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Asserting our right "...to petition the Government for redress of grievances."

Amendment 1, U.S. Constitution, Dec. 15, 1791

OBSTRUCTIVE SLEEP APNEA



National Transportation Safety Board Washington, D.C. 20594 Safety Recommendation

Date: October 20, 2009

In reply refer to: M-09-14 through -16

Admiral Thad W. Allen
Commandant
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Accident Experience

The National Transportation Safety Board (NTSB) has investigated a number of accidents and incidents in all modes of passenger transportation involving operators with sleep disorders. These accidents include two major marine accidents involving pilots with obstructive sleep apnea (OSA).

On June 23, 1995, about 1:42 a.m., a pilot directing the maneuvering of the cruise ship *Star Princess*, which was carrying 1,568 passengers and 639 crewmembers through Alaska's Inside Passage, grounded the ship on a submerged, but well-known, charted and marked rock.¹ The vessel's bottom sustained significant damage on the starboard side and was subsequently piloted to safe anchorage to assess damage and disembark passengers. No injuries or deaths resulted, but the total cost from required repairs and the delay before the vessel could return to service was estimated at over \$27 million. The pilot was obese, a loud snorer, and excessively sleepy during the day, and an evaluation performed at a sleep disorders center approximately 4 months following the accident resulted in a diagnosis of severe OSA. The NTSB determined that the probable cause of the grounding was the pilot's poor performance, which may have been exacerbated by chronic fatigue caused by OSA.

The issue of OSA re-emerged during the investigation of the 2007 allision of the *Cosco Busan* with the fendering system of the San Francisco-Oakland Bay Bridge.² In this investigation, the NTSB found that the pilot had reported a history of OSA to the U.S. Coast Guard. Though investigators did establish through review of the pilot's medical records that the OSA itself was treated, and not contributory to the accident, the Coast Guard had not required any additional documentation to establish the adequacy of the pilot's treatment for the disorder.

¹ *Grounding of the Liberian Passenger Ship Star Princess on Poundstone Rock, Lynn Canal, Alaska, June 23, 1995*, Marine Accident Report NTSB/MAR-97/02 (Washington, DC: National Transportation Safety Board, 1997).

² *Allision of Hong Kong-Registered Containership M/V Cosco Busan with the Delta Tower of the San Francisco—Oakland Bay Bridge, San Francisco, California, November 7, 2007*, Marine Accident Report NTSB/MAR-09/01 (Washington, DC: National Transportation Safety Board, 2009).

Accidents and incidents in other transportation modes have also highlighted the critical importance of screening for and effectively treating OSA among transportation operators. In a recent aviation incident, both commercial pilots fell asleep, passing over their intended destination airport in Hilo, Hawaii.³ The NTSB determined that the probable cause of this incident was the captain and first officer inadvertently falling asleep during the cruise phase of flight. The captain, who had multiple risk factors for OSA, was subsequently diagnosed with the disorder, and his undiagnosed (and untreated) OSA was found to be a factor in the incident. In a fatal rail accident in Clarkston, Michigan, the engineer of a train that proceeded through a stop indication, striking another train, was found to be at very high risk for OSA but had never been formally diagnosed or treated, and the conductor was found to have been diagnosed with OSA but had not been tested to determine if his treatment was effective.⁴ The probable cause of that rail accident was determined to be the crewmembers' fatigue, which was primarily due to the engineer's untreated and the conductor's insufficiently treated OSA. In a highway accident near Jackson, Tennessee, a tractor-trailer driver with clear risk factors for and a diagnosis of OSA collided with a Tennessee Highway Patrol vehicle trailing construction vehicles, killing the state trooper inside. The NTSB found that the driver's (unreported) OSA, his untreated hypothyroidism, or complications from either or both conditions predisposed him to impairment or incapacitation, including falling asleep at the wheel while driving. The NTSB determined that the probable cause of the accident was the driver's incapacitation, owing to the failure of the medical certification process to detect and remove a medically unfit driver from service.

