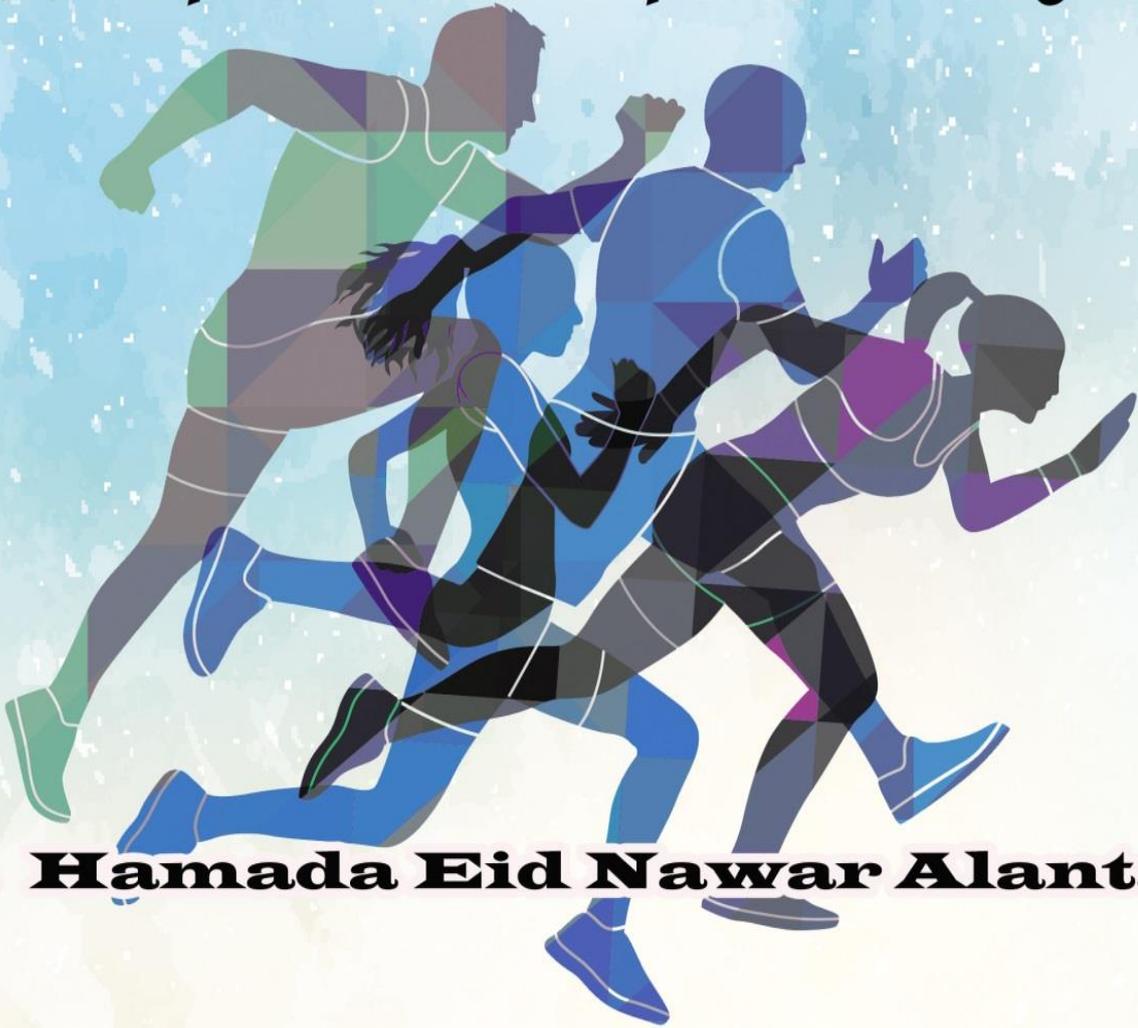


***NEW VISION OF SPORTS SCIENCE TO STUDENTS OF  
MARITIME TRANSPORT AND TECHNOLOGY COLLEGE***



**DR. Hamada Eid Nawar Alantably**



**New Vision of Sports Science to Students  
of Maritime Transport and Technology  
College**

Prepared by

**DR. HAMADA EID ALANTABLY**

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## INTRODUCTION

Health and physical fitness have a vital role in the life of Seafarers from time immemorial. The progress of the Nation lies in the hands of the people, who are healthy and physically fit. Every individual should develop physical fitness for a happy and effective living. In order to get physical fitness, one has to involve in physical activities. They have been acclaimed for health and recreation throughout the ages. They provided fun, enjoyment, youthful exuberance and elderly care. Physical activity and movements are as old as human existence. They played numerous roles from struggle of existence to that of excellence.

A sport is an activity in people's lives in which they pursuit different movements through a complete investigation of Neuro-muscular co-ordination. In this modern era, we can see that every individual has a relationship with sports directly or indirectly. Modern Physical Education is commonly known as sports where disciplined pursuits are freely formed such as biological, social and physical sciences. Over decades, the society in general has realized the need for keeping fitness and health through organized physical activity programmes. A clear scientific evidence has approved that real benefits would not exist unless a person engages himself in organized vigorous physical activity programmes.

Many researchers who strongly support regular exercises help one to have a strong and healthy body and prevent cardio vascular diseases. For a physically healthy person, a heart beats at a lower rate, and pumps more blood per pulse at rest. As a result of regular exercises and

individual's capacity to use oxygen which is increased systematically, energy production depends on internal chemical or metabolic change.

Health, Fitness and performance are poorly correlated phenomena. Health is generally defined as a freedom from disease, fitness strictly related to a person's ability to meet the demands of his environment and excellence in performance.

So we present this book to students of maritime transport and technology in order to be a new vision for sports science, and to establish a qualified concept of sports for life and for all shipping seafarers.

## CHAPTER 1

### THE CONCEPT OF SPORT AND PHYSICAL EDUCATION

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### THE CONCEPT OF SPORT AND PHYSICAL EDUCATION

#### Historical Review

Physical activities were always a part of human leisure activities. Those that held first place among primitive people were activities of warlike nature and of hunting. In time of peace, dance and recreational pastimes took place. The ancient Greeks admired the beauty of human body, and the Romans loved military and gladiatorial games and professional exhibitions. Middle Ages were famous for their knight tournaments and religious festivals.

#### What Does Sports Mean Nowadays?

**Definition of sports**, as in the dictionary, is an outdoor or indoor game, competition, or activity needing physical effort and skill, and usually carried on according to rules. Some people say that a sport is a physical activity governed by rules, and played by individuals seeking to perform opponents, while others can understand sport as organized spontaneous exercises or games, or as a competitive or non-competitive process through which an individual obtains physical skills, mental relaxation and bodily fitness. On the one hand, a sport gives people enjoyment, happiness, friendship, satisfaction, health, fitness, popularity, recognition, the feeling of victory and success. On the other hand, it may be boring and cause sadness, sorrow, disappointment, fatigue, exhaustion, injuries, illness, and in some cases, even death.

