



# Fatigue Risk Management for Employees

[Insert Trainer Name]  
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## Training Outline

Goal: To provide you with the knowledge and skills to manage fatigue-related risk

1. The causes and consequences of fatigue
2. Fatigue risk management system
3. Personal fatigue management strategies

As the workforce moves increasingly toward shiftwork and alternative working arrangements, the potential for fatigue-related risks increases.

This problem is compounded by the growing use of complex, high-powered machinery, where the margin for error is small and the potential for serious injury is high.

This training will give you an overview of:

- what causes fatigue and the risk it poses in the workplace;
- how a fatigue risk management system can reduce the risk; and
- some strategies you can use to manage your own fatigue and reduce the risks in the workplace.



# Causes and Consequences of Fatigue

Module One



## What is Fatigue?

- A state of physical or mental weariness that results in reduced alertness
- The result of a lack of adequate sleep
- A sleep debt that accumulates until paid off with adequate sleep

### **Quantity and quality**

Fatigue largely results from an inadequate *quantity* or *quality* of sleep. The quality of sleep is also important to maintain your normal alertness and performance.

### **Sleep debt**

If you don't get enough sleep (quality or quantity) over a series of nights, you'll build up a sleep debt. Losing an hour or two of sleep a day for several days can leave you as fatigued as missing an entire night's sleep. Many people sleep an extra hour or two on their day off – they're paying off their accumulated sleep debt.

A sleep debt can only be repaid with adequate recovery sleep – the sleep your body normally needs to function.

Feelings of fatigue can also be brought on or made worse by conditions in your workplace, such as:

- high-pressure demands,
- long shifts,
- stress,
- not taking breaks during your shift, and
- even poor lighting, constant noise, or bad weather conditions.



## Discussion

*What are some conditions that make you feel particularly tired or fatigued at work?*

*You may want to make a list on a whiteboard or flipchart. Get the group to divide the conditions into two lists: work and non-work factors.*



# Causes of Fatigue

Fatigue can be the result of a variety of factors:

- the body's natural rhythms
- work schedule
- type of task
- work environment
- non work-related issues

## **Body rhythms**

Your body clock – also called your circadian rhythms – programs you to sleep at night and be awake during the day. It can be difficult to get good quality sleep during the day when your body wants to be awake.

## **Work schedule**

When you work and how much time you have between shifts affect how much opportunity you have to sleep. Working through the night, long shifts, many shifts in a row, and short turnaround reduce the time you have for sleep and increase the likelihood you'll become fatigued.

## **Type of task**

Some tasks are more fatiguing than others – complex, demanding tasks *and* boring, mundane tasks increase feelings of fatigue.

## **Work environment**

Loud noise, poor lighting, heat or cold, vibration, or humidity increase feelings of fatigue.

## **Non work-related factors**

Balancing shiftwork with family and social life can be stressful and make it hard to get adequate sleep. Family demands (e.g., illness) or personal problems (e.g., divorce) increase stress and the likelihood of becoming fatigued.



# The Body Clock

- Known as **circadian rhythms**
- Operates on a 24-hour cycle
- Makes you sleepy when it's dark and awake when it's light
- Controls a variety of body functions:
  - Sleepiness
  - Digestion
  - Hormone production
  - Body temperature

It's not just because we've had a long day and we're tired that we go to sleep. Your body clock actually controls feelings of sleepiness, telling your body to go to sleep when it gets dark, and to wake up when it's light.

## **Light and dark are triggers**

That's one reason your body finds it difficult to adjust to night or evening shifts – you're working when your body clock is trying to send you to sleep.

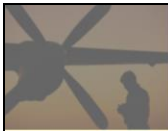
Your body does this in a variety ways, such as:

- secreting hormones (e.g., melatonin) that help induce sleepiness, and
- lowering your core temperature, which also makes you sleepy.

## **Other body rhythms**

When you work at night, you're also fighting against other body rhythms, such as digestion. Your body's digestive system slows down when you're normally sleeping, so eating at night forces your body to digest food it's not ready for.

This is why shiftworkers are more likely to experience fatigue and gastrointestinal problems.



# Circadian Rhythms



- Core body temperature across a 24-hour period
- Alertness follows a similar curve – as body temperature rises, you become more alert

## The sleepiness curve

The figure shows core body temperature across a 24-hour period (from 6 a.m. to 6 a.m.).

Alertness follows a similar curve – as body temperature rises, you become more alert and performance improves. As your temperature falls in the evening, you feel sleepier.

The lowest point of the temperature curve occurs between 3 a.m. and 5 a.m., which is a particularly difficult time to stay awake.

Feeling sleepy after lunch – known as the post-lunch dip – is also part of the body's normal rhythms. It has nothing to do with whether you had a big lunch.

## Individual differences

The ability to cope with shiftwork varies from person to person, depending on their individual circadian rhythms. That's why people can generally be divided into morning or evening types.

Morning people adapt better to early morning hours but have more trouble coping with night work. Evening types cope more easily with evening and night shifts. They tend to cope better with shiftwork overall since they generally have less rigid sleep habits and find it easier to catch up by sleeping late in the morning.

**We function best when we follow our body's natural pattern of sleep and wakefulness.**



# Sleep

- Most people need between 7 and 9 hours per day.
- It's not true that you need less sleep as you get older.
- When you sleep makes a difference in how much you get.
- Sleep is best obtained in a single block.

## **How much?**

It varies from person to person – most people need between 7 and 9 hours per day.

