CLINICAL CASE REPORTS

Clinical Case Reports Journal

ISSN: 2767-0007

The On-Call Burden of Physicians: Discussion, Recommendations and Risk Mitigation Strategies

Blake D. Lollis*, Madhukar Kumar, Jeffrey Kaplan, Christopher Schmelzer, Kerry Harthcock and Matthew Silva

Department of Medicine, Virginia Mason Memorial Hospital, WA 98902, USA

*Corresponding author: Blake D. Lollis, Occupational and Environmental Medicine Consultant, Virginia Mason Memorial Hospital, 302 S 10th Ave, Yakima, WA 98902, USA.

Tel: +1-509-574-3300; E-mail: blakelollis@yvmh.org

Article Type: Case Report

Compiled date: November 12, 2020

Volume: 1

Issue: 7

Journal Name: Clinical Case Reports Journal

Journal Short Name: Clin Case Rep J

Publisher: Infact Publications LLC

Article ID: INF1000073

Keywords: Physician; Anesthesiologist; Circadian rhythm

Cite this article: Lollis BD, Kumar M, Kaplan J, Schmelzer C, Harthcock K, Silva M. The on-call burden of physicians: discussion, recommendations and risk mitigation strategies. Clin Case Rep J. 2020;1(7):1–5.

Perspective

Dr. William Stewart, surgeon and chief of staff of Johns Hopkins Medical School in the 1880s, devised a grueling and prolonged training program for his residents in which they basically lived at the hospital and worked extremely long days with very little sleep or rest. In this manner, he believed physicians would truly be trained to the maximum extent that they could. This training regimen caught on and became the prevailing training method of residency programs throughout the US. Serious questions have been raised about what impact this might have on these physicians and the safety of those for which they provide care (Avidan, 2013) [1].

Besides long duty hours, physicians are often required to take a call from home after their work shift is over to provide telephone advice to nursing staff on their admitted patients, to provide advice to patients that might call in regarding a healthcare concern, or to be consulted by emergency room staff on the need to admit a patient to their respective service. Depending on the hospital's acuity, some physicians may actually have to reside from within the walls to provide immediate care, such as a neurosurgeon or trauma surgeon in a level one trauma hospital. All these situations come at a human cost to those physicians in the form of sleep loss, disruption of circadian rhythm, disruption of their ability to "switch off" from their work, decreased rest, adversely affected family time (Hall, 2016) [2].

The stress of being on-call cannot be overstated. One study in New Zealand reported extremely high job stress, which was, according to those physicians studied, mainly came from their on-call burden and responsibilities. The stress of those physicians being on call was positively correlated with occupational injuries, medical errors (errors of commission or omission), and physical health problems (Heponiemi, 2015) [3]. Another study found that post-call anesthesiologists had increased tension, anger, fatigue, and confusion. Those same physicians felt jittery and had high levels of sleepiness.

Not only were they sleepy, but they had circadian rhythm disruption, and there were potential negative indicators of their clinical performance, health care delivery abilities, as well as personal safety while commuting home from work (Saadat, 2015) [4]. Another study opined that being a physician has the requirements of high levels of psychomotor performance, high cognitive function, and emotional equilibrium. Physicians who are required to work long hours, where sleep is limited, often fragmented, with acute sleep disruption, will negatively impact their psychomotor performance, cognitive function, and mood

and potentially negatively impact patient safety (Siraj, 2012) [5].

In a study of Finnish anesthesiologists, a study of those physicians found that being on-call obviously increased their working hours and that this correlated with increased stress levels, lower quality of life, job dissatisfaction, circadian malalignment, poor sleep quality and duration/amount, risk of occupational injuries and increased medical error rate due to cognitive and neuropsychological performance decrement, and interference with family life. The latter impact is called "work interference with family" or WIF (Heponiemi, 2014) [6].

A very scientific paper by sleep medicine specialists defined Circadian Rhythm Sleep Disorders or CRSDs as six distinct clinical entities.

While describing all six of these in detail is beyond this paper's scope, the third type is called irregular Sleep-Wake Type, and the sixth type is called Shift Work Type. Physicians on call may have the former while those hospitalists may have the latter type, and there may be a crossover. In either case, those physicians will have an impairment, i.e., have a negative impact on their social, occupational responsibilities.

Treatments for CRSDs may include precise sleep scheduling, circadian phase-shifting, or resetting the clock, and medications that promote sleep or wakefulness. However, these medications may not be appropriate for physicians in the on-call setting or shift work setting.

However, sleep hygiene interventions can help mitigate the negative effects of these CRSDs (Sack, 2007) [7].

In another study, those hospitals that had high on-call burden for some specialties or those practices who had high on-call burden had what was defined as high-demand, low-control job strain. This increased their job dissatisfaction rate due to this stress. Those stressed physicians with a high on-call burden were more likely to have an increased "physician turnover intention" or PTI.

