

# Shiftwork Health & Safety Pocket Guide

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## **1. Introduction**

You belong to an important and growing part of the workforce. About 20% of the workforce (more than 21 million Americans) are shiftworkers, meaning they work more than half their hours outside the traditional work window of 8 a.m. to 4 p.m.

Despite the global economy's increasing reliance on shiftworkers, the fact remains that our bodies were not designed for night work. Due to our circadian rhythms, we have a natural tendency to feel sleepy at night and alert in the daytime. Until about 100 years ago, this worked out fine for most of the population—by and large people went to sleep at sundown and rose with the rooster. Of course, Thomas Edison's invention of the light bulb and electric power changed all that.

If you're having trouble coping with shiftwork, the *Shiftwork Health & Safety Guide* can change your life. It is designed to help you take charge of your life and minimize the sleep problems, fatigue, stomach upsets, and family problems that often accompany shiftwork. This guide gives you a wealth of knowledge that many shiftworkers have learned through years of trial and error.

## **2. Understanding Your Circadian Rhythms**

***“Sorry boss, but the trouble with my biological clock is that it didn’t come with an alarm.”***

Understanding how circadian rhythms affect your life as a shiftworker is an important first step toward developing coping strategies. Let’s begin with the basics: What are circadian rhythms?

### **Daily Rhythms**

Circadian comes from a Latin phrase meaning “about a day.” Human circadian rhythms refer to aspects of our physiology that fluctuate over a period of about 24 hours. Virtually every function in the human body follows a circadian pattern.

Examples include the sleep/wake cycle, body temperature, digestive secretions and hormone production. The chart on the following page shows the circadian rhythm for body temperature. Note that your body temperature falls at night, whether or not you sleep.

Not surprisingly, you feel different at different times of the day. At your circadian peaks, during the daytime:

- Your energy level increases.
- Your body temperature rises.
- Your digestive system gears up in anticipation of a meal.
- Your coordination and physical ability are enhanced.
- Your eyes focus easily.

***Your body temperature is controlled by circadian rhythms.***

During your circadian dips, in the mid-afternoon and overnight hours:

- Waves of sleepiness wash over you at intervals.
- Your head feels heavy.
- You don’t feel hungry.

### **3. Work Performance and Job Safety**

Besides influencing when you sleep, your biological clock also determines your alertness level. At certain times of the day you are fully alert while at other times your vigilance—the ability to notice what is going on in our surroundings—drops to a low point. For people on regular daytime jobs this drop in vigilance and alertness occurs between 1 a.m. and 6 a.m., a time when a day worker is normally safely asleep in bed.

However, if you're on the night shift, you have to keep working even though your alertness level drops to the low point in the circadian cycle during the wee hours of the morning. As your attention drifts, your mind wanders. Careless errors tend to occur, sometimes with grave consequences. You may miss things you would normally respond to.

Accident statistics reflect this fact. A 1994 study of shiftworkers on a rotating 8-hour schedule at a manufacturing company found that the number of serious accidents was 82% higher on the overnight shift than on the day shift.

#### **Accidents at Night**

Truck drivers, airline pilots and railroad engineers and conductors often nod off during the overnight hours, causing serious accidents. It's no coincidence that industrial accidents at Three Mile Island, Chernobyl and Bhopal all occurred during the overnight hours.

*Many industrial accidents happen at night.*

Working an irregular schedule can lead to problems such as:

- Chronic sleep deprivation
- Disrupted sleep patterns
- Reduced alertness or vigilance

## 4. Sleep

*“Let’s see... am I getting up or going to bed?”*

The number one problem of people who work shifts is difficulty sleeping. This is because human circadian rhythms cannot adjust to rapid changes in sleep/wake patterns.

Although you may never be able to sleep as well as you would on a straight day schedule, understanding how sleep works and following the recommendations in this pocket guide can cut down on sleep problems.

We have learned much about sleep in recent years:

- There are five distinct stages of sleep - Stages 1 through 4 plus Rapid Eye Movement (or REM) sleep - each with its own brain wave pattern. (You’ll find further discussion on the stages of sleep in the “How Sleep Works” section of this pocket guide)
- Good, restorative sleep requires a series of approximately 90-minute cycles, repeated four to five times during a sleep session.
- The average person does best on 7 to 8.5 hours of sleep every 24 hours. Only a small percentage of the population can function well on 5 or 6 hours.
- Short naps restore alertness and help us perform better (although long naps may leave us feeling groggy).
- Time cues such as light and darkness can make us sleepy or perk us up, and help us reset our biological clock.

### **The Need for Sleep**

Just being tired is not enough to ensure a good sleep. If your body is not accustomed to sleeping at a particular time, it can be hard to sleep properly. You may toss and turn in bed and keep waking up and then falling off to sleep again.

