GUIDELINES ON FATIGUE

MODULE 3 4

FATIGUE AND THE MASTER SEAFARER

1 Module 3 contains practical information intended for the seafarer (master, officers, ratings and all other shipboard personnel) working on ships. Prior to reviewing this Module it is strongly recommended that all seafarers become familiar with Module 1 (Fatigue - Causes and Consequences) first. Management level seafarers (officers) should also become familiar with Module 2 (Fatigue and the Company).

2 As highlighted described in Module 2, the responsibility for managing the risk of fatigue risks and minimizing the risk to safety is a shared responsibility between the Company (as your employer) and all seafarers yourself (as the employee). The Company is primarily responsible for creating a work and living environment that minimizes the risk of fatigue-related risks. This includes, but is not limited to, ensuring safe duty scheduling, adequate resources, the provision of a healthy living environment and providing fatigue training as mentioned in Module 2. It is important that the ship is sufficiently and efficiently manned to meet all situations and conditions, including emergencies. You All seafarers are responsible for ensuring that time available for rest and sleep is used appropriately and their behaviour does not create an environment that minimises the or increase risk of fatigue.

What causes fatigue and why is it important?

3 The maritime industry operates a variety of work schedules in a wide range of operational environments and a variety of working arrangements which means that at some point you seafarers may are likely to experience fatigue. [1-3]. Fatigue can affects all seafarers individuals, regardless of skill, rank, knowledge or training.

4 As highlighted in Module 1, explains that fatigue is caused by a range of factors but is primarily affected by:

   .1 lack of sleep (i.e. inadequate restorative sleep);
   .2 poor quality of sleep and rest;
   .3 work/sleep at inappropriate times of the body clock (circadian cycle);
   .4 staying awake for very long periods;
   .5 stress; and
   .6 workload (prolonged mental and/or physical exertion).

5 Fatigue may also be made worse by one or a combination of factors. These include, ship operational factors (work schedules, workload, etc.), adverse environmental conditions (noise, light, ship motion, etc.), stress and health (medical condition, sleep disorders, use of supplements, diet, etc.)—(See Module 1 for more detail). These factors alone, or in combination may also contribute to inadequate restorative sleep.

9 Fatigue can affect your mind, body and emotions and body (e.g. your capacity ability to perform for tasks involving physical exertion and strength, as well as your ability to solve complex problems or make decisions) etc. Your level of alertness is dependent on When fatigued, seafarers' your and therefore human physical and mental performance is more likely to be can be impaired, which means that in some cases you seafarers may not be able to continue to conduct shipboard tasks safely and efficiently. A dangerous aspect is
Fatigued individuals are poor judges of their own level of fatigue and hence performance, largely because fatigue can affect their ability to make judgments or solve complex problems.

When determining why fatigue has occurred, there is often a focus on sleep. This is because both the quantity and quality of sleep are important for preventing and recovering from fatigue and for maintaining alertness and performance. Sleep loss and sleepiness may degrade every aspect of a person's performance, including mental, physical, and behavioural. Studies found that the effect of sleep debt on performance has been found to be comparable to alcohol impairment, in terms of negatively impacting performance [4, 5].

Also, as we get older, it generally becomes more difficult to get to sleep when we want to sleep and to stay asleep. This is particularly true during daytime sleep, but even night-time sleep may prove to be more challenging as we get older. Frequent awakenings can lead to increased sleepiness when you are awake.

Working at sea may limit seafarers' opportunity for sleep and recovery in each 24-hour period. Seafarers working during the night, especially during their circadian low, will in most cases be working while they are fatigued. These hours of work may also limit the amount of time available for sleep. There are particular times when the risks associated with fatigue are increased, regardless of the relationship between fatigue and recovery quantity and quality of sleep. Times when fatigue risk levels are particularly high include:

.1 When working during the circadian low (0000 to 0600);
.2 When regular short breaks have not been taken;
.3 Excessive time on duty When duty schedules are longer than 8 hours;
.4 Early duty starts. Early start times (often shorten sleep obtained. This is because most people often find it difficult to go to bed earlier in compensation) and find it hard to get to sleep quickly if they do go to bed early;
.5 When new to the job or ship. When learning a new job and/or getting to know a new ship and crew, and is often challenging. Some individuals may find they do not sleep well during the first week on a new ship. This is especially the case worse when if they are suffering from jet lag;
.6 When suffering from jet lag.

How can you, seafarers, recognize fatigue in yourselves, yourself and in others (signs/symptoms)?

