td>
<td>200mg</td>
</tr>
<tr>
<td>16 oz. Starbucks Coffee Grande</td>
<td>259mg</td>
</tr>
<tr>
<td>24 oz. BooKoo Energy drink</td>
<td>360mg</td>
</tr>
</tbody>
</table>
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 cases, cases that went poorly
• Snoring bed partner
• Obstructive sleep apnea syndrome, restless leg syndrome
• Nightmares
• Domestic issues: child care, care of ill spouse/parent, lacks partner help
• Medical-legal, financial, relationship, workplace problems
• A vicious cycle of poor sleep, stress, worsening sleep
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 errors of omission; making errors 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 the problem of sleep-related fatigue

• Regulation needed — work hour restrictions like airline pilots
• Improved, scheduled breaks during work hours
• Sleep aides education needed: medications are a two-edged sword
• Start cases later in the day
• Provide nap-rooms at work
• Feel safe in admitting problem. Seek professional help if problem persists
Miscellaneous criticisms/questions of the study’s intent and design

• Worthless study---sleep-related issues not a problem in clinical practice
• Timely study, provokes needed discussion about workplace safety
• Use Ipod ear buds to listen to music to keep me alert. Is this bad?
• Does reading or listening to books on tape help or hurt?
• Does using the Internet during cases help or hurt?
• Thank you! Have seen patients & colleagues hurt by sleep issues
• Waste of time, we knew all this already
• You bring negative publicity to us! This will hurt us with physicians!
• Likely underestimating problem---people reluctant to admit problems
Sleep disturbances are common

- ~40% adults → acute/chronic issues each year
- Under-reporting is very likely
- Links to health, social and job dysfunction

Metric of its pervasiveness
- OTC & prescription advertising (TV, radio, magazine)
- Widespread & growing use of sleep aides
- Financial success of distributors
- Surveys of worker fatigue
Practice Guidelines for the Perioperative Management of Patients with Obstructive Sleep Apnea

A Report by the American Society of Anesthesiologists Task Force on Perioperative Management of Patients with Obstructive Sleep Apnea

Anesthesiology
May 2006 1081-1093
Restless legs syndrome
Periodic limb movement disorder

• 41 yo with nightly insomnia for 10 yrs
• “Uncomfortable sensations in my legs”
• “Uncontrollable urge to move my legs”
• Sensation only relieved by walking
• Maddening to bed partner
• Daytime life is distressing – exhaustion

• 5 - 20% of Americans
• Under-reporting is highly likely

JAMA 2007;297:1865-6
J Int Med 2009;266:419-431
• FDA approved drug for RLS
• Anti-parkinsonian agent
• Activates postsynaptic dopamine receptors
Narcolepsy

1:2,000 Americans suffer

Inappropriate, sudden hypersomnia
Low levels hypothalamic neuropeptides
Autoimmune injury to secreting cells?

Rx: Behavior modification to Px injury
Family & coworkers involved
Ritalin
Selective serotonin reuptake inhibitors
Provigil
Modafinil (Provigil)

- Wakefulness-promoting drug
- FDA approved: narcolepsy, OSAS, ‘shift work syndrome’
- Inhibits dopamine and norepinephrine reuptake
- Activity at hypothalamus (orexin neurons)

2004 Gold Medal Revoked
1600 M Relay
Calvin Harrison
We all have a major stake in understanding the impact of sleep on clinical performance and career sustainability.

Sleep deprivation impairs vigilance and neuro-cognitive function.
The anesthesia provider......

- Renders care when the patient presents (day or night)
- Timing of task readiness & rest --- often asynchronous
- Fatigue & sleep deprivation negatively impact performance
- Each of us is genetically “hard wired” for sleep requirement
Many anesthesia providers.....

- Are chronically sleep deprived
- Commonly push the envelope further & further
- Are often unaware (or in denial) of degree of impairment

Layering acute sleep deprivation on top of an existing sleep debt is a recipe for catastrophe*

*Van Dongen. Sleep 2003:26:117
^Dement. Personal communication. 4/10
Sleep debt, sitting still, repetitive task performance -- seriously degrade coping defenses --

How often have you been here???
The combination of:

- Sleep deprivation
- Life stressors
- Prescription drugs / OCT drugs
- Overall physical health
- Overall mental health
- Alcohol use / ‘recreational’ drugs

*Have profound and variable effects upon each of us*

24 hours of continuous wakefulness = BA 0.1%*

^Dement. Personal communication. 4/10
Caveats

- Fatigue / sleepiness = major provider concerns

- Greater detrimental effects with age*

- Sleepiness during patient care removes an essential layer of protection in a very dangerous environment

- Many providers fall asleep during care yet deny doing so*^  

Should there be regulation?

- Bus drivers
- Airline pilots
- Truck drivers
- Cruise ship captains
- Train / subway operators

- What about us?

- Too often *The Sleepy are Keeping People Asleep*
Sleep-related fatigue

Major concern in any domain where workforce behavior has immediate or potential negative consequences for others.

Often the danger is self-evident. What we do with it is up to us.
• You witness a provider who falls asleep while engaging in patient care....

• A surgeon or circulator tells you that a departmental member was sleeping during patient care....

• You are aware of a colleague who frequently self-medicates to remain alert at work....

• You are falling asleep during patient care and you have recently experienced ‘near misses’....

…..what would you do?