This refers to the increased likelihood of those physicians desiring to quit that practice and re-locate to another city or area where the on-call burden might be less. Those physicians with high demand and low control over their on-call situation were also found to have higher psychological strain and physical disease (Heponiemi and Presseau, 2015) [3]. That same author found those physicians with high on-call burden were found to have increased physician burnout (Heponiemi and Kouvonene, 2008) [8].

Circadian rhythm disturbances were seen in physicians with high on-call burden or even in physicians such as hospitalists who do "shift work" can negatively impact physicians' physical and neuropsychological condition or any other worker so exposed to that stressor. While the effect of a temporary circadian rhythm disturbance such as "jet lag" may be mild and transient to that individual, repeated challenges to individuals who have repeated circadian rhythm disturbances (such as profound sleep loss) can have their physiological rhythms disrupted, leading to disturbances in body temperature, glucocorticoid secretion, cognitive function, gastric emptying, pulmonary function, the effect of metabolism on medications, behavioral issues, and many other physiologic processes leading to increased risk of medical disorders. It may be impossible to recover from this circadian malalignment or desynchronosis completely. The condition of circadian rhythm disturbances, if prolonged, can lead to increased risk of gastrointestinal, psychoneurotic, cardiovascular, and gastrointestinal diseases. There is even increased alcohol consumption and the use of illicit drugs in those workers with circadian rhythm desynchronosis (Ladou, 2014) [9].

The increased propensity/likelihood of physicians with a high on-call burden to have errors of omission and errors of commission at work can negatively affect patient safety by increasing the medical error rate (Avidan, 2013) [1]. However, the disruption in normal sleep patterns for those physicians affected can also cause these physicians to be of danger to themselves or others when driving home, post-call. They may be involved in a Motor Vehicle Collision (MVC) due to the decrease in neurocognitive function caused by a lack of Rapid Eye Movement (REM) sleep during a night of being on call. Should they be injured and not be able to perform their regular duties, that can cause an increased Disability Adjusted Life Year or DALY rate. Should those physicians actually be killed on the way home due to a fatal motor vehicle accident, which would cause them to have, a higher Years of Potential Life Lost rate or YPLL in either themselves or others (Gordis, 2004) [10].

"Physician Burnout Syndrome" or PBS was described in an article as having three dimensions: emotional exhaustion, depersonalization, and a sense of low personal accomplishment. The authors described that the high physician burnout rate in the US (estimated as high as fifty percent) reflects being in a job of intense stress accompanied by loss of enthusiasm for work.

They described the depersonalization as a phenomenon in which those physicians saw patients and colleagues as objects. The job dissatisfaction was characterized by negative personal assessments and feelings of incompetence associated with job dissatisfaction. This rate of PBS was positively correlated with increased weekly working hours, which negatively impacted sleep duration/quality (De Novais, 2016) [11].

In a study of a community hospital with perioperative surgical services, it was noted that careful monitoring of the work hours of surgical and nursing staff regarding on-call periods and weekly working hours limits helped decrease the adverse working conditions of the surgical staff and helped provide more optimal care to the surgical patients (Olmstead, 2014) [12]. While this committee was not tasked with making recommendations on the maximum number of hours worked by physicians, it is difficult to divorce having on-call responsibilities with increased working hours per week for those physicians who have such responsibilities.

Physicians With an intense or high on-call burden, physicians can have their circadian rhythm negatively impacted by this, as has been previously described. The longer a physician remains awake, the less sleep he/she has, and the more physiologic need for sleep increases. A physician, suddenly awakened, may have "sleep inertia," an entity described as an intense desire to return to sleep, accompanied by grogginess, slurred speech, impaired cognition, and automatic behavior. Chronic sleep deprivation is even more dangerous as it can cause, in a dose-dependent function, attention lapses, depressed mood, and reduced cognitive performance, which may not be recognized by the physician. In fact, the effect of being on call every fourth or fifth night can be correlated with a 0.04% to 0.05% blood alcohol level and maybe unrecognized by that particular physician. The authors described how prolonged work shifts and circadian malalignment are associated with a higher rate of medical errors, greater attentional failure, increased frequency of self-reported motor vehicle crashes, and occupational injuries (Olson, 2009) [13]. As described previously, these motor vehicle collisions seen in physicians "post-call" could lead to an increased DALY or YPLL rate.

The stress on physicians with higher on-call burdens increases the Physician Turnover Intention (PTI), as has been described above. Even among physicians who may remain within a hospital system, they may elect not to take a call to decrease themselves' stress. However, it has been observed that there is evidence to support an increased adverse patient outcome in hospitals without adequately staffed emergency or surgical services. Hospitals are increasing "buy-in" among some of their surgical services by enforcing by-laws requiring call (sometimes not popular) and paying their physicians for their on-call burden, which sometimes that hospital can ill-afford. It is indeed a difficult balancing act in some hospital practices (O'Malley, 2007) [14].