Fatigue can affect your mind, body and emotions and body (e.g., your capacity to perform for tasks involving physical exertion and strength, as well as your ability to solve complex problems or make decisions) etc. Your level of alertness is dependent on When fatigued, your and therefore human performance can be impaired, which means that in some cases you cannot continue to perform shipboard tasks safely and efficiently. A dangerous aspect is that fatigued individuals are poor judges of their own level of fatigue and hence performance, largely because fatigue can affect their ability to make judgments or solve complex problems.

Fatigue-related signs and symptoms are often divided into three categories: mental, physical, and behavioural. Table 1.1 in Module 1 describes some of the possible effects of fatigue by listing these three categories (mental, physical, and behavioural) of fatigue signs and symptoms into the three categories (mental, physical, and behavioural). These
signs and symptoms of fatigue may be used to identify an individual's level of alertness, performance impairments and the symptoms associated with them. These signs and symptoms of fatigue may be used to identify an individual's level of alertness. It must be noted, however, that it is difficult for an individual to recognize the symptoms of fatigue within him/herself, because fatigue impairs judgement. A seafarer may recognize some of these signs and symptoms in others (with time, seafarers may learn to identify some within themselves).

11 Some of the more visible signs and symptoms include:

1. **Mental**
   - Focuses on a trivial problem, neglecting more important ones
   - Less vigilant than usual. Slow or no response to normal, abnormal and emergency situations
   - Lapses of attention
   - Misjudges. Poor judgment of distance, speed, time, etc.
   - Forgets to complete a task or part of a task
   - Difficulty concentrating and thinking clearly
   - Fails to remember the sequence of task or task elements

2. **Physical**
   - Inability to stay awake (an example is head nodding or falling asleep involuntarily)
   - Difficulty with hand-eye coordination skills (such as operating controls, switch selection)
   - Speech difficulties (it may be slurred, slowed or garbled)
   - Increased frequency of dropping objects like tools or parts
   - Insomnia

3. **Behavioural**
   - Decreased tolerance and anti-social behaviour
   - Increased mood changes (examples are irritability, tiredness and depression)
   - Ignores normal checks and procedures
   - Increasing omissions and carelessness

12 It is important to address fatigue not only for reasons of safety but also long-term health effects, as decreased sleep may also lead to cardiovascular diseases, gastrointestinal diseases, mental health problems and stress [6–7].

13 The more of the signs and symptoms seafarers experience or observe in others, the more likely it is that alertness is significantly reduced. Fatigue is not the only cause of such symptoms, but when several occur together it is likely to indicate fatigue-related impairment. It is important that the seafarer notifies their supervisor (or management level seafarers officers) when they observe fatigue symptoms in themselves or recognize that you or other crewmembers are fatigued. It is important to have open communication between seafarers and your supervisors regarding fatigue.
Your Company’s fatigue risk management (FRM) processes should support open communication and reporting between you and your supervisor (or management level seafarers/officers) regarding fatigue detection and prevention and detection. Reporting is important as it assists the Company to make an accurate assessment of the risk of fatigue and take appropriate measures, which may include adjustments to workload and/or manning levels.

### TABLE 1

**EFFECTS OF FATIGUE**

<table>
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<tr>
<th>PERFORMANCE IMPAIRMENT</th>
<th>SIGNS/SYMPTOMS</th>
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| 1 Inability to concentrate | - Unable to organize a series of activities  
- Preoccupied with a single task  
- Focuses on a trivial problem, neglecting more important ones  
- Reverts to old but ineffective habits |
| 2 Diminished decision-making ability | - Misjudges distance, speed, time, etc.  
- Fails to appreciate the gravity of the situation  
- Overlooks items that should be included  
- Chooses risky options  
- Difficulty with simple arithmetic, geometry, etc. |
| 3 Poor memory | - Fails to remember the sequence of task or task elements  
- Difficulty remembering events or procedures  
- Forgets to complete a task or part of a task |
| 4 Slow response | - Responds slowly (if at all) to normal, abnormal or emergency situations |
| 5 Loss of bodily control | - May appear to be drunk  
- Inability to stay awake  
- Affected speech e.g. it may be slurred, slowed or garbled  
- Feeling heaviness in the arms and legs  
- Decreased ability to exert force while lifting, pushing or pulling |
| 6 Mood change | - Quieter, less talkative than usual  
- Unusually irritable  
- Increased intolerance and anti-social behavior  
- Depression |
| 7 Attitude change | - Fails to anticipate danger  
- Fails to observe and obey warning signs  
- Seems unaware of own poor performance  
- Too willing to take risks  
- Ignores normal checks and procedures  
- Displays a “don’t care” attitude |
In addition to the behavioral changes listed in the table (symptoms), there are also a number of other changes associated with fatigue that will manifest as physical discomfort, such as:

- Headaches
- Giddiness
- Heart palpitations / irregular heart beats
- Rapid breathing
- Loss of appetite
- Insomnia
- Sudden sweating fits
- Leg pains or cramps
- Digestion problems

WHAT CAN CAUSE FATIGUE?