## **Meaning and Importance of Physical Education**

The primary aim of physical education is physical fitness of the individual. It is a process through which an individual obtain optimal, physical, mental and social skills and fitness. Physical education is meaningful and worthwhile experience obtained through participation in physical activities that are physically wholesome mentally and satisfying socially. Physical education is necessary because it will benefit health and satisfy the mind to keep a social leadership training. It is a must for youngster like students who like to have mental stimulation and satisfaction. There has been a keen awareness of the need for physical fitness on a nationwide basis.

## **Education and Physical Education**

Education is “the manifestation of perfection already in the man.” It draws out the best in a man through his mind and spirit. It is said that “Body and mind should be driven like a pair of horses hitched to a shaft”. Physical education is an educational process that aims at the improvement of human performance through the medium of physical activities selection to realize this outcome. Physical education includes the acquisition and refinement of motor skills. It also reflects the development and maintenance of fitness for optimal health and the attainment of knowledge and growth of positive attitude towards physical activity.

The education is taking place in three learning domains, cognitive, affective and psychomotor. Physical education contributes social needs which influence the objective of education within a society. Recent years have been marked by calls for educational reform, specially

revitalization and strengthening of educational process. The nature of educational reform that are being implemented may have consequences on the conduct of physical educational programmes in schools and colleges.

### **Why is Physical Activity Important?**

- Decrease risk of disease
- Feel great physically
- Look better
- Sleep well
- Live longer—up to five years (according to the American Journal of Preventative Medicine)
- Keep in shape so you can enjoy leisure activities
- Avoid injury and safely perform work and home chores
- Increase mental and social wellbeing
- Feel better about yourself
- Reduce the chance of becoming depressed
- Get around better
- Have stronger muscles and bones
- Achieve or maintain a healthy weight
- Be with friends or meet new people
- Have fun.

### **Why is Exercise Important?**

#### **1-Prevent Disease**

Our bodies were meant to move; they actually crave exercise. It helps to prevent diseases. Regular exercise is necessary for physical

fitness and good health. It reduces the risk of heart disease, cancer, high blood pressure, diabetes and other diseases. It can improve your appearance, and delay the aging process.

## **2-Improves Stamina**

When you exercise, your body uses energy to keep going. Aerobic exercise involves continuous and rhythmic physical motion, such as walking and bicycling. It improves your stamina by training your body to become more efficient, and uses less energy for the same amount of work. As your conditioning level improves, your heart rate and breathing rate return to resting levels much sooner from strenuous activity.

## **3-Strengthens and Tones**

Exercising with weights and other forms of resistance training develops your muscles, bones and ligaments and increases strength and endurance. Your posture can be improved, and your muscles become more firm and toned. You not only feel better, but you look better, too.

## **4-Enhances Flexibility**

Stretching exercises are also important for good posture. They keep your body limber so that you can bend, reach and twist. Improving your flexibility through exercise reduces the chance of injury and improves balance and coordination. If you have stiff, tense areas such as the upper back or neck, performing specific stretches can help to "loose" those muscles, helping you to feel more relaxed.

## **5-Controls Weight**

Exercise is also a key to weight control because it burns calories. If you burn off more calories than you take in, you lose weight. It's as simple as that.

## **6-Improves Quality of Life**

Once you begin to exercise regularly, you will discover many more reasons why exercise is so important to improve the quality of your life. Exercise reduces stress, lifts moods, and helps you to sleep better. It can keep you looking and feeling younger throughout your entire life.

## **How Often Should I Exercise?**

The benefits of any exercise program will diminish if it's disrupted too frequently. A "stop-start" routine is not only ineffective, but can cause injuries. Being consistent with exercise, therefore, is probably the most important factor in achieving desired results. People often assume that more is better. Wrong! Doing too much too soon or performing intense exercises on a daily basis will have deleterious effects, such as muscle/tendon strains, loss of lean tissue, and fitness-level plateaus.

## **Cardio**

If you are a beginner, start off slower than you think you should. Three days per week is realistic, safe and effective. If you are experienced, do cardiovascular (aerobic) exercises such as walking, jogging and bicycling for no more than 200 minutes per week with no more than 60 minutes per session.

## **Lifting Weights**

Weight training should be done no more than three times per week to beat on the same muscle groups. Exercise these groups on non-consecutive days because muscles need an adequate time to recover, and cannot be effectively trained if they are tired or sore.

## **Stretching**

Many people forget to stretch or make the excuse that they don't have the time. Flexibility is important, so make the time! Stretching can be done every day, but stick to a minimum of three times per week in order to reap the benefits. When the body is warmed up, such as after a workout session, perform five to 10 stretches that target the major muscle groups. Hold each stretch for 10-30 seconds.

## **Improve Your Mental Health and Mood**

Regular physical activity keeps your thinking, learning, and judgment skills sharp as you age. It can also reduce your risk of depression and may help you sleep better. Research has shown that doing aerobics or a mix of aerobic and muscle-strengthening activities 3 to 5 times a week for 30 to 60 minutes can give you mental health benefits. Another scientific evidence has also shown that even lower levels of physical activity can be beneficial.

## **Physical activity boosts mental wellness.**

Regular physical activity can relieve tension, anxiety, depression and anger. You may notice a “feel good sensation” immediately after your physical activity, and most people also note an improvement i

n general well-being over time as physical activity becomes a part of their routine. Mental benefits include: Improved confidence, relief of stress/tension and stress related to illness.

### **What are the mental health benefits of exercise?**

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Exercise is not just about aerobic capacity and muscle size. Sure, exercise can improve your physical health and your physiques, trim your waistline, improve your sex life, and even add years to your life. But that's not what motivates most people to stay active.

People who exercise regularly tend to do so because it gives them an enormous sense of well-being. They feel more energetic throughout the day, sleep better at night, have sharper memories, and feel more relaxed and positive about themselves and their lives. And it's also powerful medicine for many common mental health challenges.

### **Exercise and depression**

Studies show that exercise can treat mild to moderate depression as effectively as antidepressant medication—but without the side-effects, of course. In addition to relieving depression symptoms, research also shows that maintaining an exercise schedule can prevent you from relapsing. Exercise is a powerful depression fighter for several reasons. Most importantly, it promotes all kinds of changes in the brain, including neural growth, reduced inflammation, and new activity patterns that promote feelings of calm and well-being. It also releases endorphins, powerful chemicals in your brain that energize your spirits and make you feel good. Finally, exercise can also serve as a distraction, allowing you

to find some quiet time to break out of the cycle of negative thoughts that feed depression.

### **Exercise and anxiety**

Exercise is a natural and effective anti-anxiety treatment. It relieves tension and stress, boosts physical and mental energy, and enhances well-being through the release of endorphins. Anything that gets you moving can help, but you'll get a bigger benefit if you pay attention instead of zoning out. Try to notice the sensation of your feet hitting the ground, for example, or the rhythm of your breathing, or the feeling of the wind on your skin. By adding this mindfulness element—really focusing on your body and how it feels as you exercise—you'll not only improve your physical condition faster, but you may also be able to interrupt the flow of constant worries running through your head.