Previous Recommendations

As a result of the *Star Princess* accident, the NTSB issued the following recommendation to the Coast Guard:

Review, in consultation with experts in occupational health, your medical standards, guidelines, and examination forms to ensure that they require the disclosure and appropriate evaluation of the history or presence of any medical conditions, symptoms, or medication use that would affect an individual's fitness to pilot a vessel. (M-97-42)

This recommendation was classified "Closed Acceptable Action" after the Coast Guard revised Form 719K (Merchant Mariner Physical Examination Report) in January 2002.

Also as a result of the *Star Princess* accident, the NTSB made the following recommendation to the Coast Guard, the State Pilot Commissions, the Alaska Coastwise Pilot Association, the San Diego Bay Pilots Association, Inc., and the American Pilots' Association:

Advise pilots about the effect of fatigue on performance and about sleeping disorders such as sleep apnea (Safety Recommendations M-97-41, -44, -49, -51, and -54).

These recommendations were classified "Closed Acceptable Action" after the addressees took action to ensure that pilots were informed about the circumstances of the *Star Princess* accident, the effects of fatigue, and the relevance of the medical condition identified.

³ Aviation Accident Brief, Hilo, Hawaii, February 13, 2008:

<http://www.nts.gov/nts/brie.asp?evid=20080222XOO229&ntsbo=S EAO8IAO8O&akey= 1>.

⁴ *Collision of Two Canadian National/Illinois Central Railway Trains near Clarkston, Michigan, November 15, 2001*, Railroad Accident Report NTSB/RAR-02/04 (Washington, DC: National Transportation Safety Board, 2002).

⁵ *Work Zone Collision Between a Tractor-Semitrailer and a Tennessee Highway Patrol Vehicle, Jackson, Tennessee, July 26, 2000*, Highway Accident Report NTSB/HAR-02/01 (Washington, DC: National Transportation Safety Board, 2002).

Obstructive Sleep Apnea

OSA is a condition in which individuals obstruct their own airways while sleeping, typically resulting in hypoxia at night, interruptions in breathing lasting several seconds at a time, loud snoring, and non-restful sleep. They are frequently entirely unaware of the condition. Individuals with the disorder may have extreme daytime sleepiness and often fall asleep within minutes in a quiet or monotonous environment. OSA is associated with significant cognitive and psychomotor deficits, which are at least partially reversible with appropriate treatment.⁶ Such deficits are particularly problematic during many marine operations, in which critical decisions must often be made under demanding conditions. Accident rates have been shown to be considerably higher in drivers with OSA than in those without the disorder, with one case-control study demonstrating a more than six-fold higher risk of traffic accidents in drivers with OSA, after controlling for other possible confounding factors.⁷ In addition to the substantial risks of impairment or incapacitation as a direct result of the fatigue associated with OSA, the untreated disorder increases the likelihood of other operationally relevant medical conditions, including stroke, heart failure, coronary artery disease, and diabetes.

The condition is formally diagnosed through polysomnography, extensive monitoring done as part of a sleep study in which the patient sleeps under controlled conditions. If diagnosed, OSA can be effectively treated, usually through the use of a continuous positive airway pressure (CPAP) device worn at night to deliver air pressure that forces the airway open. Most modern CPAP devices are capable of recording detailed information regarding use. In some cases, surgery may be recommended to modify the individual's anatomy to allow the airway to remain unobstructed during sleep.

Obesity and high blood pressure are significantly associated with an increased risk for OSA. In one study, the prevalence of OSA was more than 50 percent in patients with an average body mass index (BMI)⁸ of 40.0.⁹ Another study found that 96 percent of male patients with resistant hypertension (high blood pressure poorly controlled despite the use of three or more antihypertensive agents) had unsuspected OSA.¹⁰ A 2006 consensus statement from the Joint Task Force of the American College of Chest Physicians, American College of Occupational and Environmental Medicine, and the National Sleep Foundation on screening for OSA recommended that a BMI of 35 or higher and hypertension that cannot be controlled on less than two medications trigger a formal evaluation for OSA.¹¹ Although these guidelines were directed at commercial drivers, they serve to highlight the risk associated with obesity and high blood pressure.