- Fatigue may be caused and/or made worse by one or a combination of things:
  - Lack of sleep
    - Only sleep can maintain or restore your performance level. When you do not get enough sleep, fatigue will set in and your alertness will be impaired. (Refer to Section 3)
  - Poor quality of sleep
    - Fatigue may be caused by poor quality of sleep. This occurs when you are unable to sleep without interruptions or you are unable to fall asleep when your body tells you to. (Refer to Section 3)
  - Insufficient rest time between work periods
    - Apart from sleep, rest (taking a break) between work periods can contribute to restoring your performance levels. Insufficient rest periods or postponing assigned rest times (to finish the job early) can cause fatigue. (Refer to Section 3)
  - Poor quality of rest
    - Disturbances while resting such as being woken up unexpectedly while on call (during port operations) or unpredictable work hours (when arriving in port) can cause fatigue.
  - Stress
    - Stress can be caused by personal problems (family), problems with other shipmates, long work hours, work in general, etc. A build up of stress will cause or increase fatigue.
  - Boring and repetitive work
    - Boredom can cause fatigue. You may become bored to the point of fatigue when your work is too easy, repetitive and monotonous and/or bodily movement is restricted.
  - Noise or vibration
    - Noise or vibration can affect your ability to sleep/rest, and it can affect your level of physical stress, thus causing fatigue.
  - Ship movement
    - The ship’s movement affects your ability to maintain physical balance. Maintaining balance requires extra energy, which can then cause fatigue. A ship’s pitching and rolling motions mean you might have to use 15-20% extra effort to maintain your balance.
31 Food (timing, frequency, content and quality)
32 Refined sugars (sweets, doughnuts, chocolates, etc.) can cause your blood sugar to rise rapidly to a high level. The downside of such short-term energy is that a rapid drop in blood sugar can follow it. Low blood sugar levels can cause weakness, instability and difficulty in concentrating and in the extreme case, unconsciousness. Eating large meals prior to a sleep period may disrupt your sleep.

33 Medical conditions and illnesses
34 Medical conditions (i.e. heart problems) and illnesses such as the common cold can cause fatigue. The effect not only depends on the nature of the illness or medical condition, but also the type of work being carried out. For example, common colds slow response time and affect hand-eye coordination.

35 Ingesting chemicals
36 Alcohol, caffeine and some over the counter medications disrupt sleep. Caffeine consumption can also cause other side effects such as hypertension, headaches, mood swings and anxiety.

37 Jet-lag
38 Jet-lag occurs following long flights through several time zones. It is a condition that causes fatigue in addition to sleep-deprivation and irritability. It is easier to adjust to time zones while crossing from east to west as opposed to west to east. The greatest difficulty in adjustment results from crossing 12 time zones, the least from crossing one time zone. Our bodies adjust at the rate of approximately one hour per day.

39 Excessive workload
40 Working consistently "heavy" workloads can cause fatigue. Workload is considered heavy when a person works excessive hours or performs physically-demanding or mentally stressful tasks. Excessive work hours and fatigue can result in negative effects:
41 Increased accident and fatality rates
42 Increased dependence upon drugs, tobacco or alcohol
43 Poor quality and disrupted sleep patterns
44 Higher frequency of cardiovascular, respiratory or digestive disorders
45 Increased risk of infection
46 Loss of appetite

What can seafarers do How can prevent to help reduce and manageing the risk of the onset of fatigue on ships?

45 Obtain adequate sleep issues

45 The most effective strategy to fight fatigue is to ensure that seafarers get the very best quality and quantity of sleep. The provision of adequate sleep opportunity is important to ensure adequate sleep. Sleep loss and sleepiness can degrade every aspect of human performance such as decision-making, response time, judgement, hand-eye coordination, and countless other skills. As indicated in module 2, the company should provide sufficient crewing to meet work demands and ensure the seafarer with an is provided with adequate sleep opportunity for recovery. In order to be effective in satisfying your body's need, sleep must meet three criteria, and include:
Duration

Everyone's sleep needs are unique; however, it is generally recommended that a person obtain on average 7 to 8 hours of sleep per 24-hour day. A person needs the amount of sleep that produces the feeling of being refreshed and alert. Insufficient sleep over several consecutive days will impair alertness; only sleep can maintain or restore performance levels.

Sleep is most valuable if obtained in a single block. Whilst a short sleep or nap can provide a powerful boost to alertness, it does not eliminate the need for adequate sleep.

Continuity

Sleep should be uninterrupted. Six one-hour naps do not have the same benefit as one six-hour period of sleep.