In one interesting study of adding a "night-float" to a surgical residency program, it subjectively helped the on-call residents with respect to job satisfaction, but there was no statistical difference between the performance of these residents whether they were working 24 hours or 12 hours in terms of resident accuracy, speed of movement, the economy of movement, and time to completion of two simulated tasks. Still, the authors note that sleep deprivation can negatively impact physician performance. They advocated further research before the night-float position be eliminated (Yi, 2013) [15].

In a sleep research article on physicians, it was discovered that there are negative impacts on the psychological and physiological health of physicians who were on call regardless of whether they had to respond during their night of call. Being on call negatively impacts sleep quality even if not called! They discovered that the mere possibility of being called to respond had a stressful impact on that physician and that recovery to normal circadian rhythm status was prolonged (Ziebertz, 2017) [16]. That same author in another article found that the sleep deprivation associated with being on-call led to increased fatigue, decreased performance, negative psychological status, higher Work Home Interference or WHI, and perceived performance difficulties or PPD (Zeibertz, 2015) [17]. Work Home Interference from being on-call can potentially lead to higher Physician Turnover Intention or PTI, as described above. Giving that physician or physician-group some say or control in developing and maintaining an on-call schedule might be a way to mitigate or lessen that stress or strain (Heponiemi, 2015) [3].

Conclusions

Physicians are a "low-density/high-demand" population who have an extended training platform. They are too precious of a resource to lose to injury, death, or relocation. However, the patient population for whom they provide care deserves a rapid response to a critical medical or surgical issue. These competing factors must be weighed when creating an on-call schedule.

It would be difficult, if not impossible, to come up with a list of recommendations or mitigating factors that would be appropriate for all medical/surgical groups due to the wide variety of medical practices and the on-call requirements that they might have.

However, the medical literature that this committee reviewed does have some helpful recommendations. These recommendations are summarized below and are found in the accompanying document to this brief paper.

Sleep hygiene practices can go a long way in protecting physicians who have the burden of being on call from some of the negative impact that being on-call can cause; these include "power naps" before and during the on-call experience, the strategic use of caffeine, light and dark exposure, and protecting the sleep environment (Avidan, 2013) [1]. Pharmacologic enhancement is probably not indicated for on-call physicians due to the potentially harmful and/or addictive nature of these drugs. "Crew rest" before and after an on-call period, used in the aviation community, would be very helpful in managing the health and maintaining the performance of on-call tasked physicians.

Maintaining adequate staffing in a practice who has the burden of providing on-call services can help spread out that on-call burden among those physicians (Olmstead, 2014) [12].

Providing support for those physicians with an on-call burden by providing flexible work schedules, thus helping decrease work interference with family or WIF, providing child care facilities, for example, will improve physicians' neuropsychological outlook.

Involving physicians who have on-call responsibilities in the creation of a call schedule is crucial.

In turn, these recommendations could decrease physician turnover intention or PTI, a loss to our community (Heponiemi, 2016) [18].

Further research could be done on this subject here at our

local hospital, Virginia Mason Memorial Hospital, by actually administering the Epworth Sleepiness Scale to a population of physicians on call and those who do not have that burden. Our practices with "heavy" call schedules could be compared with those practices where the on-call requirements are considered "light" (remember that the literature states that even physicians that have a "light" on-call rotation are negatively impacted). Statistical analysis could then be performed, by biostatisticians, to see how impaired that particular on-call group is compared to a control group. The question that could be answered in comparing two populations would be: is there a significant (p-value less than or equal to 0.05) difference between those two populations with regards to their Epworth Sleepiness Scale (Jekel, 2007) [19]?

Biostatisticians could even discover, using the Epworth Sleepiness Scale and appropriate biostatistical determinations, what impact being on call every third night *vs.* every fourth or some other on-call schedule to determine the ideal on-call shift schedule.

It may not be a good idea at all to have physician groups perform long periods of on-call duties such as three or four days at a time. If heavily tasked during these periods of "block" call, those physicians might be extremely sleep deprived and impaired even if they do not recognize it themselves.

In the discussions that we committee members had, it appears that two of the most severely impacted groups, by heavy on-call burdens, are the general surgery and orthopedic surgery groups. Perhaps a Kaizen project could be done to dive into the details and factors involved with these particular groups and might prove very fruitful in coming up with some further, targeted implementation strategies or recommendations. These would potentially help these surgeon specialty groups in the commission of their on-call responsibilities while minimizing these physicians/surgeons' negative health-effects.