A 2002 review of the epidemiology of OSA estimated that roughly 7 percent of adults have at least moderate OSA.¹² The U.S. Coast Guard Medical Evaluations Branch reviews approximately 25 percent of the applications from the nearly 300,000 mariners who require certification examinations.¹³ The Medical Evaluations Branch reports that about 2.5 percent of the mariner applications that come for medical review by an evaluator have an established diagnosis of OSA, and since all applications with a diagnosis of OSA require such review, it is likely that less than 1 percent of the certified mariner population subject to medical examination has reported such a diagnosis. The Medical Evaluations Branch also notes that more than 10 percent of mariners undergoing medical review have a BMI greater than 40. The percentage of mariners subject to medical examination with a BMI greater than 40 who do not undergo medical review is unknown. Given the prevalence of OSA in the general population, the prevalence of markedly elevated BMI in the

⁶ L. Ferini-Strambi and others, "Cognitive Dysfunction in Patients with Obstructive Sleep Apnea (OSA): Partial Reversibility after Continuous Positive Airway Pressure (CPAP)," *Brain Research Bulletin*, vol. 61, no. 1 (2003), pp. 87-92.

⁷ Teran-Santos, A. Jimenez-Gomez, and J. Cordero-Guevara, "The Association Between Sleep Apnea and the Risk of Traffic Accidents, Cooperative Group Burgos-Santander," *New England Journal of Medicine*, vol. 340, no. 11 (1999), pp. 847-51.

⁸ Body mass index is a person's weight in kilograms divided by height in meters squared. An index of 30 or more is defined as obese by the National Institutes of Health.

mariner population undergoing medical review, and the strong association between obesity and OSA, it is likely that the actual prevalence of OSA in the mariner population is several times higher than the number of reported cases would indicate.

U.S. Coast Guard Guidance

The recently revised *Navigation and Vessel Inspection Circular on Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials (NVIC 04-08)* contains guidelines for the evaluation of mariners diagnosed with OSA and suggests the following action for mariners with such a diagnosis:

Submit all pertinent information and current status report from a qualified sleep medicine specialist. Include sleep study with a polysomnogram, use of medications and titration study results. If surgically treated, should have postoperative polysomnogram to document cure or need for further treatment.

NVIC 04-08 does not contain guidance regarding the identification of mariners at risk for the disorder.

Current Coast Guard Form 719K does not ask questions specific to OSA, though it does specifically require an entry regarding "sleepwalking." The Coast Guard is revising the form, and a recent draft of that revision includes a specific question regarding OSA, among questions on other sleep disorders. The draft form does not at this writing, however, include any questions about symptoms of OSA, including daytime sleepiness or snoring.

Other Modal Agencies

Actions taken by federal agencies regulating modes other than marine vary. The Federal Aviation Administration (FAA) provides written guidance to aviation medical examiners for the submission of appropriate medical information for pilots who have reported a history of OSA¹⁴ but does not screen pilots for the presence of the disorder and has no question on the Application for Airman Medical Certificate concerning a history of OSA or the presence of symptoms, such as snoring or excessive daytime sleepiness, related to OSA. The FAA does not provide any guidance to AMEs regarding risk factors for sleep disorders or any symptoms (for example, snoring) that might be related to OSA.

The Federal Transit Administration (FTA) has no formal medical standards for transit operators; each authority independently arranges medical programs for its operators, and many operators are required, either due to their functions or by the authority for which they work, to maintain a current commercial driver license. The NTSB is not aware of any existing programs that routinely screen transit operators for OSA.

⁹ O. Resta and others, "Sleep-Related Breathing Disorders, Loud Snoring and Excessive Daytime Sleepiness in Obese Subjects," *International Journal of Obesity and Related Metabolic Disorders*, vol. 25, no. 5 (2001), pp. 669-75.