Quality

People need deep sleep. All sleep is not of the same quality and does not provide the same fully recuperative benefits.

There could be instances in which a seafarer may not obtain adequate sleep, even though they are provided with adequate sleep opportunity. Aspects mentioned below can all affect the quantity and quality of sleep obtained:

1. you are working during the night and may mean that a seafarer is simply be unable to sleep during the day;

2. if joining the ship for the first time you may experience difficulty adjusting to a new watch the sleep schedule and/or may be recovering from jet lag;

3. your sleep may have been interrupted by shipmates colleagues, unexpected events or operational demands (role-dependent);

4. you may suffer from a sleep disorder (see Module 1), or other medical or physical problem that keeps a seafarer awake;

5. emotional stress, for example due to family problems at home and/or concerns about work;

6. inability to get to sleep due to concerns about work or other worries;

7. the sleeping environment (comfort, noise, darkness, ship motion, privacy, etc.) may not allow for adequate sleep;

8. the type of food and the time that food it is consumed;

9. medication or use of prescribed/over the counter/natural remedies;

10. consumption of stimulants (i.e. caffeine, amphetamines, energy drinks alcohol);

11. consumption of alcohol;

12. use of personal electronic devices (and other sources of blue light) before sleep, which may delay the onset of sleep and not allow adequate sleep to be obtained; and
Regardlless of the circumstances causing insufficient or poor quality sleep, these should preferably be identified through proactively measures and treated as a potential shipboard hazard. This is an important aspect of any safety risk management program that includes the need to report sleep related issues.

The company should have processes procedures in place (Module 2) to enable the seafarer you to provide feedback on risks to fatigue-related risks, such as you your opportunity to report back situations when you they have been unable to obtain adequate sleep or feel at risk of making fatigue-related errors, specifically if conducting safety critical tasks (such as navigating in congested waters or in proximity of navigational hazards, stand-by conditions, etc.). This can be as simple as verbally reporting to you your the supervisor, management level seafarers, officers and/or the ship’s safety committee, or by utilising a sleep diary to monitor your sleep. Keeping a sleep diary is one way to keep track and monitor your sleep. Appendix 4 provides an example of a simple subjective sleep diary that can be used. Objective measures such as activity monitoring devices which can include watches and/or other wearables devices (see Module 2) can also be used to monitor sleep.

If you continue experiencing inadequate sleep and the opportunity for recovery from work is not provided, this will prolong fatigue putting your health, well-being and safety of the ship at risk.

Here is some general guidance on developing good sleep habits:

.8 Whenever possible, allow for ensure that you give yourself enough time in bed for plenty of sleep;
.9 As much as possible, try and ensure you they that you will have no are not interrupted losses during you their extended period of sleep;
.5 Avoid stimulating activities prior to sleep such as exercise, television, and movies, etc. and if possible limit the use of personal electronic devices;
.11 Avoid alcohol and caffeine alcohol, caffeine and other stimulants prior to sleep (keep in mind that coffee, tea, colas, chocolate, and some medications, including cold remedies and aspirin contain alcohol and/or caffeine). If possible, avoid caffeine at least six to four hours before bedtime;
.4 Get sufficient sleep, especially before a period when you it is expected that time for adequate sleep will not be available. A white noise generator or ear plugs can be of used if you can sleep with them in;
.1 If possible, develop consistent sleep times (i.e. try to go to bed at the same time every day);
.2 Develop and follow a pre-sleep routine to promote sleep at bedtime (e.g. a warm shower, reading calming material, or just making a ritual of pre-bed preparation). Try and avoid eating before sleeping;
.3 Develop and follow a pre-sleep routine to promote sleep at bedtime (e.g. a warm shower, reading calming material, or just making a ritual of pre-bed preparation can provide a good routine);
.6 Make the sleep environment conducive to sleep (a dark, quiet and cool environment, sources of blue light eliminated and a comfortable bed
encourages sleep). A white noise generator or ear plugs can be used if you can sleep with them.

7. Block out as much light as possible. This might involve the use of blackout curtains, roller shutters, heavy blinds, or an inexpensive option such as black plastic. A sleep mask can also be used.

10. Satisfy any other physiological needs before trying to sleep (e.g., if hungry or thirsty before bed, eat or drink lightly to avoid being kept awake by digestive activity and always visit the toilet before trying to sleep).

12. Consider relaxation techniques may help (such as meditation) and yoga, which can also be of great help if learnt properly.

13. Avoid alcohol, caffeine and other stimulants prior to sleep (keep in mind that coffee, tea, colas, chocolate, and some medications, including cold remedies and aspirin contain alcohol and/or caffeine). Avoid caffeine at least four hours before bedtime.