Maintaining hospitalists at this hospital can help lessen the burden on the practicing physician who has inpatient responsibilities. Maintaining these hospitalists' health by keeping them on the correct rotation schedule (duration, length, and frequency) could prevent shift work health issues, but is a subject not covered by this particular paper.

In conclusion, the on-call burden for physicians is huge. It cannot be over-estimated with regard to the negative impact it has on the well-being of physicians. It disrupts sleep and causes circadian rhythm disturbances even if the physician is never called during his/her on-call experience. The physiological and neuropsychological decrements seen can be permanent and cause long-term health consequences. However, certain mitigation strategies can help lessen this negative impact and help maintain our on-call physicians' health and safety and protect the patients for which they provide care.

References

1. Avidan AY. Sleep and fatigue countermeasures for the neurology resident and physician. Continuum (Minneap Minn). 2013;19(1 Sleep Disorders):204–222.
2. Hall SJ, Ferguson SA, Turner AI, Robertson SJ, Vincent GE, Aisbett B. The effect of working on-call on stress physiology and sleep: a systematic review. Sleep Med Rev. 2017;33:79–87.
3. Heponiemi T, Aalto AM, Pekkarinen L, Siuvatti E, Elovainio M. Are There high-risk groups among physicians that are more vulnerable to on-call work? Am J Emerg Med. 2015;33(5):614–619.
4. Saadat H, Bissonnette B, Tumin D, Thung A, Rice J, Barry N, et al. Time to talk about work-hour impact on anesthesiologists: the effects of sleep deprivation on profile of mood states and cognitive tasks. Paediatr Anaesth. 2016;26(1):66–71.
5. Wali SO, Qutah K, Abushanab L, Basamh R, Abushanab J, Krayem A. Effect of on-call-related sleep deprivation on physicians' mood and alertness. Ann Thorac Med. 2013; 8(1):22–27.
6. Heponiemi T, Puttonen S, Elovainio M. On-call work and physician's well-being: testing the potential mediators. Occup Med (Lond). 2014;64(5):352–357.
7. Sack RL, Auckley, D, Auger RR, Carskadon MA, Wright Jr KP, Vitiello MV, et al. Circadian rhythm sleep disorders: part i, basic principles, shift work and jet lag disorders. An american academy of sleep medicine review. Sleep. 2007;30(11):1460–1483.
8. Heponiemi T, Kouvonen A, Vänskä J, Halila H, Sinervo T, Kivimäki M, et al. Effects of active on-call hours on physician's turnover intentions and well-being. Scand J Work Environ Health. 2008;34(5):356–363.
9. Joseph L, Robert H. Occupational and environmental medicine, current diagnosis and treatment, 5th ed. Lange Publications: McGraw-Hill Education; 2014;35:623–624.
10. Leon G. In: Epidemiology. 3rd ed. Elsevier Publishing. 2004;53–55,66–67.
11. DE Novais RN, Rocha LM, Eloi RJ, Dos Santos LM, Ribeiro MVMR, DA Silva Ramos FW, et al. Burnout syndrome prevalence of on-call surgeons in a trauma reference hospital and its correlation with weekly workload: cross sectional study. Rev Col Bras Cir. 2016;43(5):314–319.
12. Olmstead J, Falcone D, Lopez J, Mislan L, Murphy M, Acello T. Developing strategies for on-call staffing: a working guideline for safe practices. AORN. 2014;100(4):369–375.
13. Olson EJ, Drage LA, Auger RR. Sleep deprivation, physician performance, and patient safety. Chest. 2009;136(5):1389–1396.
14. O'Malley AS, Draper DA, Felland LE. Hospital emergency on-call coverage: is there a doctor in the house? Issue Brief Cent Stud Health Syst Change. 2007;(115):1–4.

15. Yi WS, Hafiz S, Sava JA. Effects of night-float and 24-h call on resident psychomotor performance. J Surg Res. 2013; 184(1):49–53.
16. Ziebertz CM, Beckers DGJ, Hooff MLM, Kompier MAJ, Geurts SAE. The effect on sleep of being on-call: an experimental field study. J Sleep Res. 2017;26(6):809–815.
17. Ziebertz CM, van Hooff MLM, Beckers DGJ, Hooftman WE, Kompier MAJ, Geurts SAE. The relationship of on-call work with fatigue, work-home interference, and perceived performance difficulties. Biomed Res Int. 2015;2015:643413.
18. Heponiemi T, Presseau J, Elovainio M. On-call work and physicians' turnover intention: the moderating effect of job strain. Psychol Health Med. 2016;21(1):74–80.
19. Malmberg B, Kecklund G, Karlson B, Persson R, Flisberg P, Ørbaek P. Sleep and recovery in physicians on night call: a longitudinal field study. BMC Health Serv Res. 2010;10:239.