¹⁰ A.G. Logan and others, "High Prevalence of Unrecognized Sleep Apnoea in Drug-Resistant Hypertension," *Journal of Hypertension*, vol. 19 (2001), pp. 2271-2277.

¹¹ Hartenbaum and others, "Sleep Apnea and Commercial Motor Vehicle Operators: Statement from the Joint Task Force of the American College of Chest Physicians, American College of Occupational and Environmental Medicine, and the National Sleep Foundation," *Journal of Occupational and Environmental Medicine*, vol. 48, no. 9 (supplement) (2006), pp. S4-37.

¹² T. Young, P.E. Peppard, and D.J. Gottlieb, "Epidemiology of Obstructive Sleep Apnea: A Population Health Perspective," *American Journal of Respiratory and Critical Care Medicine*, vol. 165, no. 9 (2002), pp. 1217-39.

¹³ Personal communication with Chief, Medical Evaluations Branch, U.S. Coast Guard National Maritime Center.

The Federal Motor Carrier Safety Administration (FMCSA) includes a specific question on the current form completed by commercial drivers undergoing examination for medical certification that specifically asks about sleep disorders, OSA, daytime sleepiness, and snoring. Further, the FMCSA Medical Review Board in 2008 recommended that the FMCSA require screening for OSA in all drivers with a BMI over 30, but the FMCSA has yet to act on that recommendation.

The NTSB has issued safety recommendations to the FAA and the FTA, and is now issuing recommendations to the FMCSA, to ensure that operators in the relevant modes are appropriately screened, evaluated, and treated for OSA. On August 7, 2009, in connection with the Hilo, Hawaii, incident, the NTSB issued Safety Recommendations A-09-61 through -63 to the FAA.¹⁴ On July 14, 2009, in its report on the Newton, Massachusetts, rail collision, the NTSB made similar safety recommendations to the FTA (R-09-08 and -09) and to the regional rail transit authorities (R-09-10 and -11).¹⁶ The NTSB is also issuing two safety recommendations to the FMCSA (H-09-15 and -16).

In addition, in response to NTSB recommendations issued in 2002 (R-02-24 through -26), the Federal Railroad Administration is working on new forms and guidance regarding medical certification; drafts from this work have a specific question regarding sleep disorders, OSA, and snoring and provide guidelines on screening specifically for OSA.

Summary

The relative risk of accident involvement for individuals with OSA is clearly elevated and quite clearly associated with the untreated disease. The disease is probably under-diagnosed and under-reported in the mariner population. OSA is commonly unrecognized by individuals who have it, the risk of cognitive impairment is increased in those individuals, and the likelihood of both critical errors and of actually falling asleep during marine operations is substantially elevated with the diagnosis; therefore, effective screening for the disorder is warranted. The Coast Guard has guidance through which mariners who are effectively treated for their OSA can routinely be approved for continued medical certification. Some objective information already gathered by the Coast Guard (for example, height, weight, blood pressure) might be applied using the 2006 consensus statement on screening to achieve effective requirements for screening mariners for OSA; however, the most effective screening would require that the Coast Guard gather some additional, easily collected information and develop additional guidance.

Recommendations

Therefore, the National Transportation Safety Board makes the following recommendations to the U.S. Coast Guard:

Modify Form 719K (Merchant Mariner Physical Examination Report) to elicit specific information about any previous diagnosis of obstructive sleep apnea and about the presence of specific risk factors for that disorder. (M-09-14)

Implement a program to identify licensed mariners subject to the *Navigation and Vessel Inspection Circular on Medical and Physical Evaluation Guidelines for Merchant Mariner Credentials* (NVIC 04-08) and who are at high risk for obstructive sleep apnea, and require that those mariners provide evidence through the medical certification process of having been appropriately evaluated and,

¹⁴ 2009 Guide for Aviation Medical Examiners:

<<http://www.faa.gov/about/offices/headquarters/offices/ays/offices/aam/ame/guide/>>.