## **Sleep and aging**

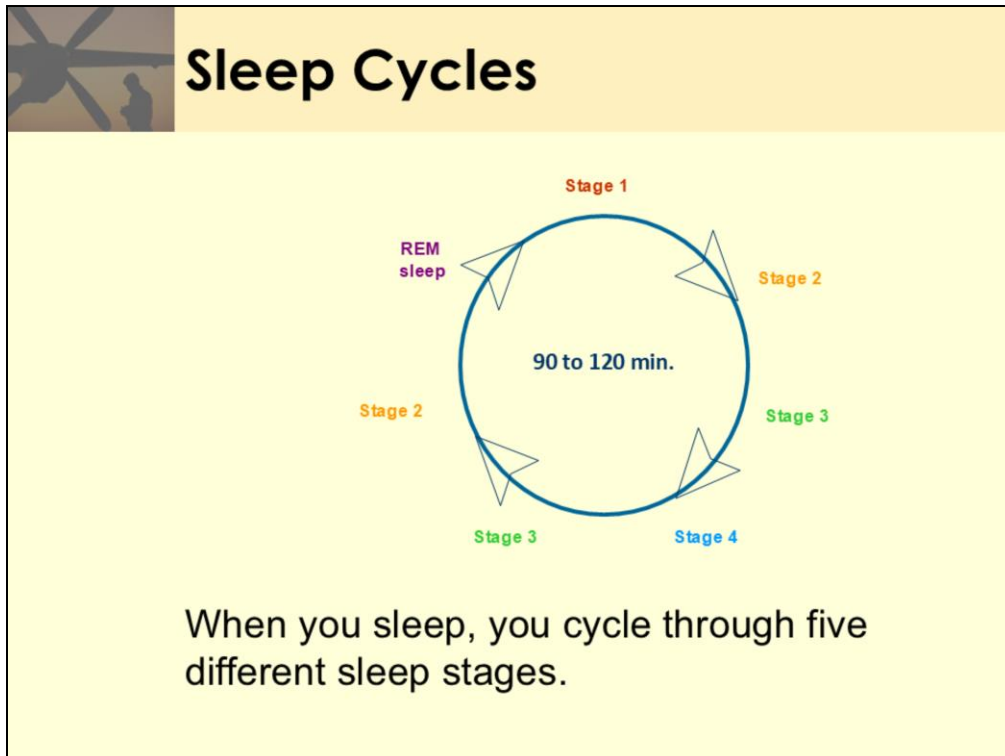
As you get older, it becomes physically more difficult to stay asleep across a sleep period without waking up. Aging brings disruptions to your body clock, and things like an aging bladder can wake you up more often in the night.

## **When to sleep**

Most people fall asleep naturally somewhere between 10 p.m. and 7 a.m. Sleeping outside these times is more difficult, more broken. Some research suggests that nightshift workers get one to three hours less sleep per day than dayshift workers. In addition to sleeping less, people who work shifts often get sleep of a lower quality.

## **A single sleep block**

Sleeping undisturbed for eight straight hours allows your body to regulate how much of each stage of sleep it gets. However, split sleep, or a number of short sleeps, is better than not getting any at all.



## Five sleep stages

**Stage 1** is the transition between consciousness and sleep. You can generally hear and respond to someone.

**Stage 2** is a light sleep. You are easily awakened but you're not aware of your surroundings.

You spend about half your sleep time in stages 1 and 2.

**Stages 3 and 4** are deep slumber – this is a very restorative phase.

**Stage 5** is known as REM or rapid eye movement sleep, and it's the stage of sleep where you dream. Researchers believe your eyes move at this stage of sleep because you're scanning the images in your dreams. It's thought to be important for learning and consolidation of memory.

A complete cycle can last between 60 and 90 minutes.

A typical sleep will move through the cycle several times, but each cycle will vary in length.

Whenever you're sleep deprived, your body will try first to catch up on deep sleep (Stages 3 and 4) and REM sleep.



## A Serious Safety Hazard

When you're fatigued:

- your reaction time is slower
- you have trouble concentrating or remembering things
- you may have difficulty communicating clearly with co-workers
- you may fall asleep on the job
- there's a greater risk you'll make a safety-critical mistake

**Being fatigued can make you a risk to yourself, your co-workers, and the public!**

Fatigue and falling asleep have been identified as significant contributors to incidents and accidents.

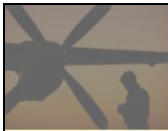
It has been estimated that between 10 and 40% of all road accidents involve fatigue.

### **High-risk times for fatigue**

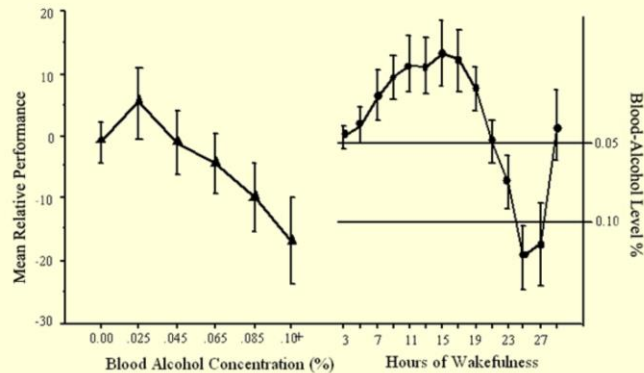
There are particular times of the day when the risks associated with fatigue are higher:

- midnight to 6 a.m. (and especially 3 a.m. to 5 a.m.) – the low point in the body's circadian rhythm that governs alertness and performance
- the beginning and end of shift when handover occurs – fatigue levels can affect communication
- when you work without a breaks for a number of hours – the longer you're on the job, the likelier you are to have accumulated fatigue
- early shift starts (before 6 a.m.)

In general, we are poor judges of our own fatigue. It's difficult to tell when your fatigue levels have reached a point where it's no longer safe to work.



## As Dangerous as Alcohol?



After 24 hours awake, you will be as impaired as if you were legally too drunk to drive.

Sleep researchers have found that impairment caused by sleep deprivation is similar to alcohol intoxication.

One study involved 40 participants who were kept awake for 28 hours and then given a series of performance tests. On another day, the same volunteers were given one standard drink every 30 minutes until their blood alcohol levels reached 0.10% and then given the same performance tests.

This graph shows the results: after 17 hours awake, you can be as impaired as though your blood alcohol level was 0.05%. After 24 hours awake, your impairment level matches a blood alcohol level of 0.10% – too drunk to drive.

*[Performance begins to improve again in the morning, but that's because your body clock is waking you up again. Your performance would not reach the same level as the day before.]*

Shiftworkers are often awake for comparable periods of time. This is particularly true for night workers who come to work after their days off. They wake up in the morning, stay awake during the day, and go to work that evening. This produces the same kind of fatigue impairment.

Shiftworkers who regularly get less than 6 hours' sleep in 24 hours are likely to have a sleep debt, which will also impair performance.



## Consequences for Health

- Fatigue has an impact outside work.
- Studies have found that shiftworkers are more likely to suffer from:
  - irritability, stress, anxiety, and depression
  - gastrointestinal problems
  - cardiovascular illnesses
  - reproductive problems

### **Irritability, stress, anxiety, depression**

These may be worsened by the stress of balancing work and family/social life.

### **Gastrointestinal problems**

Constipation, indigestion, ulcers – these may be related to the time of day you eat. Eating at night when gastric juices are dormant can disrupt the gastric system. The types of food eaten by shiftworkers (fast food, high carbohydrate snacks) may make this worse.

### **Cardiovascular illnesses**

Studies have found that shiftworkers have a higher risk than day workers of developing cardiovascular diseases such as high blood pressure and coronary heart disease.