### **Exercise and stress**

Have you ever noticed how your body feels when you're under stress? Your muscles may be tense, especially in your face, neck, and shoulders, leaving you with back or neck pain, or painful headaches. You may feel tightness in your chest, a pounding pulse, or muscle cramps. You may also experience problems such as insomnia, heartburn, stomachache, diarrhea, or frequent urination. The worry and discomfort of all these physical symptoms can in turn lead to even more stress, creating a vicious cycle between your mind and body.

Exercising is an effective way to break this cycle. As well as releasing endorphins in the brain, physical activity helps to relax the

muscles and relieve tension in the body. Since the body and mind are so closely linked, when your body feels better, so will your mind.

### **Exercise and ADHD**

Exercising regularly is one of the easiest and most effective ways to reduce the symptoms of ADHD and improve concentration, motivation, memory, and mood. Physical activity immediately boosts the brain's dopamine, norepinephrine, and serotonin levels—all of which affect focus and attention. In this way, exercise works in much the same way as ADHD medications such as Ritalin and Adderall.

### **Exercise and PTSD and trauma**

Evidence suggests that by really focusing on your body and how it feels as you exercise, you can actually help your nervous system become “unstuck” and begin to move out of the immobilization stress response that characterizes PTSD or trauma. Instead of thinking about other things, pay close attention to the physical sensations in your joints and muscles, even your insides as your body moves. Exercises that involve cross movement and that engage both arms and legs—such as walking (especially in sand), running, swimming, weight training, or dancing—are some of your best choices. Outdoor activities like hiking, sailing, mountain biking, rock climbing, whitewater rafting, and skiing (downhill and cross-country) have also been shown to reduce the symptoms of PTSD.

### **Other mental and emotional benefits of exercise**

**Sharper memory and thinking.** The same endorphins that make you feel better also help you to concentrate and feel mentally sharp for tasks

at hand. Exercise also stimulates the growth of new brain cells, and helps prevent age-related decline.

**Higher self-esteem.** Regular activity is an investment in your mind, body, and soul. When it becomes habit, it can foster your sense of self-worth and make you feel strong and powerful. You'll feel better about your appearance and, by meeting even small exercise goals, you'll feel a sense of achievement.

**Better sleep.** Even short bursts of exercise in the morning or afternoon can help regulate your sleep patterns. If you prefer to exercise at night, relaxing exercises such as yoga or gentle stretching can help promote sleep.

**More energy.** Increasing your heart rate several times a week will give you more get-up-and-go. Start off with just a few minutes of exercise a day, and increase your workout as you feel more energized.

**Stronger resilience.** When faced with mental or emotional challenges in life, exercise can help you cope in a healthy way, instead of resorting to alcohol, drugs, or other negative behaviors that ultimately only make your symptoms worse. Regular exercise can also help boost your immune system and reduce the impact of stress.

**Physical activity improves physical wellness.**

### **Reduced Risk Factors**

Too much sitting and other sedentary activities can increase your risk of cardiovascular disease. One study showed that adults who watch more than 4 hours of television a day had a 46% increased risk of death

from any cause and an 80% increased risk of death from cardiovascular disease. Becoming more active can help lower your blood pressure and also boost your levels of good cholesterol.

### **Physical activity prolongs your optimal health.**

Without regular physical activity, the body slowly loses its strength, stamina and ability to function well. People who are physically active and at a healthy weight live about 7 years longer than those who are not active and are obese.

**In addition to the health benefits listed above, moderate exercise, like brisk walking, can have other health benefits such as:**

- Improves blood circulation, which reduces the risk of heart disease
- Keeps weight under control.
- Helps in the battle to quit smoking.
- Improves blood cholesterol levels.
- Prevents and manages high blood pressure.
- Prevents bone loss.
- Boosts energy level.
- Helps manage stress
- Releases tension.
- Promotes enthusiasm and optimism.
- Counters anxiety and depression.
- Helps you fall asleep faster and sleep more soundly.
- Improves self-image.
- Increases muscle strength, increasing the ability to do other physical activities.

- Provides a way to share an activity with family and friends.
- Reduces risk of developing CHD/CVD by 30-40 percent
- Reduces risk of a stroke by 20 percent in moderately active people and by 27 percent in those who are highly active
- Establishes good heart-healthy habits in children and counters the conditions (obesity, high blood pressure, poor cholesterol levels, poor lifestyle habits, etc.) that lead to heart attack and stroke later in life
- Helps delay or prevent chronic illnesses and diseases associated with aging and maintains quality of life and independence longer for senior
- losing weight
- improved posture
- improved body shape

### **Control Your Weight**

Looking to get to or stay at a healthy weight? Both diet and physical activity play a critical role in controlling your weight. You gain weight when the calories you burn, including those burned during activity, are less than the calories you eat or drink. For more information see our section on balancing calories (<https://www.cdc.gov/healthyweight/calories/index.htm>). When it comes to weight management, people vary greatly in how much physical activity they physical need. You may need to be more active than others to achieve or maintain a healthy weight.

**To maintain your weight:** Work your way up to 150 minutes of moderate-intensity aerobic activity, 75 minutes of vigorous-intensity aerobic activity, or an equivalent mix of the two each week. Strong

scientific evidence shows that physical activity can help you maintain your weight over time. However, the exact amount of physical activity needed to do this is not clear since it varies greatly from person to person. It's possible that you may need to do more than the equivalent of 150 minutes of moderate-intensity activity a week to maintain your weight.

**To lose weight and keep it off:** You will need a high amount of physical activity unless you also adjust your diet and reduce the amount of calories you're eating and drinking. Getting to and staying at a healthy weight requires both regular physical activity and a healthy eating plan. The CDC has some great tools and information about nutrition, physical activity and weight loss.

### **Reduce Your Risk of Cardiovascular Disease**

Heart disease and stroke are two of the leading causes of death in the United States. But following the Guidelines and getting at least 150 minutes a week (2 hours and 30 minutes) of moderate-intensity aerobic activity can put you at a lower risk for these diseases. You can reduce your risk even further with more physical activity. Regular physical activity can also lower your blood pressure and improve your cholesterol levels.

### **Reduce Your Risk of Type 2 Diabetes and Metabolic Syndrome**

Regular physical activity can reduce your risk of developing type 2 diabetes and metabolic syndrome. Metabolic syndrome is a condition in which you have some combination of too much fat around the waist, high blood pressure, low HDL cholesterol, high triglycerides, or high blood sugar. Research shows that lower rates of these conditions are seen

with 120 to 150 minutes (2 hours to 2 hours and 30 minutes) a week of at least moderate-intensity aerobic activity. And the more physical activity you do, the lower your risk will be.

**Already have type 2 diabetes?** Regular physical activity helps to control your blood glucose levels.

### **Reduce Your Risk of Some Cancers**

Being physically active lowers your risk for two types of cancer: colon and breast. Research shows that:

- Physically active people have a lower risk of colon cancer than do people who are not active.
- Physically active women have a lower risk of breast cancer than do people who are not active.

### **Reduce your risk of endometrial and lung cancer.**

Although the research is not yet final, some findings suggest that your risk of endometrial cancer and lung cancer may be lower if you get regular physical activity compared to people who are not active.