¹⁵ Safety recommendation letter available at <<http://www.nts.gov/Recs/letters/2009/A096166.pdf>>.

¹⁶ NTSB/RAR-09/02.

if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification. (M-09-15)

Develop and disseminate guidance for mariners, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea (OSA), emphasizing that mariners who have OSA that is effectively treated are routinely approved for continued medical certification. (M-09-16)

Please refer to Safety Recommendations M-09-14 through -16 in your reply. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Member SUMWALT concurred in these recommendations.

[Original Signed]

By: Deborah A.P. Hersman Chairman

Sleep Apnea & the Professional Mariner by Capt. Doug Pine

*[Source: Master of Towing Vessels Association. **Editor's Note:** this is the first contribution to the Towmasters Forum from MTVA member Doug Pine, and you'll be seeing more quality writing from him in the future. You can check out his blog, [The Dullest Catch](#), and read about his recent harrowing experiences as captain of a U.S.-flagged fishing vessel working in the South Pacific. Doug is now safely back home in Washington.]*

As a professional mariner you are, I am sure, quite familiar with the sounds of snoring coming from the cabins aboard the vessels upon which you serve. Unfortunately, at times, we must share a cabin with a snoring shipmate. I remember a time over ten years ago when the assistant engineer and I shared a cabin when I was a mate on a tug for [Sause Brothers](#) in Hawai'i. One morning he went off on me at breakfast: "Doug, I can't get a moment's sleep when you're in there! You snore louder than anyone I have ever heard!" This was no surprise, as I knew that I snored. My then-wife used to kick me in my sleep to get me to roll over and stop snoring. My brother and I were famous in our family for our snoring. Next time we were in port, I walked across Nimitz Highway to the K-Mart and bought some of those strips you paste on your [schnozz](#) that are "guaranteed to stop your snoring!" I bought some sprays, too. Nothing worked. I felt bad for my cabin-mate, and stayed awake as much as I could. The A/E bitched about it until I got on a different boat that fortunately had a private berth for the Mate.

When I married my wife Kathy, she said that I snored but she didn't mind it. I thought (and still do, by the way) that I had to be the luckiest man alive to be with a woman like that. For the first five years of our marriage I snored away happily, with no middle-of-the-night kicks and no early-morning complaints from my bed partner. As time went by I, like many of my peers, began noticing that my health was slowly but surely deteriorating. I had quit smoking cigarettes in 1999 but I had developed hypertension (high blood pressure) and was obese, lazy, and pretty much sedentary.

Then, during a pre-employment physical in 2008, I learned that I had [Type 2 diabetes](#). Like a bucket of cold water, it was. I began changing my eating habits, started exercising, and hoping for change. Not much changed really, except I did start losing some weight. I was always tired though. I would come home from work, sit down in my easy chair to watch the news, and would be fast asleep within minutes. When I would wake my family would laugh at me for snoring away loudly as I snoozed in my chair. I just didn't have any energy after about 2:00pm each day. On the weekends I would mostly nap, trying to build up energy for the coming work week. At this time I was running the simulation department at [PMI](#) in Seattle, a demanding and time-consuming job that, counting my commute, kept me away from home each day for over twelve hours, and often more. I was a wreck. I thought I was depressed, so my doctor put me on anti-depressant medication. So here I was, in my mid-forties, taking four different prescription medications each day, poking my finger to test my blood sugar several times a day, and taking my blood pressure twice a day. In other words, I was the poster child for the American pharmaceutical industry's mission statement. I was in good company, yet was not comforted by that fact. I hated taking the medicine, and being tied to testing each day. It is no small thing with the Coast Guard anymore, given the new medical standards they've implemented with NVIC 04-08. Beware, my shipmates, beware!

At a routine visit to my dentist one day I noticed a rack card that discussed snoring. It encouraged me to ask my dentist about possible treatment for snoring trouble, so I did. Asking that question eventually changed my life. My dentist told me that there are several treatment approaches available, but it all starts with a visit to an MD, a sleep specialist. Great, I thought, another doctor-to-doctor scam to generate income and commissions. But I like my dentist, and trusted him. It took several months, but eventually I decided to follow up.