### **Reproductive problems\***

Some studies have found that women who work shifts, and night shifts in particular, complain more frequently of:

- irregular menstrual cycles and more severe menstrual pain
- prolonged waiting time to pregnancy
- lower foetal growth and birth weight
- increased risk of miscarriage
- pre-term birth

*\* Note: these differences are statistically small and not well understood. However, working hours should be considered a factor in reproductive health.*



## Family and Social Life

- Working shifts can make you feel socially isolated – you work while others have fun.
- It can take heavy a toll on family:
  - less involved in daily life
  - harder to organize domestic chores
  - difficulty arranging childcare
  - higher risk of divorce
- You may be tempted to choose social or family activities over sleep.

### **Social isolation**

Many people who work shifts feel socially isolated. You work while friends and family are socializing. Friends may stop calling because they assume you're not available.

It may be difficult for you to feel part of the community. You are less likely to be a member of a club, attend meetings, or get involved in group activities such as sports.

### **Effect on family**

Balancing family and work can be difficult. It can be frustrating to you and your family that you're not available to participate. It can be a source of conflict, which can in turn lead to marital difficulties. Conflicts can worsen as the demands of work or family increase.

### **Social time vs. sleep**

If you start to feel socially deprived, you may be tempted to sacrifice sleep to spend time with family and friends. This is a potential safety hazard.

*Coping strategies are discussed in detail in Module 3.*



## Commuting

- One of the most dangerous things you can do while fatigued is drive.
- You may be driving during the very times that your body most wants to sleep.
- Nightshift workers are 4 to 7 times as likely to have an accident driving home.

### **Some times are more dangerous than others**

There are high-risk times and circumstances when you should be more aware of the risk of having a fatigue-related accident:

- Long drives without a break
- Driving home after a long shift
- Driving between midnight and 6 a.m. (biological low point)
- Driving in heavy traffic
- Long stretches of road with low traffic

### **Strategies to get home safely**

You could have a coffee before leaving work, but remember it may affect your ability to get to sleep when you get home.

You could also have a nap before you leave work, but be sure to wait until you're fully awake before getting behind the wheel.

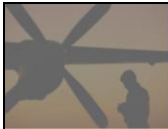
Drive carefully, don't speed to get home faster, and **PULL OVER** if you find yourself fighting to stay awake.



*This module describes a generic FRMS. You should tailor each slide to reflect the actual practices and policies of the company.*

In recent years, we've been better at managing all kinds of workplace risks – things like better material handling, using seatbelts and safety harnesses, and limiting exposure to harmful chemicals.

It's only recently that we've begun to understand the risk posed by fatigue in the workplace. In this module, we'll explain how fatigue-related risk can be managed within a safety management system (SMS).



# Fatigue Risk Management

A fatigue risk management system involves:

- Policies/responsibilities
- Risk assessment
- Hazard controls/action plans
- Training and education
- Ongoing review and improvement

A fatigue risk management system should fit within existing safety management systems. It should consist of:

## **Policies / responsibilities**

A formal policy manual outlining the responsibilities of both the company and the employees in reducing fatigue-related risk, including detailed procedures on dealing with a variety of specific fatigue-related situations.

## **Risk assessment**

A formal assessment of the safety hazard that fatigue presents for each work group or each job task. This is used to determine procedures to follow when the risk from fatigue is high.

## **Hazard controls / action plans**

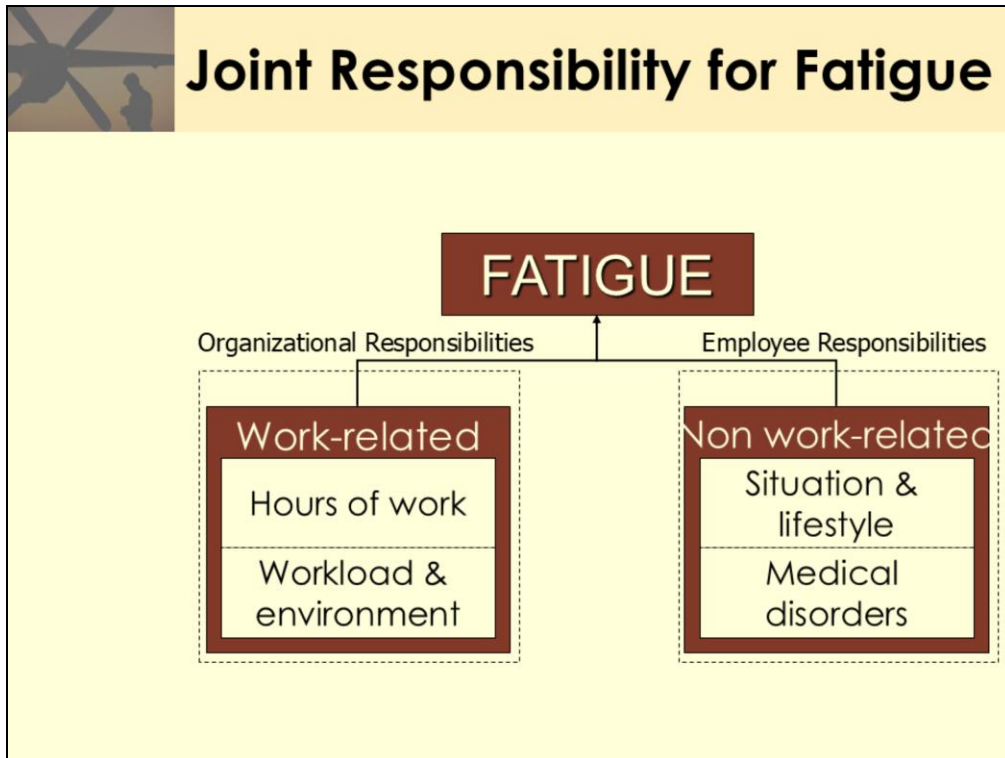
The actual procedures and tools that eliminate or minimize the likelihood and/or consequences of a fatigue-related error or incident. This includes clear decision trees for managers and employees when fatigue has been identified as a risk.

## **Training and education**

A successful FRMS requires a change in your organization's safety culture where everyone is aware of the risk from fatigue. Ongoing training and education programs are an important tool to achieve this.

## **Ongoing review and improvement**

As your organization's understanding of its own fatigue risk grows, it needs to be able to adjust its FRMS to better manage fatigue.



Because work-related causes of fatigue are largely under the control of the organization and non work-related factors are controlled by individual employees, both have a responsibility for managing fatigue.

Both employers and employees need to be aware of the risks posed by fatigue on the job, and to take steps to reduce that risk.

These responsibilities are clearly spelled out in any fatigue risk management system (FRMS).

**Work-related**

- hours of work
- length and timing of shift
- number of shifts in a row
- breaks within and between shifts
- time off (providing sufficient sleep opportunity)
- workload (type of task, complexity)
- environment (noise, lighting, heat, humidity, vibration, etc.)