### **Improve your quality of life.**

If you are a cancer survivor, research shows that getting regular physical activity not only helps to give you a better quality of life, but also improves your physical fitness.

### **Strengthen Your Bones and Muscles**

As you age, it's important to protect your bones, joints and muscles. Not only do they support your body and help you move, but also keep bones, joints and muscles healthy. They help ensure that you're

able to do your daily activities and be physically active. Research shows that doing aerobics, muscle-strengthening and bone-strengthening physical activity of at least a moderately-intense level can slow the loss of bone density that comes with age.

**Hip fracture** is a serious health condition that can have life-changing negative effects, especially if you are an older adult. But research shows that people who do 120 to 300 minutes of at least moderate-intensive aerobic activity each week have a lower risk of hip fracture.

**Regular physical activity helps with arthritis** and other conditions affecting the joints. If you have arthritis, research shows that doing 130 to 150 (2 hours and 10 minutes to 2 hours and 30 minutes) a week of moderate-intensive, low-impact aerobic activity can not only improve your ability to manage pain and do everyday tasks, but it can also make your quality of life better.

### **Build strong, healthy muscles.**

Muscle-strengthening activities can help you increase or maintain your muscle mass and strength. Slowly increasing the amount of weight and number of repetitions you do will give you even more benefits, no matter your age.

### **Why promote physical activity at work?**

Staff ill health has cost implications for businesses through loss of production, early retirement, staff turnover and absenteeism (both through long term sick pay and the cost of temporary staff). Back pain is the most common cause of sickness absence from work in the UK, with an estimated 16 million people affected each year, at a cost to industry of

£5.7 billion each year. Meanwhile, evidence shows that physical activity can reduce a person's risk from suffering from back pain and can also aid recovery from back pain and other musculoskeletal disorders.

Work related stress, depression and anxiety form the second most common reasons for work related sickness absence, costing the UK economy between £3.7 and £7 billion each year. However, physical activity has been shown to have an anxiety-reducing effect; and single sessions of moderate intensity exercise have been shown to reduce short term reactions to stress and enhance recovery from stressors.

The 2003 paper, “Let's Make Scotland More Active: A Strategy for Physical Activity,” highlights the fact that “workplaces are an ideal setting to reach a large section of the adult population,” and further notes that "pressure of work" is one of the most common barriers to increasing physical activity. With time being scarce, the convenience of being active at and through work can be very attractive (Let's Make Scotland More Active: A Strategy for Physical Activity). Evidence suggests that physical activity can benefit an organization because active workforces tend to:

- Report less illness and recover more quickly from the illnesses they do get.
- Experience less work absence.
- Experience lower staff turnover.
- Be more productive.
- Have fewer industrial injuries.

- Report higher levels of satisfaction with their work.
- Create a positive corporate image.

According to *Physical Activity Task Force* (2003), physically active employees take 27% fewer days of sick leave. This equates to over two days improved attendance and a savings of £135 per employee.

### **What can employers do to promote physical activity?**

Employers can promote and encourage increased levels of activity in a number of ways. It is recommended that employers develop an organizational wide plan or policy to support employees to be more physically active. Suggestions on how to encourage employees to be more physically active include:

- Encouraging employees to walk, cycle or jog part of or all of the journey into work. This can be encouraged in a number of ways, such as by offering secure cycle parking, developing a travel plan and providing information on, and actively promoting, local walking and cycle routes.
- Allowing staff to work flexible hours that can accommodate physical activity, such as longer lunch breaks.
- Joining a corporate membership scheme with local leisure services and promoting this with staff.
- Encouraging participation in local and national events, such as sponsored walks and fun runs.

- Arranging a team gathering or corporate away day that involves some form of physical activity that most staff would be able to participate in, such as a short organizer led walk.
- Encouraging the use of stairs by displaying the *Healthy Working Lives* stair walking posters.
- Arranging a corporate challenge with prizes or incentives that involves physical activity. For example, assigning staff into teams to compete to see who can walk, jog, run, swim and cycle the most miles in a given time period.
- Providing staff with information on the benefits of physical activity and asking them what types of activities they would be interested in participating in.

## **Fitness Components**

### **Primary Components of Fitness:**

The four primary components (also known as the components of health related fitness) that are important to improved physical health are as follows:

- **Cardiorespiratory capacity** is the ability of the body to take in oxygen (respiration), deliver it to the cells (circulation), and use it at the cellular level to create energy (bioenergetics) for physical work (activity). In fitness, we also refer to cardiorespiratory capacity as aerobic capacity. This capacity includes aerobic endurance (how long), aerobic strength (how hard), and aerobic power (how fast). Some of the long-term adaptations of cardiorespiratory training are: decreased resting

heart rate, decreased risk of cardiovascular disease, improved endurance, increased stroke volume and cardiac output.

- **Muscular capacity** refers to the spectrum of muscular capability. This includes muscular endurance (i.e., the ability to apply force over a long period of time or to complete repeated muscle contractions); muscular strength (i.e., the ability to generate force, or the maximum amount of force that a muscle can exert in a single contraction); and muscular power (i.e., the ability to generate strength in an explosive way). Some of the long-term adaptations of improving muscular capacity are increased strength, improved muscular endurance, increased basal metabolic rate, improved joint strength, and overall posture.

- **Flexibility** is the range of movement or amount of motion that a joint is capable of performing. Each joint has a different amount of flexibility. Some of the long-term adaptations of improved flexibility are decreased risk of injury, improved range of motion, improved bodily movements, and improved posture.

- **Body composition** is the proportion of fat-free mass (muscle, bone, blood, organs, and fluids) to fat mass (adipose tissue deposited under the skin and around organs). Some of the long-term adaptations of improving body composition are decreased risk of cardiovascular disease, improved basal metabolic rate, improved bodily function, and improved BMI.

### **Secondary Components of Fitness**

The secondary components of fitness (also known as the components of performance based fitness) are involved in all physical activity and are necessary for daily functioning. Athletes experience

different levels of success depending on how well these secondary fitness components are developed. Although the primary components of fitness are thought to be the most important, we should not ignore the secondary components because of their importance in the completion of daily tasks. The secondary components include the following.

- **Balance** is the ability to maintain a specific body position in either a stationary or dynamic (moving) situation.
- **Coordination** is the ability to use all body parts together to produce smooth and fluid motion.
- **Agility** is the ability to change direction quickly.
- **Reaction time** is the time required to respond to a specific stimulus.
- **Speed** is the ability to move rapidly. Speed is also known as velocity (rate of motion).
- **Power** is the product of strength and speed. Power is also known as explosive strength.
- **Mental capability** is the ability to concentrate during exercise to improve training effects as well as the ability to relax and enjoy the psychological benefits of activity (endorphins).

