

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. It is recommended that all seafarers become familiar with Module 1 (Fatigue - Causes and Consequences) first. Management level officers (master and officers) should also become familiar with Module 2 (Fatigue and the Company).

2 As highlighted in Module 2, the responsibility for managing fatigue risks and minimizing the risk to safety is a shared responsibility between the company (as your employer) and yourself (as the employee). The company is primarily responsible for creating a work and living environment that minimizes fatigue-related risks. You are responsible for ensuring that time available for rest and sleep is used appropriately and your behaviour does not create or increase risk.

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 which means that at some point you are likely to experience fatigue [1-3]. Fatigue affects all individuals, regardless of skill, rank, knowledge or training.

4 As highlighted in Module 1, 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 be made worse by one or a combination of factors. These include, ship operational factors (work schedules, workload), adverse environmental conditions (noise, 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.

6 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 recovery from fatigue and for maintaining alertness and performance. Sleep loss and sleepiness can degrade every aspect of a person's performance, mental, physical and behavioral. Studies found the effect of sleep debt to be comparable to alcohol impairment, in terms of negatively impacting performance [4, 5].

7 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.

8 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 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 sleep. Times when fatigue risk levels are particularly high are:

- .1 When working during the circadian low;
- .2 When regular short breaks have not been taken;
- .3 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. Learning a new job and/or getting to know a new ship and crew is often challenging. Some individuals may find they do not sleep well during the first week on a new ship. This is especially worse if they are suffering from jet lag.

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

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, your ~~and therefore human~~ performance can be is 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.

10 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~~ lists these 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. You may recognize some of these signs and symptoms in others (with time, you may learn to identify some within yourself).~~

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
- Lapses of attention
- Misjudges distance, speed, time, etc.
- Forgets to complete a task or part of a task
- 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 switch selection)
- Speech difficulties (it may be slurred, slowed or garbled)
- Increased frequency of dropping objects like tools or parts
- Insomnia

3 Behavioral

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

12 Long-term effects of sleep loss may lead to cardiovascular diseases, gastrointestinal diseases, mental health problems and stress [6, 7].

13 The more of the signs and symptoms you experience the more likely it is that alertness is significantly reduced. It is important that you notify your supervisor (or management level officers) when you recognize that you or other crewmembers are fatigued. It is important to have open communication between you and your supervisor regarding fatigue prevention and detection. Your company's fatigue risk management (FRM) processes should allow for open communication and reporting between you and your supervisor (or management level officers) regarding fatigue prevention and detection.

TABLE 4
EFFECTS OF FATIGUE

PERFORMANCE IMPAIRMENT	SIGNS/SYMPTOMS
4 Inability to concentrate	<input type="checkbox"/> Unable to organize a series of activities <input type="checkbox"/> Preoccupied with a single task <input type="checkbox"/> Focuses on a trivial problem, neglecting more important ones <input type="checkbox"/> Reverts to old but ineffective habits
2 Diminished decision-making ability	<input type="checkbox"/> Misjudges distance, speed, time, etc. <input type="checkbox"/> Fails to appreciate the gravity of the situation <input type="checkbox"/> Overlooks items that should be included <input type="checkbox"/> Chooses risky options
3 Poor memory	<input type="checkbox"/> Fails to remember the sequence of task or task elements <input type="checkbox"/> Difficulty remembering events or procedures
4 Slow response	<input type="checkbox"/> Responds slowly (if at all) to normal, abnormal or emergency situations

5	Loss of bodily control	<input type="checkbox"/> May appear to be drunk <input type="checkbox"/> Inability to stay awake <input type="checkbox"/> Affected speech e.g. it may be slurred, slowed or garbled <input type="checkbox"/> Feeling heaviness in the arms and legs <input type="checkbox"/> Decreased ability to exert force while lifting, pushing or pulling
6	Mood change	<input type="checkbox"/> Quieter, less talkative than usual <input type="checkbox"/> Unusually irritable <input type="checkbox"/> Increased intolerance and anti-social behavior <input type="checkbox"/> Depression
7	Attitude change	<input type="checkbox"/> Fails to anticipate danger <input type="checkbox"/> Fails to observe and obey warning signs <input type="checkbox"/> Seems unaware of own poor performance <input type="checkbox"/> Too willing to take risks <input type="checkbox"/> Ignores normal checks and procedures <input type="checkbox"/> Displays a "don't care" attitude

14 — 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?