I called the [Tacoma Sleep Clinic](#) and made an appointment. When I went in I thought it would be a quick in-and-out with a return visit to my dentist for an appliance fitting. What actually happened was I had about a one hour sit down with Dr. Daniel Clerc (pronounced: claire) who proceeded to tell me all I ever wanted to know about something called [Obstructive Sleep Apnea \(OSA\)](#). He took a detailed medical history from me and looked inside my nose, ears and mouth. He took measurements of my various pieces and parts in there and said that, absent the results of a sleep study, he would just about guarantee that I had OSA. The most interesting moment for me that day was when he asked "Do you suffer from nightmares?" I replied that I did indeed, almost every night. "Hmm", he said, "Interesting."

Dr. Clerc urged me to schedule a sleep study on my way out of his office. He said it would probably save my life. That really piqued my curiosity. "Save my life?" I asked. His answer was to list for me, and give me a

pamphlet that listed for me, many of the conditions that can be related to OSA. As I read through the list of deadly diseases, I occurred to me that I already had a few of them:

- **Hypertension**
- [Diabetes](#)
- [Obesity](#)
- [Depression](#)
- [Fatigue](#)

There are several more on that list, and all of them are killers.

Needless to say, I scheduled a sleep study. This involved going to a clinic in Tacoma to spend the night while being hooked up to about thirty different sensors that measured my brain function, respiration, temperature, eye movement, pulse, blood oxygen levels, leg muscle movement and a polygraph. Well, not the polygraph. But they might as well have done it since polygraphs measure most of the same stuff. My session would also be recorded on video and audio. The results of the study would be sent to a sleep specialist for interpretation and diagnosis. I tossed and turned a bit, not used to being wrapped in wires, and eventually fell asleep. I woke up the next morning, grumpy and tired, and headed for work. The clinic called back a week or so later and said that, based on my initial study, they wanted me to come in for another one, this time using a machine to assist my breathing.

So back I went. While he was hooking me up to the now-familiar sensors, the technician showed me the mask and machine I would be breathing from and said he would be controlling it from his lair. So I picked a sleep number (love those sleep number beds!), watched a little TV and, after bitching a bit about the mask, fell asleep. He woke me the next morning and sent me on my way. I had gone in on a Friday night so I headed for home on Maury Island. When I got home I decided to do some yard work. Heavy stuff, tree trimming, clearing and chipping. I worked for eight hours straight and then figured it was time for my afternoon nap. Here's where everything went sideways for me: I went in, turned on the TV, reclined in my easy chair and expected to fall asleep in moments. I waited, and waited some more, for sleep. It eluded me. I drank a beer, thinking that would push me over the edge. No sleep. Not even a yawn. So I got up and went outside and did three more hours of yard work. I had more energy on that Saturday in July of 2008 than I'd had since I was a twenty-something surfer on Maui. Kathy was as amazed as I was.

First thing Monday I called Dr. Clerc's office. Gimme one of those machines, now! But no, one must work within the system. Two weeks for the results, two more weeks to get a machine ordered and set up. The longest month of my life, knowing that the cure was out there but not being able to get it. I was miserable. Two weeks later, I got a call from Dr. Clerc's office. They asked me to come in for a follow-up visit for the results of my sleep study. I went in shortly thereafter and Dr. Clerc told me that I did indeed have a whopper of a case of OSA, and they would be able to fix me up without surgery. This was right around the time that television reporter Tim Russert died suddenly, and I'd been wondering if he, too, suffered from OSA, and if it had killed him. I wouldn't be surprised if it did.