### **Activity Guidelines**

Health Canada introduced Canada's *Physical Activity Guide to Healthy Active Living* to help Canadians make wise choices about physical activity as a way to improve health. Scientists say you should accumulate 60 minutes of physical activity every day to stay healthy or improve health. The recommendations in the Physical Activity Guide are as follows:

- **Endurance:** On 4 to 7 days a week, perform continuous activity for your heart, lungs, and circulatory system. Time required for improvements depends on effort.
- **Flexibility:** On 4 to 7 days a week, perform gentle reaching, bending, and stretching to keep muscles relaxed and joints mobile.
- **Strength:** On 2 to 4 days a week, perform resistance exercise to strengthen muscles and bones and improve posture.

The American College of Sports Medicine (ACSM) has also developed activity guidelines for improving health:

- Perform 30 minutes or more of moderate-intensity physical activity on most days of the week for cardiovascular health. The 30 minutes need not be continuous.
- Performing 1 set of 8 to 12 repetitions of resistance training for the entire body is necessary to maintain and develop muscular strength and endurance.
- Flexibility training should be performed daily, including stretches for all major muscle groups, in order to maintain mobility.

### **Cardio-Respiratory Capacity**

**Cardio-respiratory or aerobic fitness** refers to the ability of the heart-lung system to deliver O<sub>2</sub> to and remove CO<sub>2</sub> from the working skeletal muscles during prolonged exercise activities. The greater this ability, the higher the cardio-respiratory fitness level is. A low level of cardio-respiratory fitness is directly related to lack of exercise. Regular exercise is a significant factor in reducing the severity of cardiovascular disease. A regular exercise program leads to adaptive changes in the

system to yield a higher cardio-respiratory fitness level. To obtain an adaptive response of the cardio-respiratory system, demands must be made on the system that exceeds those normally encountered.

Most experts recommend consideration of four factors to achieve beneficial results from exercise:

- **The Type of Exercise:**

To provide improvements of the cardio-respiratory system, exercise must be rhythmical and continuous while providing an adequate, but not too great intensity. It must also be enjoyable for adherence; for examples, walking/jogging, running, bicycling, skiing, swimming, rope skipping, aerobics or music, like **Nia**, Nia, Nia.

- **Frequency of Exercise:** 3 times per week is the minimum required for improvement, 4 to 6 times per week will provide greater improvement.
- **Duration of each Exercise Session** is the amount of time during each exercise session that the appropriate intensity is continuously maintained. Minimum is 20 minutes per exercise session. Duration and intensity are dependent upon each other in order to achieve improvement. Duration needs to be increased if lower end intensity levels are chosen within the appropriate range.
- **Intensity of the Exercise** is the degree of difficulty. Intensity is the most critical component of the exercise prescription. Choose your desired intensity level according to the five Heart Rate Zones:
  - **Zone 1(the Healthy Heart Zone):** 50 to 60% of Maximum Heart Rate, appropriate for beginners, for recovery sessions for fitter

people, for after lay-off or injury, or when "not really feeling well". For example, easy walk or Nia.

- **Zone 2 (the Temperate Zone):** 60 to 70% of Maximum Heart Rate, moderate and comfortable exercise that burns a high percentage of fat, leads to gain of muscle mass and increase resting metabolism. It also leads to cardiovascular improvements such as increased size and number of blood vessels and increased size and strength of the heart, which results in higher blood volume pumped with each heartbeat, and an increased ability to deliver oxygen to the muscles. Endorphins ("Pleasure Hormones") are released, resulting in an euphoric feeling of after-exercise bliss. Exercise example: brisk walk, easy jog, Nia (more mellow, lyrical moves, slower music or smaller range of motion)
- **Zone 3 (the Aerobic Zone):** 70 to 80 % of Maximum Heart Rate, more intense, less comfortable exercise that requires more effort than above. Continues to burn a high percentage of fat, it leads to gain muscle mass and an increase in resting metabolism. It also leads to cardiovascular improvements such as increased size and number of blood vessels and increased size and strength of the heart, which results in higher blood volume pumped with each heartbeat, and an increased ability to deliver oxygen to the muscles. Endorphins are also released. Exercise example: Step aerobics class, Nia (more energetic, power moves, faster music or larger range of motion)
- **Zone 4 (the Anaerobic Zone):** 80 to 90% of Maximum Heart Rate, short spurts of very hard, vigorous exercise, improves tolerance to lactic acid, and is beneficial for high performance training. However, during anaerobic exercise, the muscles being exercised have

insufficient oxygen to meet the demands of the activity, and thus must also use alternate, non-oxygen-dependent and thus non-fat-burning processes to produce energy. Anaerobic exercise uses the phosphagen energy system (can provide maximal muscle power for 8 to 10 seconds) and the glycogen lactic acid system (provides 1.3 to 1.6 minutes of maximal muscle activity under optimal conditions, in addition to those 8 to 10 seconds provided by the phosphagen system). Exercise example: race pace, time trials

- **Zone 5 (the Redline Zone):** 90 to 100% of Maximum Heart Rate, no health benefits. Near max, near total exhaustion, for the extreme athlete who wishes for a near-death experience. Exercise example: Sprints to finish line in a race.

A number of methods have been developed to determine the appropriate intensity level. The heart rate reserve or Karvonen method of calculating your target heart rate or training zone is based on your maximal heart rate (MaxHR) and resting pulse (RHR), and considered relatively accurate. Easier calculated but less accurate is the method using only the age specific maximal heart rate. Other methods include the Borg Scale of Perceived Exertion. This method relies purely on your subjective feeling of how hard you think you are working. This is especially helpful when the other methods can't be used, e.g., when the exerciser has a condition that affects heart rate if he takes certain medication or fights a disease causing agent. With a little bit of practice, it is surprising how much this scale can correlate with the actual HR computed using one of the other methods. For heart rate, calculation during exercise in the water subtracts 13% or 17 beats per minute from the Target Heart Rate Zone calculated by above methods, as water

temperature, gravity, compression, partial pressure and the dive reflex affect (reduce) heart rate.

To figure out your target training zone, determine your true resting heart rate: Three mornings in a row, just after waking up (preferably without startling alarm) or before sitting up or standing up, take your resting pulse for one full minute. When counting beats, start with the first beat as zero: i.e., 0-1-2-3-4.... Add all of them together, and divide by 3 to get the average. For most healthy people, it should be somewhere around 60 beats per minute.

## **Training Programs**

Use the above notes to assist you in the preparation of a general strength training program, to develop your general strength, and a specific strength training program to develop your specific strength to meet to the demands of your event/sport. If weight training facilities is limited to your home and a set of dumbbells, it is still possible to construct a dumbbell weight training program. To monitor progress in training, you should conduct strength and muscle balance tests on a regular basis.

## **Which weight training exercises?**

The exercise must be specific to the type of strength required, and is therefore related to the particular demands of the event (specificity). The coach should have knowledge of the predominant types of muscular activity associated with the particular event, the movement pattern involved and the type of strength required. Exercises should be identified that will produce the desired development. Although specificity is

important, it is necessary in every schedule to include exercises of a general nature; e.g.

- Power Clean
- Power Snatch
- Bench Press
- Back Squats
- Deadlift
- Standing Shoulder Press (Military Press)
- Lat Pull downs
- Tricep Press
- Bicep Curls
- Lower Back Extensions
- Sit Ups
- Calf Raise
- Leg Curls
- Leg Extension
- Leg Press

These general exercises give a balanced development, and provide a strong base upon which highly specific exercise can be built.