15 — Fatigue may be caused and/or made worse by one or a combination of things:
Lack of sleep

16 — 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)

17 — Poor quality of sleep

18 — 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)

19 — Insufficient rest time between work periods

~~20 — 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)~~

~~21 — Poor quality of rest~~

~~22 — 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.~~

~~23 — Stress~~

~~24 — 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.~~

~~25 — Boring and repetitive work~~

~~26 — 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.~~

~~27 — Noise or vibration~~

~~28 — Noise or vibration can affect your ability to sleep/rest, and it can affect your level of physical stress, thus causing fatigue.~~

~~29 — Ship movement~~

~~30 — 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 causes 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 work load~~

~~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
Poor quality and disrupted sleep patterns

43 — Higher frequency of cardiovascular, respiratory or digestive disorders
44 — Increased risk of infection
Loss of appetite

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

45 Obtain adequate sleep Issues

.1 The most effective strategy to fight fatigue is to ensure that you 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 you with an adequate sleep opportunity for recovery. In order to be effective in satisfying your body's need, sleep must meet three criteria, and include:

- Quantity Duration
- Quality; and
- Continuity.

46 — Duration

.1 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.

47 Sleep is most valuable if obtained in a single block. A short sleep or nap can provide a powerful boost to alertness. However, it is important to know that napping does not eliminate the need for sleep.

.1 Continuity

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

.1 Quality

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

50 There could be instances in which you may not obtain adequate sleep, even though you 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 simply be unable to sleep during the day;

- .2 your sleep may have been interrupted by colleagues, unexpected events or operational demands (role-dependent);
- .3 you may suffer from a sleep disorder, or other medical or physical problem that keeps you awake;
- .4 emotional stress due to family problems at home;
- .5 inability to get to sleep due to concerns about work or other worries;
- .6 the sleeping environment (comfort, noise, darkness, ship motion, privacy) may not allow for adequate sleep;
- .7 the type of food consumed;
- .8 medication or use of prescribed/over the counter/natural remedies;
- .9 consumption of stimulants (i.e. caffeine, amphetamines, alcohol);
- .10 use of personal electronic devices before sleep, which may delay the onset of sleep and not allow adequate sleep to be obtained;
- .11 social activities or high arousal just before your sleep period, and inability to sleep.

51 Regardless of the circumstances causing insufficient or poor quality sleep, these should preferably be identified through proactive 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.

52 The company should have processes in place (Module 2) to provide you the opportunity to report back situations when you 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 your supervisor, management level 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 sleep. Appendix 3 provides an example of a simple subjective sleep diary that can be used. Objective measures such as activity monitor watches (see Module 2) can also be used to monitor sleep.

53 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.

54 Here is Below is some general guidance on developing good sleep habits:

- .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).
- ~~.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).~~

- .4 Get sufficient sleep, especially before a period when you expect 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.
- .5 Avoid stimulating activities prior to sleep such as exercise, television and movies, etc.
- .6 Make the sleep environment conducive to sleep (a dark, quiet and cool environment, and a comfortable bed encourages sleep).
- .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.
- .8 Whenever possible, ensure that you give yourself enough time in bed for plenty of sleep.
- .9 As much as possible, try and ensure you ~~that you will have no~~ are not interrupted during your ~~extended~~ period of sleep.
- ~~.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).~~
- .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). Avoid caffeine at least ~~six~~ four hours before bedtime.
- ~~.12 Consider r~~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 bed time.

Maintain fitness for duty ~~Guidelines on maintaining performance~~

55 Ensuring you 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 supervisor, management level officers and the company is important to ensure that you are provided with the best possible opportunity to maintain fitness for duty.