**Non work-related**

- Home situation and lifestyle (e.g., new baby, second job, child care, home renovations, roadwork outside your house, noisy housemates)
- Illness (e.g., cold/flu, sick partner/child, chronic illness, back pain, etc.)
- Sleep disorders (e.g., insomnia, restless leg syndrome, sleep apnea)



*Discuss the specific responsibilities of the employer based on the company's FRMS.*

### **Employer Responsibilities**

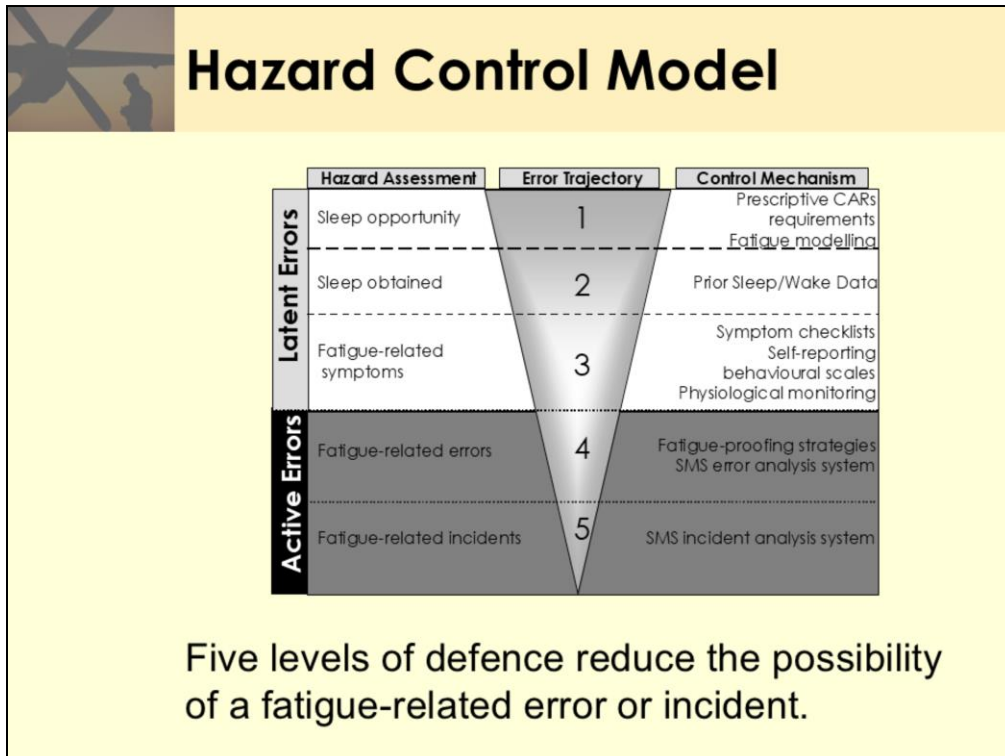
- Appropriate and safe work design, such as schedules that allow for adequate recovery periods during the shift and between shifts
- Ensuring safe work practices, such as scheduling sensible levels of overtime
- Assessment, control, and monitoring of fatigue-related hazards
- Development of policies, procedures and practices to manage fatigue-related risk
- Information and training about fatigue as a workplace hazard



*Discuss the specific responsibilities of the employee based on the company's FRMS.*

**Employee Responsibilities**

- Arriving at work in a fit state to work
- Reporting all incidents and accidents, as well as potential fatigue-related hazards
- Maintaining communication with work colleagues, supervisors, managers
- Being aware of fatigue and how to counteract it in the workplace
- Avoiding behaviours that place you or others at risk



An effective fatigue risk management system uses multiple, overlapping levels of control as a defence against fatigue-related incidents. That way, an incident can only occur when all the defensive levels fail.

**This system has 5 control levels**

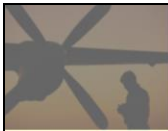
Level 1: making sure schedules provide employees with enough time off to get the sleep they need

Level 2: determining whether employees actually got the sleep they needed

Level 3: keeping an eye out for anyone who displays symptoms of fatigue on the job

Level 4: strategies to make sure that when fatigue is detected in the workplace, it does not result in errors or incidents

Level 5: an accident or incident investigation procedure that allows the organization to determine whether fatigue was a factor, and if so, how to avoid a repeat incident



## Level 1 Controls Sleep Opportunity

Level 1 controls are intended to make sure you get enough time off between shifts to get enough sleep

Schedules are evaluated according to:

- length and timing of shifts
- length and timing of breaks
- number of shifts worked in a row
- number of days off between shifts

Level 1 controls are aimed at ensuring that the work schedule provides you with sufficient sleep opportunity.

It's not just how much you sleep but *when* you sleep that affects the quality of rest. Schedules need to reflect that.

We also know that people need time to do other things when they're not at work besides sleep – you need time to manage other responsibilities, such as family. You need time to relax and socialize. A schedule should take these factors into account.

Level 1 Controls Sleep Opportunity					
Fatigue Likelihood Scoring Matrix for Work Schedules					
	0 points	1 point	2 points	4 points	8 points
a) Total hours per 7 days	≤ 36 hours	36.1 – 43.9	44 – 47.9	48 – 54.9	55+
b) Maximum shift duration	≤ 8 hours	8.1 – 9.9	10 – 11.9	12 – 13.9	≥ 14
c) Minimum short break duration	≥ 16 hours	15.9 – 13	12.9 – 10	9.9 – 8	≤ 8
d) Maximum night work per 7 days	0 hours	0.1 – 8	8.1 – 16	16.1 – 24	≥ 24
e) Long break frequency	≥ 1 in 7 days	≤ 1 in 7 days	≤ 1 in 14 days	≤ 1 in 21 days	≤ 1 in 28 days