This is common when you change from a day shift to an overnight shift. On the first night at work you may get really sleepy around 4 a.m. Yet when you

## **5. Health Problems and Solutions**

*“We eat breakfast at 6 pm, lunch at midnight, and dinner at 8 am; it’s like celebrating Christmas in July!”*

Shiftworkers have more health problems, statistically, than people working traditional hours. But that does not mean that you, as an individual, have to suffer more problems than anyone else. You can offset the physiological stresses of shiftwork through good sleep, exercise, a healthy diet and an understanding of your body and its rhythms.

In this section we’ll discuss two common health problems among shiftworkers, digestive ailments and heart problems, as well as some related issues. We’ll also discuss some steps you can take to reduce your risk and discomfort associated with these common health problems.

### **Digestive Problems**

The primary reason that shiftworkers have higher rates of gastrointestinal problems than the general population is that the body’s circadian rhythms make it hard for the body to digest food at night. The adult human body simply was not designed for 3 a.m. feedings.

Like other challenges you face, the scientific rationale for this lies in circadian rhythms. Among the dozens of bodily functions that follow a circadian (or daily) pattern are several related to digestion. These so-called “circadian feeding rhythms” include the stomach’s secretion of acid, enzymes and hormones, all of which aid in digestion.

Working in combination, these digestive circadian rhythms gear up in anticipation of breakfast, lunch and dinner at their traditional times. In the late evening, activity begins to slow down and it continues this downward slide during the overnight hours.

Because circadian rhythms are heavily influenced by sunlight and darkness, your circadian feeding rhythms

## 6. Nutrition

*“When I gave up eating cheeseburgers at 3 am, it not only got rid of my indigestion — it also cut my dry cleaning bill in half!”*

Although you can't easily change your work schedule, you do have control over what you choose to eat. This chapter suggests foods and eating strategies to help you stay healthy and help you keep alert at work.

Let's start with some of the foods you should avoid at night:

- Fatty meats—hamburgers and chicken and turkey with the skin left on
- Fried foods
- Pastries
- Potato and corn chips
- Subs and pizza
- Whole-milk dairy products.

What can you eat, and still feel good afterwards? Here are some foods that provide energy over the long haul:

- Pasta, rice and potatoes
- Whole grain breads and cereals
- Fruit and vegetables
- Fish, lean meats (such as skinless chicken and turkey)
- Soybeans, tofu and beans
- Skim or low-fat milk and cheese products.

### **Good Meals From Home**

Here are some ideas for when you're brown bagging it:

- Bread. For sandwiches, choose a healthy bread such as whole wheat, rye or oatmeal. For a change of pace, use a bagel, an English muffin or pita bread.

## **7. Family and Social Life**

*“Do you promise to love, and cherish each other in sickness, health, and rotating shifts?”*

In this section we look at what may be most important to you, how you make the most of free time with family and friends.

First of all, you should be aware that you're not alone in sometimes experiencing frustration with your home and social life due to the nontraditional hours you work.

Shiftworkers commonly cite difficulty maintaining friendships, keeping the kids quiet during the day, accomplishing household duties, and finding time for a satisfying marriage. Partners of shiftworkers, meanwhile, may not like the feeling of being left alone at night.

Here are some tips for minimizing family problems:

- Bring up problems early and resolve them - before they threaten relationships.
- Make “dates” with your partner or children to share special activities.
- Designate a certain time each week to relax and talk with your partner (even if the time changes weekly).
- Plan a “family day” once a month.
- Set up a family bulletin board where family members can leave notes, schoolwork, drawings, photographs, cartoons, etc.
- Use your VCR to tape TV shows the whole family enjoys, and watch them together later.
- Rent or purchase a cam-corder for special events you have to miss, such as birthdays, Little League games, ballet recitals, etc. Watch the tapes together.
- Install a home security system, or get a dog, if your partner is fearful at night.

## APPENDIX A

### How to Determine Whether You are a Lark or an Owl.

Take the following survey to help you determine if you are a lark, an owl, or somewhere in-between. Take a piece of paper and write down the point value (indicated in brackets) of each response you have to the following 13 questions. Then add up the points and compare the total to the chart located at the end of the survey.

- 1) Considering only your own “feeling best” rhythm, at what time would you get up if you were entirely free to plan your day?
  - 5:00-6:30 a.m. (5 points)
  - 6:30-7:45 a.m. (4 points)
  - 7:45-9:45 a.m. (3 points)
  - 9:45-11:00 a.m. (2 points)
  - 11:00 a.m.-12:00 (noon ) (1 point)
  
- 2) Considering only your own “feeling best” rhythm, at what time would you go to bed if you were entirely free to plan your evening?
  - 8:00-9:00 p.m. (5 points)
  - 9:00-10:15 p.m. (4 points)
  - 10:15 p.m.-12:30 a.m. (3 points)
  - 12:30-1:45 a.m. (2 points)
  - 1:45-3:00 a.m. (1 point)
  
- 3) Assuming normal circumstance, how easy do you find getting up in the morning?
  - Not at all easy (1 point)
  - Slightly easy (2 points)
  - Fairly easy (3 points)
  - Very easy (4 points)
  
- 4) How alert do you feel during the first half hour after having awakened in the morning?