14. Do not nap during the day if you have difficulty sleeping during your normal sleep period.

15. Limit the use of personal electronic devices prior to bedtime.

Maintaining fitness for duty Guidelines on maintaining performance

55. Ensuring you that seafarers are fit for duty and able to maintain safe levels of alertness and performance is important. Taking responsibility for your duty schedules and rest periods and providing feedback to your supervisors, management level seafarers officers and the company is important to ensure that you seafarers are provided with the best possible opportunity to maintain fitness for duty.

56. In some cases, monitoring and assessing your level of individual fatigue, in particular prior to your going on duty, schedule can be helpful as a feedback loop and for assessing the results of efforts to manage the risk of fatigue at sea, in ensuring you are able to perform tasks safely. There are a number of methods and tools that can be used to assess fatigue levels how you feel prior to and during your duty periods (see Appendix 5 and 6). This can be done through: self-monitoring (Appendix 5.4 – Subjective Fatigue and Sleepiness Ratings), and fatigue assessment (Appendix 6.5 – Fatigue Self-Assessment Tool). These tools can also be used as a discussion point prior to duty hand-over. It is important to report (to your supervisors and/or management level seafarers officers) any instances in which you feel that safety could have been or will be compromised due to fatigue impairment in either yourself or your peers. This is important as it provides a way of defending the vessel against threats to safety, and forms an integral part of fatigue risk management (FRM).

57. Some ships may have systems in place to monitor and assess seafarer sleep and fitness for duty. It is important that you seafarers contribute to this process. This information provides an indicator to the management level officers and the company of fatigue levels.

58. Here are some general guidelines that may help you seafarers maintain performance fitness for duty:

1. Get sufficient sleep, especially before a period when you expect that time for adequate sleep will not be available.

2. Ensure continuous periods of sleep.

9. The seafarer should review their maintenance records and report actual of your daily hours of work and rest for accuracy. Apart from being This is a regulatory
requirement and these may assist with managing the risk of fatigue; also provide an indicator on whether your workload is manageable by maintaining individual records of hours rested or worked;

8. **Report any fatigue impairment in yourself and others that could have or may have the potential of effecting ship safety.**

3. **Take strategic naps** (the most effective length of time for a nap is about 20 minutes);

4. **Take short breaks** when scheduled **short breaks are assigned**;

5. **Develop and maintain good sleep habits**, e.g. develop a pre-sleep routine.

6. **Whenever possible, monitor and effectively manage your sleep** (can use Appendix 3);

7. **Whenever possible, maintain and monitor fitness for duty including medical fitness** (can use Appendix 4 and Appendix 5);

8. **Report any fatigue impairment in yourself and others that could have or may have the potential of effecting ship safety**;

9. **The seafarer should review the Maintain a Records and report actual of your daily hours of work and rest for accuracy. Apart from being this is a regulatory requirement and these may assist with managing the risk of fatigue, also provide an indicator on whether your workload is manageable by maintaining individual records of hours rested or worked;**

10. **Eat regular, well-balanced meals and exercise regularly**; and **Try and avoid eating right before sleeping. Try and exercise regularly**

11. **Limit the use of seasickness medication** (if you are using medication inform your shipboard supervisor should be informed).

**Strategies that provide short term relief**

59. **The most powerful means of relieving fatigue is to get proper sleep and to rest when appropriate. However, A number of countermeasures strategies have been identified as potentially providing some short term relief in managing fatigue. It must be emphasized that these countermeasures strategies will not restore an individual's state of alertness; they only provide short-term relief, and may in fact, simply mask the symptoms temporarily.** At some stage, **sufficient adequate sleep must be obtained for physical and mental recovery to occur.** The following list captures some of these management strategies short-term countermeasures:

1. **Short rest breaks within duty periods.**

   Rest, apart from sleep, can be provided in the form of **Short breaks** or changes in activities during the **long duty periods** can benefit performance. **Rest pauses** or **Short breaks** **are indispensable** may be helpful as a physical requirement if performance is to be maintained over long periods of time. For example, whilst on watch or conducting demanding physical work activities, taking 5-10 minutes break to have a cup of tea or a snack when it is safe to do to reduces the risk of fatigue. **Factors influencing the need for rest are the length and intensity of the activities prior to a break or a change in activity, the length of the break, or the nature or change of the new activity.** The practical issues in a shipboard environment are it is recognised, that in a shipboard environment this may not always be feasible, however as much as possible short breaks should be planned into the duty period.
.2 Strategic napping

Whilst voluntary napping on duty is generally unacceptable, a short sleep or nap whilst off duty can provide a powerful boost to alertness. Research has identified strategic napping as a short-term relief technique to help maintain performance levels during long periods of wakefulness or if sufficient longer sleep is occasionally missed. Naps as short as 10 to 15 minutes are known to deliver measurable benefits. The most effective length of time for a nap is about 20 minutes. Naps are helpful in maintaining performance if sufficient longer sleep is occasionally missed. The most effective length of time for a nap is about 20 minutes. It is recommended that you take naps are taken in the way that you believe best suits you each individual seafarer. Napping should be encouraged to be a planned activity of fatigue management and prevention. This means that if you a seafarer have the opportunity to nap you it should be taken. However voluntary napping during duty periods is not acceptable.