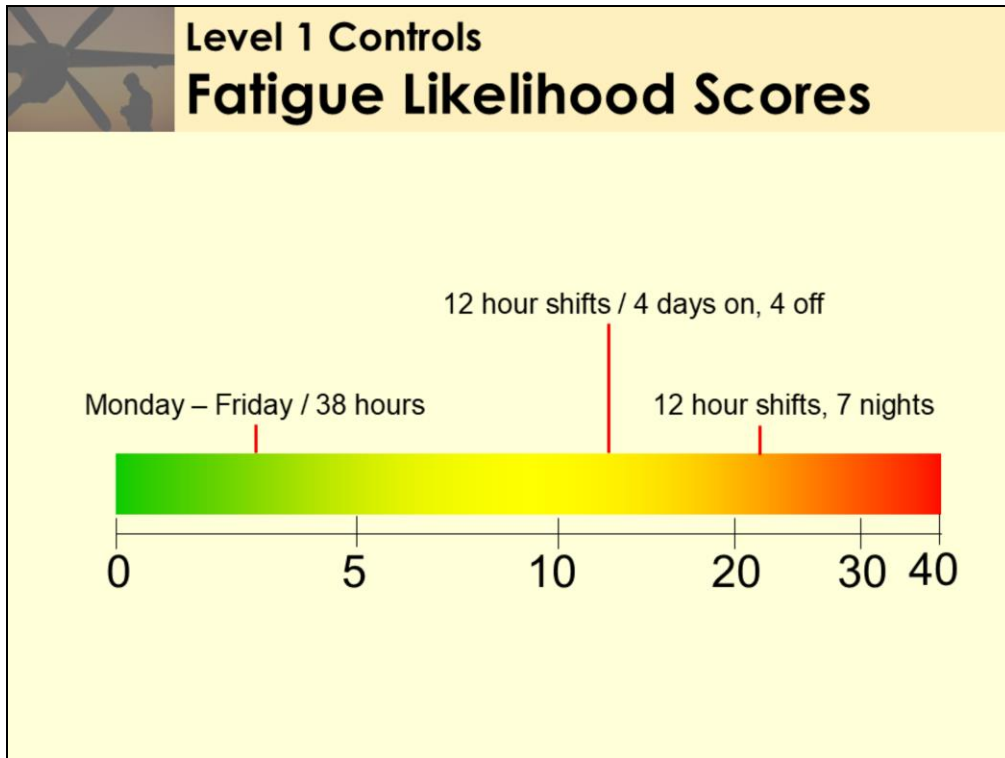
One way to evaluate a work schedule is to calculate a fatigue score based on factors such as shift lengths, days off, and number of nightshifts.

For example, a 9 a.m. to 5 p.m. work week (5 days in a row) would produce a score of zero. On the other hand, a work schedule of seven 12-hour nightshifts, followed by seven days off would produce a score of 21, which would be considered high.

*The table shown here is an example only. Each company should have its own scoring matrix based on its own assessment of its fatigue risk.*

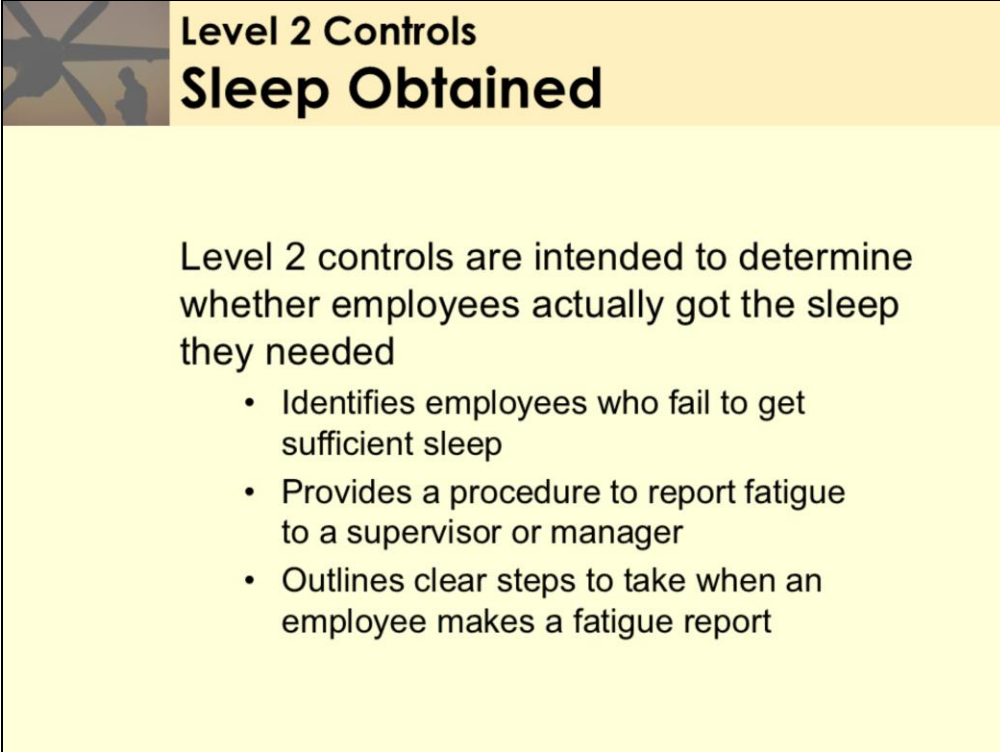
### **Biomathematical modelling**

Instead of using a matrix like this one, some companies use scheduling software that is also capable of analysing the schedule for its fatigue impacts.



This graph shows how some common work schedules might score using this system.

*Each organization should decide its own maximum acceptable score. Companies can assign a lower score for safety-critical tasks that have a higher risk from fatigue, and a higher score for less critical work.*

The graphic features a yellow background with a dark grey header. On the left side of the header is a silhouette of a person's head and shoulders, with a stylized sun or starburst pattern behind it. The text 'Level 2 Controls' is in a smaller font, and 'Sleep Obtained' is in a larger, bold font. Below the header, the text 'Level 2 controls are intended to determine whether employees actually got the sleep they needed' is centered. Underneath this text is a bulleted list with three items: 'Identifies employees who fail to get sufficient sleep', 'Provides a procedure to report fatigue to a supervisor or manager', and 'Outlines clear steps to take when an employee makes a fatigue report'.

**Level 2 Controls**  
**Sleep Obtained**

Level 2 controls are intended to determine whether employees actually got the sleep they needed

- Identifies employees who fail to get sufficient sleep
- Provides a procedure to report fatigue to a supervisor or manager
- Outlines clear steps to take when an employee makes a fatigue report

Level 2 controls are intended to determine whether you actually got the sleep you needed. An FRMS typically requires you to report to your supervisor or manager when you haven't had enough sleep.

There are a number of reasons you may not get enough sleep:

- Inadequate sleep opportunity – this is a sign that the work schedule wasn't adjusted properly using Level 1 controls, or that the controls themselves are not effective. Level 1 controls should be reviewed.
- Personal stress – there may be things going on in your life outside work that affect your ability to get adequate sleep – sick children at home, social or family responsibilities, etc.
- Medical problems – cold, flu or even a sleep disorder can affect your sleep.

Some companies set up systems where employees calculate for themselves how much sleep they have had and report when their sleep doesn't meet the requirements. For example, in a high-risk operation the company may decide that anyone who has had less than 6 hours of sleep in 24 hours, or 12 hours of sleep in 48 hours, or has been awake for longer than 18 hours, must report to the supervisor.



## Level 2 Controls Fatigue Likelihood Score

Prior sleep factor	Threshold value	Score
X (sleep in prior 24 hours)	5 hours	Add 4 points for each hour below threshold
Y (sleep in prior 48 hours)	12 hours	Add 2 points for each hour below threshold
Z (time awake since last sleep)	Y	Add 1 point for each hour of wakefulness greater than Y

A simple calculation can give you a fatigue likelihood score.

