



FAA

**Welcome
To the
Fatigue Countermeasure Workshop:
Sleep Basics
Module**

Audio Companion

Welcome to the Fatigue Countermeasure Workshop. This audio companion has been designed to be used in conjunction with the online course for learners that do not have audio or need additional resources in completing the course.

Section 1 – Welcome

1 Welcome to Sleep Basics

This lesson describes basic information about sleep. Now that that you've learned the basics about fatigue, you will learn about sleep basics such as why we need sleep, the sleep process, your body's natural body clock, sleep disorders, sleep quantity and quality, and sleep debt.

2 Lesson Objectives

This lesson describes the basics about sleep. This section will introduce you to some very basic information about sleep.

Read through the lesson objectives listed here. Then click next to continue.

Section 2 – Sleep Basics

3 Sleep Overview

Just like food, water, or air, sleep is a basic need for survival. Yet, as important as sleep is to well-being, The National Institute of Health reports that an estimated 50 to 70 million Americans are affected by sleep problems, either chronic sleep disorders or intermittent problems sleeping.

A survey of workers involved in workplace accidents revealed that 55% of those polled reported having sleep difficulties.

Those individuals accounted for 75% of the workplace accidents that required medical treatment.

In other words, individuals with sleep difficulties are more likely to be involved in severe workplace accidents.

4 Why Do We Need Sleep?

Sleep is a basic physiological need. There is often a mindset of being “tough” about going without sleep, but would you ever try to go without water, or air? Probably not, and with good reason. Sleep is necessary for the mind and body to restore itself at the end of the day and to prepare for the next day. Obtaining 8 hours of quality sleep in each 24 hour period will prevent fatigue and is considered the only effective long-term countermeasure for fatigue. Without sleep, we literally cannot survive.

Section 3 – The Sleep Process

5 The Sleep Process

The process of sleep is actually a cycle that lasts approximately 90 to 120 minutes and is repeated throughout the entire sleep period.

Each cycle consists of two different phases: non-rapid eye movement sleep or NREM, and rapid eye movement sleep or REM. Both phases are necessary for restoration although they differ in some important ways.

The last cycle of the night is often incomplete due to waking up by alarm clock or other outside stimuli. Waking up during an incomplete cycle can result in a groggy feeling when you first wake up. This groggy feeling is known as sleep inertia and typically lasts for 15-20 minutes after waking.

6 The Sleep Phases

The sleep cycle consists of two distinct phases, NREM and REM. You need both types of sleep to restore a sleep deficit. It's important to realize that all sleep is restorative, and that the sleep process is adaptive. If you don't get enough of one stage of sleep during a sleep period, your body will compensate during the next sleep period and increase the stage that you are short on.

In general, people spend more time in stage 4 sleep at the beginning of the night and an increasing amount of time in REM sleep as the sleep cycle goes on. This doesn't hold as true for daytime sleep, which may be more variable. The process of sleep is why it's important to maintain sleep periods of many hours in a continuous block, and why you can't get by on naps alone.

Click on each flash card to learn more about the sleep phases. When you are finished, click Next to continue.

Section 4 – Sleep Debt

7 Normal Quality & Quantity

The first step to beating fatigue is to get adequate, high-quality sleep.

When you get adequate sleep, you should be able to sit quietly during the day and remain alert even if you're feeling bored. Sleep is involuntary and if you feel the urge to doze every time that you sit down, you are likely fatigued. This does not apply to the nighttime or mid-afternoon hours due to the influence of the circadian rhythm.

The elements of good sleep are displayed. Drag each element to learn more about beating fatigue.

8 Sleep Debt

If you don't get enough sleep or if your sleep is of poor quality, you will accumulate a 'sleep debt.'

Sleep debt is the difference between the amount of sleep a person should get, and the amount of sleep that they do get. This debt must be repaid in order for you to perform optimally.

Unfortunately the sleepiness and fatigue associated with sleep debt is also cumulative. This means that losing even an hour of sleep each night over the course of a week can accumulate into a substantial debt that negatively affects performance. For example, individuals that get 6 hours of sleep per night for 11 nights, perform like someone who has not slept at all for 24 hours. Similarly, individuals that get 4 hours of sleep per night for 6 nights, also perform like someone who has not slept at all for 24 hours.

9 Recovery Sleep

Sleep debt does not have to be re-paid hour for hour. When operating with a sleep debt, the body “rebounds” and increases the amount of deep sleep. This is known as recovery sleep, and though it helps your body to compensate, it does not completely make up for missed sleep.

To help restore alertness, two nights of uninterrupted sleep can go a long way. Most people will sleep for anywhere between eight to twelve hours when recovering from a sleep debt. The important thing is to allow your body to determine when it has received enough sleep and to wake up naturally. If you still feel fatigued after two nights of uninterrupted sleep, then you will need to get additional sleep to fully restore alertness.

Section 5 – The Circadian Rhythm

10 The Circadian Rhythm

Sleep isn't the only factor influencing fatigue; the body's internal clock also plays a role in determining alertness. Known as the circadian rhythm, the body goes through physical, mental and behavioral changes that follow a roughly 24-hour cycle, based on cues from its environment. Light is the main cue influencing your circadian rhythm, telling your body to be awake when it's light and go to sleep when it's dark.

