

Fatigue and Maritime Operations

Sleep is a basic human need. Fatigue is the degradation of performance associated with the basic human need for sleep. Fatigue and the need for sleep are too often viewed as weaknesses. Our modern, 24-hour-a-day, just-in-time, jet-lagged, technologically-driven world promotes fatigue. Accidents occur in all fields of endeavor as a consequence of fatigue.

Some well-known cases of fatigue-related accidents in the maritime industry include the grounding of the tankers WORLD PRODIGY and EXXON VALDEZ. A July 2004 study (“Bridge Watchkeeping Safety Study”) by the Marine Accident Investigation Branch of the United Kingdom’s Department for Transport reported that “A third of all the groundings involved a fatigued officer alone on the bridge at night.”

In Washington State, fatigue was a factor in a number of bunker spills. In two accidents, tow vessel operators literally fell asleep at the helm, grounding a barge in 1995 and substantially damaging the structure of a heavily used highway bridge in 2000.

There are many misconceptions about fatigue and the need for sleep, including:

- “I know how tired I am.” Wrong. Since fatigue impairs all mental functions, including perception, people consistently underestimate their levels of fatigue.
- “I’ve been awake this long before with no problem.” Wrong. The body’s natural sleep rhythms are complex and subject to a variety of factors. Do not assume that because you stayed awake for a long period without incident you can safely repeat the experience – it is possible you were just lucky.
- “If I drink coffee I’ll stay awake with no problem.” Wrong. Caffeine’s effect is temporary (3 to 4 hours), and those who drink caffeinated beverages regularly experience less of a stimulant effect over time. In addition, once the stimulant effects have worn off, you may experience a “rebound effect” and be even more fatigued. Stimulants such as caffeine can also degrade the quality of sleep you experience.

A number of fatigue-related effects have been identified: “Lapses” (failures to respond, slow responses, and inappropriate responses), decreased performance consistency, slowed reactions, increased mental errors, decreased memory and recall, decreased vigilance, and increased risk-taking behavior.

WHY IT MATTERS

Sleep is a basic human need and performance can be severely affected by lack of sleep. Without proper sleep, the crews’ performance can be compromised thereby creating a safety hazard for the ship. Data indicates that accidents occur more often when we are fatigued.

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The insidious nature of fatigue is that, since all mental functions are affected, the ability to recognize and compensate for the effects is decreased. There may be no warning before a fatigued individual experiences the occurrence of a lapse or the onset of sleep. When signs and symptoms do appear they may include forgetfulness, poor decision-making, inattention to essential duties, poor communication, and fixation on a single task or decision.

Social interaction, such as conversation, tends to stimulate a fatigued individual temporarily, which may mislead a supervisor making important staffing decisions. It is necessary to understand the causes of fatigue to properly identify fatigued individuals whose sleep deprivation may compromise vessel safety and performance.

Fatigue stems from a variety of sources, but all relate to the need to sleep. Some common fatigue-inducers include:

- Sleep disorders. There are a number of sleep disorders, but the most common disorder (4 percent to 9 percent of the U.S. population) is sleep apnea. Apnea is the cessation of breathing during sleep. This cessation causes a person to arouse from a deep state of sleep so breathing can resume. Snoring may be a symptom of apnea. Individuals who are overweight and snore may be at increased risk for apnea.
- Jet-lag. When people cross time zones the body's internal clock is disrupted by the rapid change in daylight hours. This mismatch between the body's accustomed sleep time and the sleep time and daylight in the new time zone can degrade mental and physical functioning.
- Changes in work shifts. As with jet-lag, changes in work hours disrupt our body's normal cycle of wakefulness and sleep and can degrade mental and physical functioning.
- Sleep deficit. Inadequate sleep can result in the accumulation of a "sleep debt" which can only be "repaid" by sleeping.
- Drug and alcohol effects. Many drugs and alcohol have sedative effects on the body. Drugs and alcohol may also induce fatigue because they disrupt normal sleep patterns, reducing the quality and/or quantity of sleep.

There are a number of ways to help prevent fatigue

For individuals these include:

- Make quality sleep time a priority (don't let other activities intrude).
- Make your sleep space as conducive to sleep as possible (e.g. dark and quiet).
- Maintain total sleep time by whatever means possible (7 to 8 hours of sleep is typically needed to ensure adequate rest). If you cannot get your accustomed sleep all at once, try to make time for a nap. [Note: After sleep, ensure you leave adequate time to regain your alertness prior to undertaking your duties.]
- Avoid using sleep-disruptive and sleep-inducing drugs and alcohol.
- Maintain a record of you sleep time. If you are getting inadequate rest, bring it to your supervisor's attention.

For managers and supervisors these include:

- Make thoughtful and informed decisions about scheduling – understand how improper scheduling can induce fatigue.

- Research and consider alternative watch schedules that ensure adequate rest by allowing for periods of uninterrupted sleep closer to the 7 to 8 hours required by most people.
- Provide a good sleeping environment for crew members.
- Make the availability of adequate sleep periods for crewmembers a priority.
- Consider sleep needs when making manning decisions, avoiding short- and minimum-manning.
- Use a team approach (bridge resource management, for instance), where possible, to prevent the fatigue of a single crewmember from impeding safety.
- Consider requiring a minimum of two persons on watch in the wheelhouse at night.
- Provide sufficient time for crewmembers to adjust their internal sleep clock before they are required to assume safety-dependent duties, for example when a vessel master travels through multiple time zones to relieve another master.
- Listen to and address crewmember concerns of inadequate rest, and use their feedback to constantly re-evaluate manning and scheduling decisions.
- Ensure that the rest hour standards contained in the Standards for Training and Certification of Watchstanders (STCW) Code are met by all shipboard personnel.

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