You can do a relatively simple calculation to determine whether you've had enough sleep.

X = sleep in the past 24 hours

Y = sleep in the past 48 hours [how many hours of sleep you've had over the past two days]

Z = time since your last sleep [how many hours since you woke up]

In general, you are likely to be experiencing some form of fatigue-related impairment if:

- X is less than 5 hours
- Y is less than 12 hours
- Z is greater than Y

In a typical FRMS, these scores may be used to determine whether your co-workers, your supervisor or your manager should intervene to reduce the risk you may pose to operations.

*The table shown here is just an example. Threshold values are decided by the company based on its own assessment of the fatigue risk for each work group or each task.*

Level 2 Controls Sample Decision Tree	
Score	Action
0	No action.
1-4	Talk to supervisor and undertake approved individual countermeasures (i.e., self monitoring for symptoms, team monitoring by colleagues, task rotation)
5-10	File fatigue report with supervisor. Organize supervisory checks. Complete symptom checklist, task re-assignment
10+	File fatigue report with manager. Do not engage in risky behaviour. Do not start shift until fit for work.


When you report to your supervisor that you haven't had enough sleep, it is important that everybody understands the procedures in place to manage the risk from fatigue.

This is an example of a decision tree that a company might use to decide what to do if an employee reports not getting enough sleep.

A score of 10 is considered serious – according to this chart, you should be sent home until you're rested enough to return to work.

There is a whole gamut of measures that companies can take, depending on how serious the fatigue risk is. These range from asking co-workers to keep an eye on you to asking your supervisor to assign you to another task.

*It's up to each company to decide which measures need to be taken when an employee reports a fatigue score greater than zero.*



## Level 2 Controls

# IFLS Card

FRONT

**Individual Fatigue Likelihood Assessment**

**Step 1. Sleep in prior 24 hours**

Sleep	≤ 2h	3h	4h	5+h
Points	12	8	4	0

**Step 2. Sleep in prior 48 hours**

Sleep	≤8h	9h	10h	11h	12+h
Points	8	6	4	2	0

**Step 3. Hours of wake since last sleep**  
Add one point per hour awake greater than sleep in step 2.

BACK

**Individual Fatigue Likelihood Assessment**

**Step 4.**  
Add all points together to determine your score

Score	Control Level
1-4	Self-monitoring
5-8	Supervisor monitoring
9+	Don't commence shift until fit for work

Refer to FRMS policy for detailed explanation of controls

*In some industries, companies give employees pocket cards that have the fatigue scoring rules on one side and the measures to be taken on the other side. If your company has such a card, discuss it here.*



## Level 3 Controls

# Fatigue Symptoms

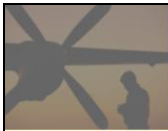
*What are some of the common symptoms of fatigue?*

*Make a list on a whiteboard or flip chart. To help provoke some discussion, ask the group to describe how they can tell another person – their child, their spouse, their co-worker – is tired. Discuss which symptoms are physical, mental or emotional.*

**Physical:** falling asleep, head nodding, heavy eyelids, rubbing eyes, lack of coordination, dizziness, change in appetite, headache, impaired vision, yawning, etc.

**Mental:** making errors, difficulty making decisions, difficulty concentrating, trouble communicating, short attention span, lapses in memory, slower reaction time

**Emotional:** irritable, unmotivated, lethargic, lacking in energy, quiet, withdrawn



## Level 3 Controls Fatigue Symptoms

Level 3 controls are intended to identify employees who show signs of fatigue

- symptoms of fatigue indicate an increased risk of fatigue-related error
- employees should watch for symptoms in themselves and others
- a system of reporting allows the company to take measures when the risk is considered high

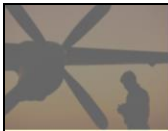
*Many companies teach employees how to identify symptoms, in themselves and others, that may indicate an increased risk of a fatigue-related error. In a typical FRMS, there are clear guidelines about what to do when you spot a co-worker showing signs of fatigue.*

For example, if you catch someone yawning three times in 15 minutes, you should bring it to their attention. If it looks like they may fall asleep, you should tell your supervisor.

Making everyone aware of the signs and symptoms of fatigue is another layer of defence against fatigue-related errors and incidents.

### **Assessing Level 1 & 2 controls**

Another reason to report fatigue symptoms is to let the company know that it may need to adjust its Level 1 or 2 controls. If employees are reporting being fatigued, the schedule may not be giving them enough time to sleep or minimum sleep levels are not enough.



## Level 4 Controls Fatigue Proofing Strategies

Increased supervisor/co-worker monitoring  
Working in pairs  
Double-check systems  
Checklists  
Task rotation  
Additional breaks  
Napping  
Moving critical/monotonous tasks to daytime

*Sometimes working conditions likely to produce fatigue are unavoidable – such as working overtime. Companies should have in place a list of fatigue-proofing strategies to reduce the risk. These are just a few examples.*

### **Increased monitoring, working in pairs, checklists, double-checking**

It can be as simple and informal as more frequent conversations with your supervisor over the course of a shift. Or it can involve more formal procedures for additional, verified supervisory checks on safety-critical work.

### **Task rotation, moving critical tasks to daytime**

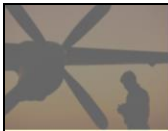
These can all help ensure that safety-critical work is not at risk from fatigue. Monotonous tasks can worsen feelings of fatigue as much as those that require intense concentration.

### **Additional breaks**

A break of 10 to 20 minutes is usually enough to improve your performance in the short term. Research has found that performance starts deteriorating after two hours on high-demand tasks. Use your break to do something to improve your alertness, like getting some fresh air, exercising, or having a coffee.

### **Napping**

*Some companies have set up a place for employees to take a nap if necessary. Naps should last at least 20 minutes. Don't forget the sleep inertia effect – give yourself 10 to 20 minutes to wake up fully before starting work.*



## Level 5 Controls Errors and Incidents

Level 5 controls consist of:

- fatigue error or incident reporting system
- Investigation procedures to determine whether fatigue was a cause of an incident
- review of fatigue management controls

*Most organizations have formal requirements to report errors and incidents as a part of their safety management system. These should be discussed specifically here.*