However, seafarers need to be aware that naps there are some drawbacks associated with napping. One potential drawback is longer than 30 minutes will cause sleep inertia where situational awareness is impaired (grogginess and/or disorientation) for up to 20 minutes after waking. A second is that the nap may disrupt later sleeping periods (you may not be tired when time comes for an extended period of sleep).

.3 Caffeine Food and consumption of chemicals

Another popular fatigue countermeasure is the strategic use of caffeine (encountered in coffee and tea, some energy drinks, and to a lesser extent in colas and chocolate) as a stimulant. Caffeine can improve alertness temporarily but it is not a substitute for adequate sleep and rest. It takes caffeine 15-30 minutes to take effect and caffeine levels drop by half every 5-6 hours. Its effects can last long after consumption and may interfere with needed sleep. It is important to consider however, that there are individual differences in terms of how the effects of caffeine, tolerance and withdrawal develop. If possible, Caffeine should be avoided before bedtime. In addition, However regular usage over time reduces its value as a stimulant and may make you a seafarer more tired and less able to sleep. Caffeine consumption can also cause other side effects such as hypertension, headaches, mood swings and anxiety.

What strategies can be used to help mitigate the effects of fatigue?

Interest or opportunity

An interesting challenge, an exciting idea, a change in work routine or anything else that is new and different may help to keep you awake. If the job is boring or monotonous, alertness fades.

.4 Nutrition and Hydration

Adequate nutrition and hydration is also important for managing and preventing fatigue. To be as alert and awake as possible, you a seafarer needs to monitor your fluid intake. The recommended daily intake of water is two litres or eight glasses. Ideally, one should have a balanced diet, eat regularly, have healthy snacks, eat breakfast, plan meals, and drink water regularly and avoid late night meals (which result in slower digestion). The recommended daily
intake of water is two litres or eight glasses. To be as alert and awake as possible, you need to monitor your fluid intake.

.5 Environment (light, temperature, humidity, and sound, and aroma)
Bright lights, cool dry air, obtrusive or loud music or other annoying irregular sounds may temporarily increase alertness. Refer to module 2 for more information.

.6 Muscular Physical activity
Physical well-being has a number of key components: notably exercise, diet, hydration, and sleep. Any type of physical activity helps to keep you seafarers alert; running, walking and stretching or even chewing gum can stimulate anyone’s level of alertness. Exercise can also improve sleep. Proper physical self-care results in a range of positive outcomes including reserves of energy during the duty period, consistent and restful sleep patterns, proper concentration spans and a satisfying sense of feeling healthy. The benefits of regular exercise include improved mood, improved ability to cope with better stress, coping, and enhanced self-esteem and well-being. All of these benefits assist in managing fatigue.

.7 Social Interaction
Social interaction (conversation) can help you seafarers stay awake. However, the interaction must be active to be effective.

.8 Job Rotation
Changing the order of activities where personnel are assigned tasks that include variety in the nature of tasks can be beneficial in breaking up job monotony. Mixing tasks requiring high physical or mental work with low-demand tasks can be beneficial.

An important consideration is that when feelings of fatigue levels are high, seafarers may try to reduce the likelihood of fatigue-related errors by using some of the methods as mentioned in this Module control fatigue engage in individual fatigue countermeasures (such as walking around, using caffeine or stimulants, etc.) to reduce the likelihood of fatigue-related errors. However, there may be circumstances when instances that high levels of fatigue cannot be mitigated controlled by individual methods countermeasures. Hence, prompt, consistent, and appropriate action is required (by the management level seafarers officers through company support) whenever a crewmember is potentially not fit for duty. This may include the need for additional actions (such as task rotation, additional supporting resources, etc.) for managing the risk of fatigue-related risks. The aim should be to maintain and promote safety.

What can seafarers do to maintain their responsibilities in managing the risk of fatigue management on ships?

As highlighted in Section 3, there are many factors contributing to fatigue that are unfortunately beyond the individual seafarers’ control a single person’s ability to influence, such as voyage scheduling, cargo operations, ship design, and work scheduling which can affect the quality and quantity of sleep. Therefore, the particular nature of fatigue as a safety hazard makes managing shipboard fatigue and associated risks the shared responsibility of the company (as the employer) and the seafarer (as the employee). Both
must be aware of the risks involved, especially the impact of various types of duty and work schedules.