## **CHAPTER – 2**

### **Health Care and Medical Fitness in The International Convention on Standards of Training, Certification and Watch keeping for Seafarers(STCW)**

## CHAPTER 2

### **Health Care and Medical Fitness in The International Convention on Standards of Training, Certification and Watch Keeping for Seafarers(STCW)**

#### **Introduction**

The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW)(1978), was adopted by the International Conference on Training and Certification of Seafarers on 7 July 1978. The 1978 STCW Convention entered into force on 28 April 1984. Since then three amendments thereto were adopted in 1991, 1994 and 1995.

The 1991 amendments relating to the global maritime distress and safety system (GMDSS) and conduct of trials were adopted by resolution MSC.21 (59), and entered into force on 1 December 1992. The 1994 amendments on special training requirements for personnel on tankers were adopted by resolution MSC.33 (63) and entered into force on 1 January 1996. The 1995 amendments were adopted by resolution 1 of the Conference of Parties to the International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW Conference), which was convened by the International Maritime Organization, and met at the Headquarters of the Organization from 26 June to 7 July 1995. Resolution 1 is Attachment 1 to the Final Act of the STCW Conference. By resolution 2, the STCW Conference also adopted the Seafarers' Training, Certification and Watch keeping (STCW) Code (attachment 2 to the Final Act) and resolutions 3 to 14

(attachment 3 to the Final Act). The STCW Conference did not consider for amendment the articles of the 1978 STCW Convention.

Resolution 2 of the STCW Conference and the STCW Code annexed thereto are contained in the latter part of this publication. The STCW Code contains, in:

- Part A, mandatory provisions to which specific reference is made in the annex to the STCW Convention and which give, in detail, the minimum standards required to be maintained by Parties in order to give full and complete effect to the provisions of the STCW Convention.
- Part B, recommended guidance to assist Parties to the STCW Convention and those involved in implementing, applying or enforcing its measures to give the STCW Convention full and complete effect in a uniform manner.

The 1997 amendments, relating to training of personnel on passenger and ro-ro passenger' Ships and the consequent renumbering of sections B-V (a, b and c were adopted by resolutions MSC.66 (68) and MSC.67(o8). These entered into force on 1 January 1999.

This part of the publication contains the text of

- The Final Act of the 1995 STCW Conference;
- The articles of the 1978 STCW Convention; resolution 1 of the 1995 STCW Conference and the annexed 1995 amendments, which completely replace the annex to the 1978 STCW Convention. The 1991 and 1994 amendments thereto; resolutions 3 to 14 of the STCW Conference; and the 1997 amendments.

The footnotes to the text of the regulations of the STCW Convention, which have been added by the IMO Secretariat, do not form part of that Convention. They have been inserted for ease of reference. The IMO Secretariat has been instructed to update these references as and when appropriate. In all cases the reader must make use of the latest editions of the referenced texts, bearing in mind that such texts may have been revised or superseded by updated material since publication of this consolidated edition of the STCW Convention and STCW Conference resolutions.

### **Fitness for duty**

- (1) The system of watches aboard a ship shall be so arranged and duties so organized that:
  - (a) The efficiency of all personnel with watch keeping duties is not impaired by fatigue.
  - (b) The first watch at the commencement of a voyage and subsequent relieving watches are sufficiently rested and otherwise fit for duty.
- (2) The owner and master of a ship shall establish and implement procedures in respect of the ship's crew taking into account, the requirement in regulation 17(1), to ensure that all crew are fit for duty when keeping a watch.
- (3) The crew of a ship shall ensure, taking into account the requirement in regulation 17(2), that they fit for duty at all times when keeping a watch.

## **Fatigue**

- (1) When the owner or the master establishes and implements procedures for ensuring a seafarer's fitness for duty, he shall take into account that:
  - (a) The level of alertness of a person keeping a navigational or engine room watch may be affected by fatigue; and
  - (b) Whenever alertness is affected by fatigue, performance can be impaired.
- (2) When considering his or her fitness for duty, a seafarer shall take into account:
  - (a) the signs, symptoms, and effects of fatigue;
  - (b) that fatigue affects alertness; and
  - (c) that the performance of any person whose alertness is affected by fatigue can be impaired.

## **PART 8—MEDICAL STANDARDS**

Purpose and application of Part 8:

- (1) This Part makes provision for medical standards required for seafarers serving aboard ships registered or licensed in Fiji and for citizens of Fiji who are employed aboard any ship and apply to:
  - (a) Recognized medical practitioner responsible for assessing medical fitness and recognized optometrist responsible for assessing eye and color vision test;
  - (b) Persons responsible for the recruitment and employment of seafarers;
  - (c) Owners and masters of ships registered or licensed in Fiji;
  - (d) Seafarers required by Part 6 to hold a certificate and any other persons serving aboard Fiji ships;

- (e) Seafarers required by the Convention and the STCW Code to hold a certificate who are citizens of Fiji serving on any ship;
  - (f) Persons required by these Regulations to maintain registers and records pertaining to seafarers and their certificates.
- (3) The vision and hearing requirements of these Regulations apply to seafarers who are employed in any capacity for which a certificate as a master, mate, chief engineer, engineer or watch keeper is required by Part 6.

### **Standards**

- (1) The standards of medical fitness for seafarers required by Regulation 1/9 of the Convention are as set out in Schedule 8, and the ILO/IMO Guidelines on the medical examination of seafarers as amended and IMO Guidelines STCW.7/Circ.19 of 9 January, 2013 as amended.
- (2) Only a registered medical practitioner recognized by the Chief Executive Officer shall conduct medical examinations and issue Certificates of Medical Fitness to seafarers pursuant to Regulation 1/9 of the Convention.
- (3) A list of registered medical practitioners recognized by the Chief Executive Officer shall be maintained by the Authority, and made available to other Parties to the Convention, to ship owners, operators and seafarers.
- (4) Only registered optometrists recognized by the Chief Executive Officer shall conduct eye and colour vision examinations, and certify that the seafarer's eyesight and colour vision meet the standards in Part 3 of Schedule 8, pursuant to Regulation 1/9 of the Convention.
- (5) A list of registered optometrists recognized by the Chief Executive Officer shall be maintained by the Authority and made available to

other Parties of the Convention and to ship owners, operators and seafarers.

- (6) Every person who is required to use spectacles or contact lenses to perform his or her duties shall have a spare pair of spectacles or contact lenses conveniently available aboard ship.
- (7) The eyes of every seafarer shall be free of disease, and any permanent or progressive debilitating pathology without recovery is regarded as the cause for the determination of unfitness.
- (8) Any information in respect of medical examinations shall be provided to the Authority for inclusion in the register kept by the Registrar.
- (9) A seafarer submitting to medical examination shall declare any existing medical pre-condition or illness that might be a determinant of unfitness for duty.