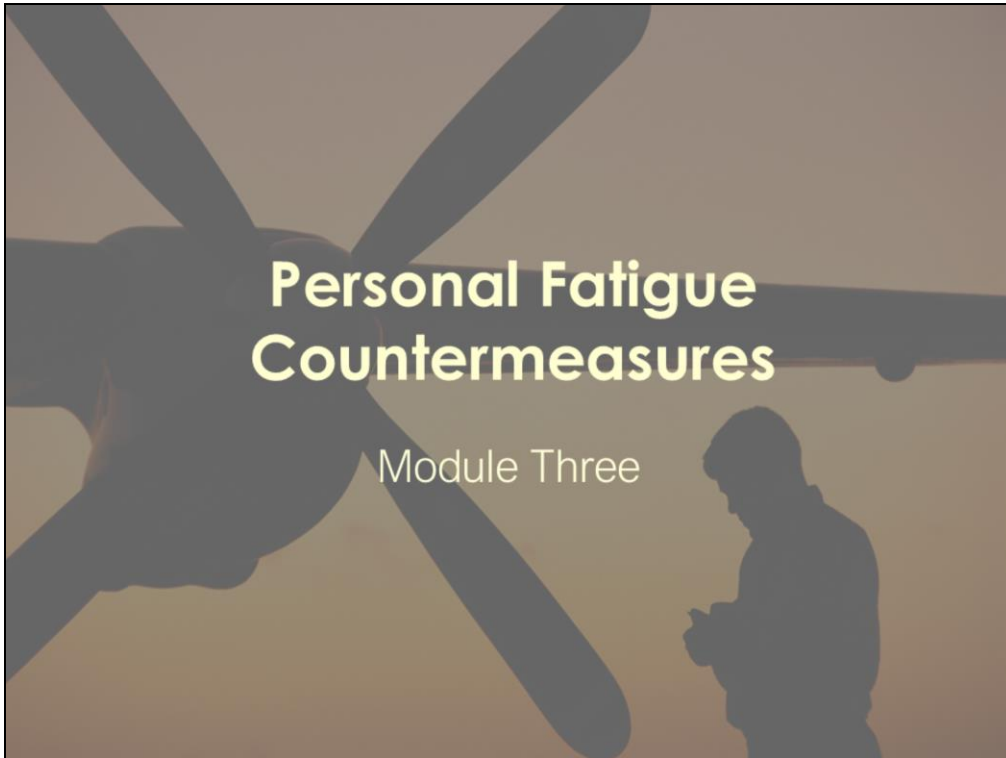
Level 5 deals with events or incidents that have actually happened.

As part of any investigation into an incident or error, the company should ask at least three basic questions:

1. Did the schedule provide enough opportunity for sleep?
2. Did employees involved in the incidents actually get enough sleep?
3. Did anyone observe any symptoms related to fatigue?

In most FRMSs, these questions aren't aimed at finding anyone guilty of anything – it's a way to find out whether the fatigue management controls are actually working.

Some companies use different reporting forms for fatigue than for regular incidents. Some have set up a confidential on-line database to collect information on how often employees don't get enough sleep, show fatigue-related symptoms, or make a non-reportable error that's fatigue related.



*This module offers some strategies to help you make sure you get the rest you need to be fit for duty.*



*What strategies do you use to stay alert when you're working?*



# Get the Sleep You Need

## Set up your bedroom for sleeping

- Make it as dark as possible
- Make sure the temperature is right: 18° C to 24° C
- Move distractions to another room
- Make sure you won't be disturbed

### **Dark**

Because light makes your body think it's time to wake up, your room should be dark.

### **Temperature**

As soon as the temperature falls outside 18-24° C, your body will keep you awake to cool down or heat up as necessary.

### **Distractions**

Try to use your bedroom only for relaxing, sleeping, and sex. Move potential distractions such as televisions and computers to another room.

### **Noise**

Use an answering machine for the telephone. If there are children around, make sure they won't wake you. If noise is keeping you awake, try using ear plugs. Because noise can sometimes disturb your sleep without actually waking you, some people use "white noise", such as a fan or an untuned radio, to help dampen other sounds.



## Good Sleeping Habits

- Keep to a regular bedtime routine
- Wind down before trying to sleep
- Be careful what you eat or drink before bed
- Don't toss and turn waiting to fall asleep
- Adjust your bedtime gradually if your shift changes

### **Routine**

Doing little things like brushing your teeth every day in the same order before bedtime can train your body that it's time to sleep, even if it's daytime and your body is normally awake.

### **Wind down**

It's better to relax a little before trying to sleep. A little light exercise can sometimes help, although avoid anything strenuous.

### **Eating and drinking**

Your body is programmed to digest food during the day, so it's better not to eat a big meal just before bedtime. A light snack may be okay. Avoid anything with caffeine, such as coffee or energy drinks. Alcohol is not a good idea either, because you won't sleep as deeply and don't wake up feeling as refreshed.

### **Don't toss and turn**

If you can't get to sleep, it's sometimes better to get up and do something relaxing instead of tossing and turning. Try reading or taking a bath.

### **Adjusting to new shifts**

Try changing your bedtime by an hour or two each day to get your body gradually used to your new shift.



## Take a Nap

- Naps can supplement sleep, not replace it.
- Naps 10 minutes or longer can improve alertness, communication and mood.
- The value of a nap doesn't depend on the time of day.
- Allow 5 to 20 minutes for sleep inertia to pass.

While a nap is no substitute for a good night's sleep, it can help you recover from fatigue and make you feel refreshed. The benefits of a nap do not last as long as a good, long sleep, however.

### **How long?**

How long you should nap depends on how much time you have available. You'll feel more refreshed if you wake up naturally at the end of your sleep cycle. A nap should be at least 10 minutes long.

### **When to nap?**

Although the recovery value doesn't seem to depend on what time of day you take it, it's easiest to fall asleep when your body is most tired – between midnight and 6 a.m., and mid-afternoon. The recovery value of the nap doesn't seem to change.

### **Sleep inertia**

Remember that when you wake up from a nap, you may feel groggy and disoriented for up to 20 minutes. This is especially true if you're wakened by an alarm instead of waking up naturally, or if you awaken from a particularly deep stage of sleep. This is called sleep inertia. Make sure you build in time to wake up properly before taking on anything that requires full concentration, such as driving.



## Drink Plenty of Fluids

- Dehydration slows you down and increases feelings of sluggishness.
- Working in heat, air conditioning, or at night can be dehydrating.
- Drinking coffee, tea, soft drinks, or alcohol, and eating salty foods can make you feel thirstier.
- Adults should drink at least 2 litres of fluid a day.

### **Makes you feel tired**

When your body is low on water, it tries to conserve what you have left. It slows down your activity and makes you relax – which makes you feel sleepy. Being dehydrated can also make you feel lightheaded and cause headaches.

### **Working environment**

You should pay particular attention if you work in a hot, dry, or air-conditioned environment, or if your job is physically demanding and makes you sweat.

### **Careful what you drink or eat**

Drinks that contain caffeine or alcohol can actually make you more dehydrated – they're diuretics, which makes your body flush water from your system. Sugary drinks or fruit juices can make you feel more thirsty.

Eating high-fat or high-salt foods can also make you dehydrated – they require additional water to digest.