56 In some cases, monitoring and assessing your level of fatigue prior to your duty schedule can be helpful in ensuring you are able to perform tasks safely. There are a number of tools that can be used to assess how you feel prior to and during your duty period. This can be done through: self-monitoring (Appendix 4 - Subjective Fatigue and Sleepiness Ratings), and fatigue assessment (Appendix 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 supervisor and/or management level 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 contribute to this process. This information provides an indicator to the management level officers and the company of fatigue levels.

58 Here Below are some general guidance lines that can help you 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.~~
- .3 Take strategic naps (the most effective length of time for a nap is about 20 minutes);
- .4 Take 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 Record and report actual hours of work and rest. Apart from being a regulatory requirement, these provide an indicator on whether your workload is manageable by maintaining individual records of hours rested or worked;
- .10 Eat regular, well-balanced meals. 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).

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, 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 duty period. Rest pauses or breaks are indispensable may be helpful as a physical requirement if performance is to be maintained over long periods of time. 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. 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

A short sleep or nap 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. Naps as short as 10 to 15 minutes are known to deliver measurable benefits. 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 in the way that you believe best suits you. Napping should be encouraged to be a planned activity of fatigue management and prevention. This means that if you have the opportunity to nap you should take it. However, there are some drawbacks associated with napping. One potential drawback is that naps longer than 30 minutes will cause sleep inertia.

~~However, there are some drawbacks associated with napping. One potential drawback is that naps 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. Caffeine should be avoided before bedtime. In addition, ~~However~~ regular usage over time reduces its value as a stimulant and may make you 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. Ideally, one should have a balanced diet, eat regularly, have healthy snacks, eat breakfast, plan meals, 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.

.6 Muscular activity

Physical well-being has a number of key components: notably exercise, diet, hydration, and sleep. Any type of activity helps to keep you alert; running, walking, stretching or even chewing gum can stimulate your 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, better stress coping, and enhanced self-esteem and well-being.

.7 Social Interaction

Social interaction (conversation) can help you 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.

60 An important consideration is that when feelings of fatigue are high, seafarers may 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 instances that high levels of fatigue cannot be mitigated by individual countermeasures. Hence, prompt, consistent, and appropriate action is required (by the management level 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 fatigue related risks. The aim should be to maintain and promote safety.

What are the seafarer responsibilities in fatigue risk management on ships?

61 As highlighted in section 3, there are a number of ~~steps~~-measures that can be taken to manage and reduce the risk of fatigue. Many of the measures ~~that reduce fatigue~~ are unfortunately beyond a single person's ability to influence, such as voyage scheduling, ship design, and work scheduling which can all 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:

- .1 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 effect 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 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 includes short-term (acute) and chronic 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 monitor and manage 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 officers do ~~be done~~ to 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~~ in controlling and reducing the ~~prevention~~ risk of fatigue on board ships, and are within the management level 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 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 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 allow time for communication at watch/duty handovers;
- .6 Ensuring nutritious food options are served on-board and crew have continuous access to drinking water;
- .7 Providing nighttime personnel with appropriate meal choices;
- ~~.8 Impressing upon shore management the importance of the~~ Maintain constant interaction between shore management and the ship management with respect to fatigue awareness and preventive measures on board the ships;
- .9 Creating an open communication environment, by making it clear to the crew that it is important to inform supervisors when fatigue is impairing their performance or that of others and ensuring that there will be no recriminations for such reports;
- .10 Ensure 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 Provide 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 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;
 - .22 Establishing shipboard practices for dealing with fatigue incidents and learning from them (e.g. as part of the safety meetings);
 - .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 Organisation (ILO)
Convention Concerning Seafarers' Hours of Work and the Manning of Ships — ILO Convention No.180⁶;~~
- .2 International Maritime Organization (IMO)
 - International Convention on Standards of Training Certification and Watchkeeping for Seafarers, 1978, as amended in 1995 (STCW Convention) (STCW Convention)⁷; ~~Seafarer's Training, Certification and Watchkeeping Code (STCW Code) Parts A8 and B9;~~
 - 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.~~

~~6~~ Not yet in force.
~~7~~ Mandatory instrument.
~~8~~ Mandatory instrument.
~~9~~ Recommendatory guidance.
~~10~~ Mandatory instrument.

71 — 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)¹¹ — 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.~~

72 — Other Instruments

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

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