### **Approval of medical practitioners and optometrists**

- (1) Subject to such conditions as the Chief Executive Officer considers necessary, the Chief Executive Officer may approve a registered medical practitioner as a recognized medical practitioner for the purposes of this part, if the Chief Executive Officer is satisfied that the practitioner:
  - (a) has experience to determine whether a seafarer:
    - (i) meets the required medical standard; and
    - (ii) is fit for the duties to which the seafarer's certificate or license relates, or which the seafarer is to perform;
  - (b) is professionally independent from employers, seafarers, and employer and seafarer representatives;
  - (c) satisfies the requirements specified in this part in respect of the approval.

- (2) Subject to any such conditions that the Chief Executive Officer considers necessary, the Chief Executive Officer may approve a registered optometrist as a recognized optometrist for the purposes of this section if the Chief Executive Officer is satisfied that:
- (a) the optometrist has the knowledge and equipment necessary to conduct the tests required by this part;
  - (b) the requirements specified in this part have been complied with in respect of the approval.
- (3) An approval made under sub-regulation (1) or (2) is valid for 5 years from the date of approval.

### **Certificate of Medical Fitness**

- (1) Medical examinations required under this Part shall be carried out in accordance with this Part and the Medical Standards in Schedule 8.
- (2) The recognized medical practitioner shall set out in the Medical Fitness Examination Report, in Form No. 1 as prescribed in Schedule 9, his or her assessment of the seafarer's suitability as:
- (a) unfit for service at sea;
  - (b) fit for service at sea, with limitations; or
  - (c) fit for service at sea, without limitations.
- (4) The recognized medical practitioner who assesses a seafarer as fit for service at sea with limitations shall state those limitations on the seafarer's Certificate of Medical Fitness.
- (5) The recognized medical practitioner carrying out a medical examination of a seafarer shall:
- (a) Complete the applicable sections of the medical examination form that is acceptable to the Chief Executive Officer.

- (b) Take into consideration the guidance for the conduct of medical examinations outlined in Part 2 of Schedule 8.
  - (c) Comply with the instructions for conduct of medical examinations specified in Part 2 of Schedule 8.
  - (d) In the case of a seafarer engaged on a voyage in the unlimited area, take into consideration the guidance on vaccination requirements for seafarers outlined in Part 2 of Schedule 8; and examine whether specialized testing such as chest X-ray and STD is required.
  - (e) Judge whether specialized testing such as chest X-ray and STD is required.
  - (f) Determine whether the seafarer complies with the required medical standard outlined for that seafarer in this regulation.
- (6) When determining whether a seafarer satisfies the required medical standard, the recognized medical practitioner shall ensure that the seafarer's eyesight and colour vision meet the standard required for the seafarer in Part 3 of Schedule 8.
- (7) A recognized medical practitioner may, for the purposes of sub-regulation (5), accept an approved eye and vision test from a recognized optometrist that certifies that the seafarer's eyesight and colour vision meet the standards in Part 3 of Schedule 8.
- (8) Where a recognized medical practitioner finds that the seafarer needs to wear corrective lenses to meet any standard required by Part 3 and Part 4 of Schedule 8, the practitioner shall endorse the seafarer's Certificate of Medical Fitness to that effect.

## **Issue of Certificate of Medical Fitness**

On completion of a medical examination of a seafarer under these Regulations, a recognized medical practitioner shall issue a Certificate of Medical Fitness to the seafarer in Form No. 2 prescribed in Schedule 9.

## **Duration of certificates**

- (1) Except where a re-examination is required under regulation 62, and subject to sub-regulations (2) and (3), a Medical Fitness Certificate is valid:
  - (a) for a period of 1 year for seafarers under the age of 18 years; and
  - (b) for a period of two years for all other seafarers.
- (2) If appropriate, taking into account the state of health of the seafarer examined, a recognized medical practitioner may issue a Certificate of Medical Fitness that specifies a shorter period of validity than the period set out in sub-regulation (1) (a) and (b).
- (3) If the period of validity of a Certificate of Medical Fitness expires in the course of a voyage, then the medical certificate shall continue in force until the next port of call where a medical practitioner recognized by the Party is available, provided that the period shall not exceed three months.
- (4) A colour vision test is carried out at intervals of six years.

## **Re-examination**

- (1) The Chief Executive Officer may at any time require the re-examination of a seafarer:

- (a) if the Chief Executive Officer has reason to believe that a re-examination is desirable in order to protect the safety of the ship or of other seafarers onboard the ship;
  - (b) at the request of the seafarer's employer, if the employer has grounds to believe that the seafarer's state of health may constitute a risk to the safety of the ship or of other seafarers on board the ship;  
or
  - (c) at the request of the seafarer.
- (2) A re-examination under this regulation shall be conducted as if it were an original examination by a recognized medical practitioner nominated by the Chief Executive Officer.

### **Review of a Medical Fitness Certificate**

- (1) A seafarer may apply to the Chief Executive Officer for a review by a reviewing medical practitioner of a Certificate of Medical Fitness issued under this Part that indicates the seafarer is:
- (a) Unfit for service at sea; or
  - (b) Fit for service at sea with limitations.
- (2) The reviewing medical practitioner shall be a medical practitioner recognized by the Chief Executive Officer.
- (3) After reviewing a Certificate of Medical Fitness and the state of health of the seafarer to whom it was issued, the reviewing medical practitioner may direct that a further medical examination be carried out and may stipulate the examination and the medical practitioner or organization to carry it out.
- (4) The reviewing medical practitioner must:
- (a) confirm the Certificate of Medical Fitness originally issued; or

- (b) where appropriate, based on further examinations conducted pursuant to sub-regulation (3), issue a new Certificate of Medical Fitness in the form set out in Schedule 9.

### **Appeal of a reviewed Certificate of Medical Fitness**

- (1) A seafarer who has requested a review of a Certificate of Medical Fitness, may appeal to the Chief Executive Officer for a further review of the case by an appeal committee if the Certificate of Medical Fitness confirmed or issued by the reviewing medical practitioner indicates that the seafarer is:
- (a) unfit for service at sea; or
  - (b) fit for service at sea with limitations.
- (2) An application for a review by an appeals committee shall be accompanied by a review fee prescribed in Schedule 7.
- (3) On receipt of a request from a seafarer pursuant to sub-regulation (1), the Chief Executive Officer shall appoint an appeals committee consisting of:
- (a) a representative of the Chief Executive Officer;
  - (b) a representative proposed by the employer of the seafarer; and
  - (c) a representative proposed by the seafarer.
- (4) Every appeals committee shall be assisted in its deliberations by a recognized medical practitioner.
- (5) An appeals committee has the same power as a reviewing medical practitioner and may:
- (a) confirm the Certificate of Medical Fitness issued by the reviewing medical practitioner; or
  - (b) issue a new Certificate of Medical Fitness where appropriate in the form set out in Schedule 9.

- (6) An appeals committee shall record its decision and the reasons for it in writing, and send a copy of it to the Chief Executive Officer, to the seafarer and to the employer of the seafarer.