62 Seafarer responsibilities include:

.5 Being aware of fatigue and how to counter its effects;
.2 Monitoring and effectively managing hours of sleep;
.6 Using available rest periods appropriately, in addition to using personal fatigue mitigation management strategies;
.3 Reporting fatigue related hazards events that affect safety in accordance with the ship's safety management system;
.4 Maintaining appropriate communication about safety; and
.1 Make best effort to commence Commencing their duty schedule in a fit state to work the expected duty length and capable of performing assigned shipboard work safely;
.2 Monitoring and effectively managing hours of sleep.
.3 Reporting fatigue related hazards that affect safety in accordance with the ship's safety management system;
.4 Maintaining appropriate communication about safety;
.5 Being aware of fatigue and how to counter its effects; and
.6 Using available rest periods appropriately, in addition to using personal fatigue mitigation management strategies.

63 Seafarers should monitor and seek appropriate treatment for their health and general well-being, as physical health can impact on fatigue. Health and well-being is affected by short-term (acute) and (chronic) long-term many things including physical and mental health conditions, genetic predispositions, nutrition, hydration and sleep difficulties. A wide range of sleep difficulties can affect fatigue, circadian functions, sleep duration and sleep quality. This includes a diversity of sleep disorders as indicated in Module 1. Hence, when managing fatigue, seafarers are responsible to should monitor and manage report any health concerns that may impact on their fitness for duty.

64 Module 2 provides recommended strategies for the company, to manage the risks of fatigue at sea. Some important aspects related to company responsibility include:

.1 Developing policies and practices within the ship’s safety management system to manage fatigue related risks;
.2 Developing work schedules that prevent high levels of fatigue during duty periods;
.3 Developing work schedules that allow for adequate rest and recovery periods between duty schedules (if possible allow for an anchor sleep period of 7 to 8 hours);
.4 Implementing appropriate and safe duty/watch periods taking into account circadian effects;
.5 Providing an adequate sleep environment on the ship;
.6 Ensuring all crew are trained and aware of the causes and consequences of fatigue;
.7 Promoting a safety reporting culture and open communication; and
.8 Continuously assessing, controlling, monitoring and evaluating fatigue-related hazards.

65 What can management level seafarers officers do be done to help reduce and manage the risk of seafarer fatigue on board ships?

66 The following provides a recommended list of important fatigue management strategies. Steps such as the following are important for managing in controlling and reducing the prevention risk of fatigue on board ships, and may be are within the management level seafarers’ officers’ ability to influence and/or implement:

.1 Ensuring compliance with maritime regulations (minimum hours of rest and/or maximum hours of work);
.2 Using rested personnel to cover for those traveling long hours to join the ship and whom are expected scheduled to go on watch duty as soon as they arrive on board (e.g. allowing proper time to overcome fatigue—and become familiarized with the ship);
.3 Are aware of and promote the implementation of the Company’s fatigue management policies; impressing upon shore management the importance and benefits of addressing fatigue management and countermeasures in the context of the company’s Safety Management System (as required by the International Safety Management Code) and highlighted in Module 2;
.4 Managing the amount of time seafarers need to spend performing sustained physically and mentally demanding work (tank cleaning, navigation through congested waters, etc.);
.5 Setting standards and policies to allowing time for communication at watch/duty handovers;
.6 Ensuring Providing nutritious food options are served on-board and crew have continuous access to drinking water;
.7 Providing nighttime personnel with appropriate healthy meal options choices;
.8 Impress upon shore management the importance of maintaining constant interaction between shore management and the ship management with respect to fatigue awareness and preventive control measures on-board the ships;
.9 Encourage and facilitate reporting on sleep issues, fatigue and fatigue-related events that affect shipboard health and safety. Creating an open communication environment, by making it clear to the where crew can report that it is important to inform supervisors when fatigue is impairing their performance or that of others and ensuring that there will be no without recriminations for such reports;
.10 Ensuring that selected seafarers can do the job for which they are assigned to prevent the potential for fatigue in other crew members;
.11 Improving shipboard conditions to ensure that when there is an opportunity to sleep, crew members can take advantage of it without interruptions, e.g. by scheduling drills and routine maintenance functions in a manner that minimizes the disturbance of rest/sleep periods. All relevant crew should be aware of these protected sleep opportunities;
.12 Establishing on-board management techniques when scheduling shipboard work and rest periods and when scheduling watchkeeping work practices and assignment of duties in a more efficient manner (using, where appropriate, IMO and ILO recommended formats — “Model Format for Table of Shipboard Working Arrangements” and “Model Format for Records of Hours of Work or Hours of Rest of Seafarers”);