It's this response to variations in light and darkness which makes shift work particularly difficult for many people. Work / rest schedules and social interactions do appear to play some role in adapting the circadian rhythm to your schedule. However, the influence of the circadian rhythm is quite strong and can make alternative work schedules that interfere with natural sleep times very challenging.

11 The Circadian Rhythm & Body Functions

The circadian rhythm is so important, that in addition to sleeping patterns, it controls many body functions. It's also responsible for fluctuations in digestion, hormone production, body temperature, and the cardiovascular system. Click on each item to learn more about how the circadian rhythm affects each body function. When you are finished, click Next to continue.

12 The Circadian Rhythm & Alertness

The chart shows the highs and lows of the circadian rhythm. Labels for the corresponding levels of alertness that people experience throughout the day are shown on the left. The circadian rhythm peaks in the midmorning and then again around the early evening.

Notice a clear dip around 3:00pm followed by an increase in alertness that peaks between 6:00pm and 9:00pm, then another decline that reaches its low between 3:00am and 6:00am. The early morning hours are when you're more likely to be a danger to yourself and others.

13 The Circadian Rhythm & Sleep History

In addition to the influence of the circadian rhythm, your individual sleep history also plays a key role in fatigue. To understand sleep history, think about how well you slept during your last sleep period, how long you slept, and how long it's been since you slept last. It's actually the interaction between your sleep history and the circadian rhythm that causes the most extreme fatigue.

Any one of the following conditions increases fatigue, multiple conditions experienced at the same time make fatigue even more severe: increased time awake, decreased time asleep, increased sleep interruptions, increased circadian rhythm disruptions.

It's actually the interaction between your sleep history and the circadian rhythm that causes fatigue. Circadian rhythm lows can increase the symptoms of fatigue, making performance errors more likely when the body is naturally shutting down.

14 The Circadian Rhythm & Sleep History

This is William. Watch how the combination of a long sleep history and circadian rhythm lows can impact eye-hand coordination in a manner similar to intoxication. **Drag each drink to William's mouth** to see the impact.

15 Sleep History

The interaction between the circadian rhythm and sleep history is what allows you to get your "second wind" after staying up all night. In the morning hours, the circadian rhythm automatically increases alertness and tells your body to wake up. You are also likely to experience a period of increased alertness in the late afternoon or early evening hours. This produces the "second wind," but because you haven't had any or much sleep you're likely to still feel a little tired because you've been awake so long. Think of your "second wind" as your body trying to trick you into thinking that you are not fatigued when you really are. You may feel like you can perform effectively, but you will not be performing at 100%.

Section 6 – Sleep Disorders Overview

16 Sleep Disorders Overview

Anytime we talk about sleep loss or circadian rhythm disruption, we have to talk about the role of sleep disorders. Sleep disorders involve any difficulties related to sleeping, including difficulty falling or staying asleep, falling asleep at inappropriate times, excessive total sleep time, or abnormal behaviors associated with sleep.

The National Institute of Health reports that an estimated 50 to 70 million Americans are affected by sleep problems – either chronic sleep disorders or intermittent problems sleeping. Sleep disorders are considered the number one cause of workplace accidents, and individuals with sleep difficulties are more likely to be involved in workplace accidents.

In this section you will learn about symptoms that may indicate if you have a sleep disorder as well as information about the most common sleep disorders.

17 Common Sleep Disorder Symptoms

Sleep disorders can lead to a sleep deficit by preventing you from sleeping or from sleeping soundly. They can be particularly insidious because you may not even be aware that you have a problem, since often those with sleep disorders simply become accustomed to feeling fatigued.

There are a number of symptoms that may indicate a sleep disorder. Read through some of the common symptoms listed here. When you are finished, click next to continue.

18 Common Sleep Disorders

Some of the most common sleep disorders are listed here. Click each disorder to learn more. When you are finished, click Next to continue.

19 Complications from Sleep Disorders

Sleep disorders can lead to a sleep deficit by preventing you from sleeping or from sleeping soundly. They can be particularly difficult because you may or may not be aware of the problem and it may lead to serious problems such as high blood pressure, morning headaches, and constantly fighting sleep. Sometimes people will become accustomed to feeling fatigued and when they finally seek treatment, the response is one of surprise because they feel so much better when they are finally able to get quality rest.

Fortunately, many sleep disorders can be effectively treated and managed. If you or a family member suspects that you suffer from a sleep disorder, please talk to your doctor. They can help you to determine if this is the case and what can be done to relieve your symptoms.

Click next to continue.

Section 8 – Summary

25 Summary of Sleep Basics Section

Before moving on to the next lesson, here's a summary of what you have learned. If you would like to review this lesson, use the Back button. Remember, the questions in the Course Exam are based on the content presented in this lesson. Be sure you have a thorough understanding of each section before moving forward. If you are ready to move on to the next lesson, click next to continue.