Dr. Clerc prescribed my treatment: the machine I craved. A *Continuous Positive Air Pressure (CPAP)* machine. This little beauty blows pressurized air into your airway when you sleep, preventing the soft tissues from collapsing and obstructing (OSA, get it?) your airway and causing **apneas**, which are the times when you stop breathing at night and your brain eventually forces you awake just enough to draw a breath. It is these apneas that cause all the trouble. If you're waking up a hundred times each night, to prevent yourself from suffocating to death, you simply cannot get any good sleep. Your body will, over time, suffer terribly. In other words, a fan can save your life.

The CPAP machine is small and quiet. I use a mask that fits into my nostrils, and doesn't cover my mouth. It even has a humidifier built in. It's portable, so I take it to work with me. It's the easiest cure I've ever taken. I've been using CPAP for just over a year and, during that time, I've lost forty pounds. I'm not taking prescription medications anymore. None. My blood pressure is normal. My blood sugar is normal. I'm not depressed. My energy level is up. I exercise. At my last eye exam I read one line better than I'd ever done before. Oxygen is an essential element, and when you get enough of it your body responds in positive ways. What a concept. Most intriguing to me: I no longer have the nightmares. I used to wake screaming in the night from horrible nightmares, and they scared the heck out of my wife. The last one I had was one night when I didn't use the machine. They're gone.

I wanted to share this story with my fellow mariners, especially those whose employers still see fit to force them to work a six-on/six-off watch rotation. The two-watch system alone is a huge threat to a mariner's health. Add sleep disorders to the mix and it becomes potentially deadly. Look around you at work. How many of your peers suffer from hypertension, diabetes and obesity? How many of your shipmates snore? How many live sedentary lives? How many have died within a year or two of retirement? We all know them. That was me not too long ago. My diagnosis of OSA, and the treatment with CPAP, has changed my life for the better, and more than likely has extended it by many years.

Many of us in the maritime industry, like it or not, are stuck in the two-watch system. We owe it to ourselves to maintain our health as best we can under these difficult work hours. Quit smoking if you haven't. Switch to decaf. Drink lots of water, and try to get at least five hours of sleep during one of your off-watch periods. It's a challenge, to say the least. I don't believe that the two-watch system will disappear in my lifetime, so I've decided that, for me, it isn't worth it. I won't work another six-and-six boat unless I have to in order to feed my family. But I'm at a point in my career where I have the luxury of making that choice. If you can't make that choice for yourself do everything you can to preserve your health so you'll be around for your family for many years to come.

I did an interview with Dr. Clerc for this article, and his answers follow:

Doug: What do you estimate is the number of people in the United States with OSA?

Dr. Clerc: It is conservatively likely somewhere between 5 to 15% of the entire population, some estimates are higher (20%) = 15 to 60 million people).¹

Doug: Of these, how many have been diagnosed and treated?

Dr. Clerc: Possibly 10 to 15 percent.

Doug: What can be the long term impact on the health of those with untreated OSA?

Dr. Clerc: In terms a layman can understand: It can kill you.²

Doug: How does treatment of OSA impact the lives of those treated?

Dr. Clerc: From a clinical perspective there is very often a complete resolution of clinical complaints. The associated medical conditions are known to be improved: less cardiac problems, improved depression, improved diabetes control, decreased sleepiness, and a generalized improvement in cognitive function.

Doug: Is treatment complicated and difficult to comply with?

Dr. Clerc: The treatments can be divided into three broad groups: surgical, medical(CPAP), and dental (oral appliances). Adjunctive treatments include weight loss, elevation of the head of the bed, and maximizing treatment of conditions like nasal allergies and congestive heart failure. Compliance with treatments is largely dependent on the person rather than the approach to care. The treatment modality is predicated upon anatomy and the severity of the OSA. With guidance by a dedicated Board Certified Sleep Specialist who will choose the correct treatment and address problems that may arise related to the specific treatment modality...compliance is related more to innate personality traits than the mode of therapy being used.

Doug: Considering professional mariners, in particular those on six hour watches who regularly get only four to five hours of sleep per day, at times in one to two hour blocks, can CPAP treatment for OSA help mitigate fatigue?