.13 Assigning work by mixing up tasks to break monotony and to combine work requiring high physical or mental demand with low-demand tasks (job rotation);

.14 Avoid scheduling potentially hazardous tasks during the circadian lows of the seafarers involved, when practicable;

.15 Providing Facilitating training and support for seafarers to recognize and deal with the effects of fatigue including onboard training if provided;

.16 Emphasizing the relationship seafarers’ responsibility to sleep during between work and rest periods to ensure that adequate rest sleep is received obtained;

.17 Encourage and facilitate reporting on sleep issues, fatigue and fatigue-related events that effect shipboard health and safety;

.18 Taking time to personally verify monitor that watchkeeping all personnel are getting adequate rest sleep;

.19 Ensuring that shipboard conditions, within the crew's ability to influence, are maintained in a good state (e.g. maintaining the heating, ventilation and air-conditioning on schedule, light bulbs are replaced, sources of unusual noise are taken care of at the first opportunity);

.20 Re-appraising traditional work patterns and areas of responsibility on board to establish the most efficient utilization of resources (such as sharing the long cargo operations between all the deck seafarers officers instead of the traditional pattern and utilizing rested personnel to cover for those who have travelled long hours to join the ship and who may be expected to go on watch as soon as they arrive);

.21 Promoting supportive relationships on board (good morale) and dealing with interpersonal conflict between seafarers. If there are instances of harassment and bullying, this may cause stress which can effect sleep. This should be appropriately managed;

.22 Establishing shipboard practices for dealing with fatigue incidents and learning from them (e.g. as part of the safety meetings); and

.23 Increasing awareness of the benefits of a healthy lifestyle (e.g. exercise, relaxation, proper nutrition). long term health care of appropriate lifestyle behavior (e.g. exercise, relaxation, nutrition, smoking and alcohol consumption)

What rules and regulations are in place to prevent and deal with help manage fatigue?

67 Each individual Flag Administration is responsible for the development, acceptance, implementation and enforcement of national and international legislation (conventions, codes, guidelines, etc.) that deal with the various fatigue aspects (Module 6): work hours, work scheduling, rest periods, crew competency and watchkeeping practices.

68 The following international organizations have issued various conventions and other mandatory instruments that address fatigue:

1. International Labor Organization (ILO)
   Convention Concerning Seafarers’ Hours of Work and the Manning of Ships – ILO Convention No. 180 \(^6\);

2. International Maritime Organization (IMO)
   - International Safety Management Code (ISM Code); and various guidelines/recommendations.
   - IMO Resolution A.1047(27) Principles of Minimum Safe Manning

3. International Labor Organization (ILO)
   - Maritime Labor Convention (MLC), 2006 (Regulations, Standards and Guidelines)

69. In addition to the international standards, company and flag administration policies, which may be more stringent in some cases, should be followed on board all ships.

How does fatigue relate to these ILO and IMO instruments?

70. The following ILO instruments contain guidance on fatigue related aspects:

1. Convention No. 180
   This convention introduces provisions to establish limits on seafarers’ maximum working hours or minimum rest periods so as to maintain safe ship operations and minimize fatigue. The text from the Convention is provided in the Appendix.

2. Other Conventions
   Other ILO Conventions related to fatigue include the following convention numbers: 92, 133, 140, 141 and 147. Each introduces minimum habitability requirements (e.g. noise control and air conditioning) on board ships.
The following IMO instruments contain guidance on fatigue-related aspects:

1. **ISM Code**
   This Code introduces safety management requirements on shipowners to ensure that conditions, activities, and tasks (both ashore and afloat) that affect safety and environmental protection are planned, organized, executed, and verified in accordance with company requirements. The fatigue-related requirements include:
   - manning of ships with qualified and medically fit personnel;
   - familiarization and training for shipboard personnel; and
   - issuance of necessary support to ensure that the shipmaster's duties can be adequately performed.

2. **STCW Convention and STCW Code**
   The STCW Convention requires that Administrations, for the purpose of preventing fatigue, establish and enforce rest period requirements for watchkeeping personnel. In addition, the Convention sets minimum periods and frequencies of rest. Part A of the Code requires posting of the watch schedules. Part B of the Code recommends that record keeping is useful as a means of promoting compliance with the rest requirements.

3. **Resolution A.772(18)**
   - Fatigue Factors in Manning and Safety
   This Resolution provides a general description of fatigue and identifies the factors of ship operations which may contribute to fatigue.

Other Instruments
The Appendix contains a list of IMO instruments identified as having some applicability to crew fatigue.
References