### **2 litres a day**

Most people don't drink enough to stay fully hydrated. If drinking water isn't easily accessible where you work, consider bringing a bottle to work with you.



## Make Smart Use of Caffeine

- Has stimulant effects that can improve alertness and performance
- Best used strategically – only when you really need help staying awake
- Takes 20 minutes to take effect and the effects can last up to 6 hours
- You can develop both a dependence and a tolerance

Caffeine is one of the mostly widely used drugs in our society. Many people use the caffeine in a strong cup of coffee or tea to get their day started and to fight off feelings of fatigue as the day wears on.

### **Strategic use of caffeine**

If you drink multiple cups of coffee throughout the day – or even one cup at the same time every day – your body adapts to the caffeine and it becomes less effective. Avoid drinking caffeine when you're not really tired.

You can also buy caffeine pills such as NoDoze.

### **Lasts up to 6 hours**

It takes about 20 minutes to feel the stimulating effects of caffeine, and they can last for 4 to 6 hours. Avoid drinking caffeine too close to bedtime.

### **Dependence and tolerance**

Your body quickly builds up a tolerance to caffeine – the more regularly you use it, the more it will take to keep you alert when you really need help. You can also develop a dependence to caffeine. Many people develop withdrawal symptoms such as headaches when they try to go without.

**Remember that stimulants only hide or postpone the effects of fatigue. They do not replace the need for sleep.**



# Caffeine

## Caffeine content of common foods/drinks

### Coffee (250 mL)

Instant	65-100 mg
Drip	115-175 mg
Brewed/Espresso	80-135 mg

### Soft drinks

Coke/Pepsi (340 mL)	50 mg
Jolt (500 mL)	100 mg
Red Bull (200 mL)	80 mg

### Tea (250 mL)

Green tea	8-30 mg
Regular	50-70 mg

### Most chocolate bars

20-40 mg

### NoDoz, 1 regular strength tablet

100 mg

To make smart use of caffeine, you should be aware of the caffeine content of common drinks or foods.

You should also be aware that the sugar in many caffeinated drinks can actually work against the stimulating effect of the caffeine and reduce your alertness after the initial effect wears off.



## Drugs and Alcohol

- Alcohol can help you relax before bed, but it can also disrupt your sleep.
- Sleeping pills are best used occasionally or for only a few days at a time.
- Cold and flu medication can keep you from sleeping.

### **Alcohol**

Some people use alcohol to help them relax before bedtime. While a couple of drinks may help you fall asleep more easily, alcohol tends to disrupt your sleep cycle and often produces a light, restless sleep that leaves you less refreshed.

### **Sleeping pills**

Like caffeine, your body can develop a resistance and a dependence. After about a week, you may have difficulty falling asleep without them. Over time, you may need a larger and larger dose.

### **Cold & flu medication**

While cold and flu medication that contains pseudoephedrine may dry up your runny nose, it can also act as a stimulant to keep you awake. It may also leave you dehydrated, which will affect the quality of your sleep. Choose a nighttime version if you need to relieve cold symptoms



## Eating Right

- Maintaining blood sugar levels is key to controlling ups and downs in energy levels.
- Eating low-fat, high-protein foods can actually increase alertness.
- High-fat foods can slow you down.
- High-sugar foods can cause your blood sugar to rise and fall quickly.

Being careful about what you eat can play an integral role in maintaining alertness on the job.

Maintaining blood sugar levels is a key to controlling ups and downs in energy. The way blood sugar levels react to food is known as the glycemic index (GI) of foods.

For example, snack bars or sugary foods can give you a rush of energy – a sugar high – but that's usually followed by a low that makes you feel tired again.

Foods like potatoes, pizza, and white bread have a high glycemic or sugar index and can make you feel sluggish.

Eating a tuna sandwich on brown bread will keep you going longer without getting tired – tuna packed in water is a high-protein, low-fat food, and brown bread has a lower glycemic index than white bread.



## Eating Right

### High Glycemic Index (GI) Foods

French fries, doughnuts, muffins, bread (white or whole grain), Cornflakes, rice (white or quick brown), cakes

### Low GI Foods

Fish (canned in water), low-fat dairy (cottage cheese, yoghurt), lean meat (steak, chicken breast, lamb), pasta, All-Bran, porridge, hard boiled eggs, peanuts, lentils, fresh fruit

High GI foods make your blood sugar levels rise and fall quickly, whereas low GI foods make your blood sugar level rise and fall slowly.

High GI foods are ideal when you have been doing physical work or exercise and need energy quickly to recover.

Low GI foods are ideal to keep an already stable blood sugar level from becoming too high or low. Low GI foods are also ideal for raising low blood sugar levels slowly and avoiding the fast drop in blood sugar (and energy) that can occur after eating high GI foods.

Low GI foods are ideal as regular snacks across a shift to help you avoid big changes in your energy levels.



## Physical Exercise

- Good for your overall health
- Can help you sleep better and feel more rested
- Helps relieve stress, boost your health, strengthen your immune function, and improve muscle tone and strength
- Any activity that keeps your heart rate elevated for at least 20 minutes is good

Regular exercise helps you sleep well, stay healthy, and feel fit.

It may not be easy to find a regular time to exercise if your work schedule keeps changing, but you don't need to join a gym or a local sports team to enjoy the benefits of exercise.

Even going for regular walks can help improve your energy levels and stamina, reduce the risk of heart disease and other health problems, and help you feel better and sleep better.

You should avoid heavy exercise one hour before bedtime – let your body unwind and calm down before sleep.



## A Healthy, Balanced Life

- Get enough sleep
- Spend time with friends and family
- Enjoy time for yourself
- Stay fit and healthy

### **Get enough sleep**

Remember that it's your responsibility to get enough rest to be fit for work. And don't forget that you need to be rested to fully enjoy your family and social time.

### **Spend time with friends and family**

You may have to plan your time more carefully, and make more of an effort to stay in touch with friends. Let your family and friends know your work schedule. Try to plan events well in advance. You may have to organize activities yourself, rather than waiting for others to include you.

Joining a recreational organization can also be a useful strategy to minimize feelings of social isolation. This can be particularly effective for meeting friends who work on a schedule similar to yours. It provides an opportunity to socialize and relax when most other people are working.

### **Enjoy time for yourself**

Take advantage of the fact that you don't need to compromise or negotiate for time alone to relax, enjoy a hobby, plan a trip or event, get some exercise – or even catch up on some much-needed sleep!

### **Stay fit and healthy**

Get regular exercise and eat a nutritionally balanced diet. Learn to relax, manage your fatigue, and get the sleep you need. Pay attention to your overall health and visit your doctor regularly.

# Questions/Comments



[Presenter's name]

[Presenter's organization]

[Presenter's e-mail address]



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Any questions/comments?