Dr. Clerc: The general concept is that if you have OSA...you have it at all times and locations. It doesn't matter when or where you are sleeping. The CPAP should be on during sleep, even if it's a short nap.

Doug: What are the potential long term effects on the overall health of mariners working a six and six watch rotation?

Dr. Clerc: The immediate effects related to sleepiness and fatigue related to disruption of the normal circadian rhythms. This is often related to the development of mood disorders (depression/anxiety disorder), metabolic disorders (weight gain, diabetes), and cardiovascular problems (HTN). These problems can of course persist long after return to a normal sleep schedule, but can be diminished by a health conscious individual who exercises and has a good diet and lifestyle.

Doug: What are good sleep strategies for mariners working six hour watches?

Dr. Clerc: This is an area that has gotten increased attention over the years. The question is – what happens when the normal circadian cycle is disrupted? And, is there a way to maximize function when a traditional regimen of 8 hours sleep/16 hours of wakefulness is not possible? The navy has used an 18 hour schedule...6 on and 12 off with 3 rotating shifts. Much research has been done on this. The problems arise with the use of stimulants like caffeine to stay awake and alert....but then adversely impact the ability to sleep. The ideal position is to avoid stimulants for 12 hours before desired sleep. Make the sleep environment as dark, quiet, and comfortable as possible. With 6 on/6 off scheduling...many find it useful to choose one of the 6 off time periods as the major sleep period and they try to get the most sleep – 5 hours or more during that time period....and a shorter nap during the alternate time. Other obligations....hygiene and meals also eat into the time periods. Consistency is the most important approach. Avoidance of sedatives is important and is often prohibited in environments that involve the operation of equipment.

¹ **Depending on the study and the criteria being used for diagnosis (the criteria have been modified over the years and the technology being used has advanced) it is conservatively likely somewhere between 5 to 15% of the entire population, some estimates are higher (20%) = 15 to 60 million people).**

- Community Based Study 30-60 yrs old (random sample of 602 employed men and women)
- OSA defined as AHI > 5 = 9% women, 24% men

- OSA defined as AHI > 5, plus excessive daytime sleepiness = 2% women and 4% men (Young T, Palta M, Dempsey J, Skatrud J, Weber S, Badr S., NEJM, 1993;328:1230)

Note the year of this study: 1993. The prevalence today is likely to be much higher.

1. Our society is growing more and more obese.

2. The equipment and techniques used to diagnose OSA are now far more sensitive.

- 35 to 50% of hypertension (HTN) patients have underlying sleep disordered breathing (SDB)
- >70% of drug resistant HTN patients have SDB
- Roughly 50% of patients with diabetes type 2 have underlying SDB
- 70% incidence of OSA in stroke patients
- 50% incidence of obstructive or central sleep apnea in congestive heart failure patients
- 40% incidence of SDB in coronary artery disease patients

²OSA is independently associated with:

- HTN
- Cardio-vascular disease (CAD, CHF)
- Cerebro-vascular accidents
- Daytime sleepiness & impaired cognitive function
- Motor-vehicle & job-related accidents
- Diminished quality of life.
- Insulin Resistance/Diabetes

(Young T, Peppard PE, Gottlieb DJ. Epidemiology of Obstructive Sleep Apnea: A population health perspective. Am J Resp Crit Care Med.2002;165:1217-39)

(Mohsenin V. Is sleep apnea a risk factor for stroke? A critical analysis. Minerva Med. 2004 Aug;95(4):291-305)

(Harsch IA, Hahn EG, Konturek PC. Insulin resistance and other metabolic aspects of the Obstructive Sleep Apnea Syndrome. Med Sci Monit. 2005 Feb 25;11(3):RA70-75)

(Peker Y, Kraiczi H, Hedner J, Loth S, Johansson A, Bende M. An independent association between obstructive sleep apnea and coronary artery disease. Eur Respir J. 1999;13:179-184)

OSA is also associated with:

- Depression
- Anxiety disorder
- Substance abuse
- Memory impairment
- Sleep fragmentation & insomnia