- Not at all alert (1 point)
  - Slightly alert (2 points)
  - Fairly alert (3 points)
  - Very alert (4 points)
- 5) During the first half hour after having awakened in the morning, how tired do you feel?
- Very tired (1 point)
  - Fairly tired (2 points)
  - Fairly refreshed (3 points)
  - Very refreshed (4 points)
- 6) You have decided to engage in some physical exercise. A friend suggests that you work out twice a week for an hour and the best time for him is 7:00-8:00 a.m. Bearing in mind nothing else but your own “feeling best” rhythm, how do you think you would perform?
- Would be in good form (4 points)
  - Would be in reasonable form (3 points)
  - Would find it difficult (2 points)
  - Would find it very difficult (1 point)
- 7) At what time in the evening do you feel tired and, as a result, in need of sleep?
- 8:00-9:00 p.m. (5 points)
  - 9:00-10:15 p.m. (4 points)
  - 10:15 p.m.-12:30 a.m. (3 points)
  - 12:30-1:45 a.m. (2 points)
  - 1:45-3:00 a.m. (1 point)
- 8) You wish to be at your peak performance for a test that you know is going to be mentally exhausting and lasting for two hours. You are entirely free to plan your day, and considering only your own “feeling best” rhythm, which one of the four testing times would you choose?
- 8:00-10:00 a.m. (4 points)
  - 11:00 a.m.-1:00 p.m. (3 points)

- 3:00-5:00 p.m. (2 points)
  - 7:00-9:00 p.m. (1 point)
- 9) One hears about “morning” and “evening” types of people. Which one of these types do you consider yourself to be?
- Definitely a morning type (4 points)
  - More a morning than an evening type (3 points)
  - More an evening than a morning type (2 points)
  - Definitely an evening type (1 point)
- 10) When would you prefer to rise (provided you have a full day’s work--8 hours to do) if you were totally free to arrange your time?
- Before 6:30 a.m. (4 points)
  - 6:30-7:30 a.m. (3 points)
  - 7:30-8:30 a.m. (2 points)
  - 8:30 a.m. or later (1 point)
- 11) If you always had to rise at 6:00 a.m., what do you think it would be like?
- Very difficult and unpleasant (1 point)
  - Rather difficult and unpleasant (2 points)
  - A little unpleasant but no great problem (3 points)
  - Easy and not unpleasant (4 points)
- 12) How long a time does it usually take before you “recover your senses” in the morning after rising from a night’s sleep?
- 0-10 minutes (4 points)
  - 11-20 minutes (3 points)
  - 21-40 minutes (2 points)
  - More than 40 minutes (1 point)
- 13) Please indicate to what extent you are a morning or evening active individual:
- Pronounced morning active (morning alert and evening tired) (4 points)

- To some extent, morning active (3 points)
- To some extent, evening active (2 points)
- Pronounced evening active (morning tired and evening alert) (1 point).

Total your score (Add all of the points from each of your 13 responses.)

What is your total score?

22 or less	Very much a night person
23-29	Somewhat a night person
30-36	No particular tendency
37-43	Somewhat a morning person
44 or more	Very much a morning person

*Source: Smith, Reilly, and Midkiff, 1989*

## Glossary

### Alertness

The activated state of the brain. Level of alertness is determined by nine factors (see Nine Switches of Alertness).

### Automatic Behavior Syndrome

A waking state in which the body can perform routine functions but is incapable of responding to unusual events.

### Circadian rhythm

Patterns of bodily functions that rise and fall throughout a period of about a day. Derived from the Latin words “Circa” (about) and “Dies” (day). Circadian rhythms actually have a period of approximately 25 hours in the absence of other time cues.

### Diurnal

Having a daily cycle. Diurnal living generally refers to a lifestyle of sleeping at night and being awake during the daytime.

### Fatigue

The absence of alertness.

### Insomnia

Difficulty in falling asleep or staying asleep.

### Microsleep

A brief burst of sleep that can last from a split second to as long as 20 or 30 seconds. Microsleeps often are due to excessive fatigue.

### Melatonin

A hormone produced by the pineal gland that helps to induce sleep. Melatonin levels rise at night and drop during the day and may have the effect of resetting the biological clock. Synthetic melatonin is sold as a sleep aid although studies on its long-term effect have not been performed.

### Nap

A brief sleep episode.

### Nine Switches of Alertness