### **A Required Certificate of Medical Fitness**

- (1) A seafarer employed on a ship to which the Convention applies shall hold a valid Certificate of Medical Fitness if the seafarer:
- (a) is required to be on board by virtue of the ship's Safe Manning Certificate;
  - (b) has any responsibility on board relating to emergency procedures;
  - (c) has any watch keeping responsibilities; or
  - (d) has any duties relating to the normal operation of the ship.
- (2) A seafarer, who is employed on a ship engaged in trade in the unlimited area, shall hold a certificate that is acceptable to the Chief Executive Officer indicating the type, place, and date given of all vaccinations that the person has received.

### **Equivalent Certificates**

- (1) Subject to sub-regulation (2), a Certificate of Medical Fitness issued to a seafarer by or on behalf of a state that is a party to STCW Convention and that has an agreement with Fiji for recognition of certificates of competencies, may be recognized by the Chief Executive Officer as equivalent to the Certificate of Medical Fitness issued in Fiji.
- (2) A Certificate of Medical Fitness will only be accepted under sub-regulation (1) as equivalent to a Certificate of Medical Fitness issued under this Part during any period for which the certificate is expressed to remain in force, up to the maximum validity period

permitted under regulation 61(1), if such a medical certificate meets the medical standards prescribed in these Regulations.

### **Requirements to Wear and Carry Spectacles**

A seafarer to whom this regulation applies whose Certificate of Medical Fitness requires the use of spectacles or contact lenses shall :

- (a) wear the required spectacles or contact lenses while performing watch keeping duties; and
- (b) have a spare pair available on-board the ship.

### **Requirements to Produce a Certificate of Medical Fitness to the Chief Executive Officer or Master on request:**

A seafarer to whom these Regulations apply shall, when requested to do so by the Chief Executive Officer or the master of the vessel on which the seafarer is employed, produce his or her valid Certificate of Medical Fitness.

### **Seafarers on foreign ships:**

A seafarer on a foreign ship in a Fiji port that is:

- (a) a passenger ship engaged on an international voyage;
- (b) a non-passenger ship engaged on an international voyage; shall
  - (i) hold a valid Certificate of Medical Fitness issued by or on behalf of a state that is a party to STCW;
  - (ii) produce the Certificate of Medical Fitness to the Chief Executive Officer upon request.

## **Medical Standards for Seafarers being Examined for Certificates of Competency and Certificate of Medical Fitness**

1. The recognized medical practitioner must bear in mind that it is not possible to develop a comprehensive list of contra-indications but that this list may provide some guidance. It cannot replace sound medical judgment.
2. When determining fitness for sea service in the case of persons with medical problems, the recognized medical practitioner must consider:
  - (a) The critical time needed for treatment and the time to appropriate health care.
  - (b) The extent of the threat and danger caused by the medical problem to the patient, other persons on board and to the safety of the ship or the environment.
  - (c) The current risk of occurrence of the medical problem.
3. The recognized medical practitioner conducting a medical examination under Part 7 must ensure that the seafarer does not suffer from:
  - (i) An impairment that causes unpredictable loss of consciousness and that cannot be controlled through medication;
  - (ii) A disorder that could prevent the seafarer from reacting efficiently, while on watch, or in an emergency;
  - (iii) A condition that is likely to require emergency medical care and that cannot be controlled through medication;
  - (iv) High blood pressure, or high risk of stroke or heart attack;
  - (v) A condition that could endanger others, taking into account the confined living conditions on board ship, such as :
    - a. AIDS or other sexually transmitted disease;

- b. A communicable disease that could affect other seafarers coming into close contact;
  - (vi) Alcohol or drug addiction that could impair the seafarer's ability to carry out his or her duties as and when required;
  - (vii) An active psychiatric disorder,
  - (viii) The doctor should order a blood test if he or she suspects the seafarer has been in contact with a HIV positive person.
4. The recognized medical practitioner must ensure that the seafarer has—
- (i) adequate muscle strength to carry lift and carry a load of 18 kg;
  - (ii) the physical capacity to wear breathing apparatus and lifesaving equipment;
  - (iii) adequate vision and hearing and the agility and strength to perform the duties of firefighting, first-aid administration and ship abandonment in an emergency.
5. The recognized medical practitioner must ensure that a seafarer who performs the following duties meets the physical requirements set out in this regulation.
6. A medical examination conducted under Part 7 must conform to these medical standards.
7. Colour vision standards and procedures are those set out in Part 3 and Part 4 of this schedule.
8. Subject to the provisions contained in regulation 10.15 and Part 3 of this schedule, every seafarer before going to sea must:
- (a) Be in good health with normal blood pressure, or be on maintenance medication to maintain the blood pressure not to exceed 160/100;

- (b) Have vision of 20/20 or equivalent international vision criteria, correctable to 20/40 for deck applicants and 20/50 for engineer applicants;
  - (c) Have an unaided average threshold of hearing of 70 dB or less in each ear for deck applicants, or functional speech discrimination of at least 80 per cent at 55 dB binaural, and 40 dB or less for engineer applicants, or functional speech discrimination of at least 90 per cent at 55 dB binaural.
9. Deck applicants may have aided average of 40db or less or functional speech discrimination of 90 per cent at 55 dB binaural. Waivers may be granted in exceptional conditions for applicants who do not meet these criteria.
10. The medical conditions cited below are examples which might justify restrictions on time, position, trade area, type of ships, medical surveillance or render the applicant seafarer temporarily or permanently unfit.

### **10.1 Infectious and parasitic diseases**

- (a) Acquired Immune Deficiency Syndrome (AIDS)/Human Immunodeficiency Virus (HIV)
- (b) Hepatitis
- (c) Sexually transmitted diseases
- (d) Tuberculosis
- (e) Enteritis
- (f) Malaria
- (g) Any other infectious or parasitic disease in its communicable or carrier state which would present a health hazard to other crew members or passengers through casual contact.

## **10.2 Neoplasms**

- (a) Neoplasms of any type which could be considered to disqualify a seafarer from duty until evaluated. Exceptions may be appropriate for serving seafarers after treatment and without signs of recurrence.

## **10.3 Endocrine. Nutritional and Metabolic Conditions and Immunity Disorders**

- (a) Adrenal insufficiency
- (b) Diabetes mellitus, all cases requiring insulin
- (c) Immunosuppressive therapy
- (d) Obesity, incapacitating function
- (e) Thyroid disease

## **10.4 Diseases of the blood and blood forming organs**

- (a) There should be no diseases or abnormalities of the haemopoetic system or the circulating blood.

## **10.5 Mental disorders**

- (a) Consumption of alcohol which adversely affects the health of the seafarer or the safety of the ship
- (b) Use of psychotropic drugs which may affect the health of the seafarer or the safety of the ship
- (c) Psychosis
- (d) Psychoneurosis
- (e) Dementia
- (f) Personality disorder
- (g) State after mental disorder with tendency for recurrence

### **10.6 Conditions of the nervous system**

- (a) Organic diseases of the nervous system or disorders due to metabolic disease causing disturbance of muscular function, balance, co-ordination or alertness
- (b) Epilepsy
- (c) Migraine, frequent attacks causing incapacity
- (d) Syncope and other disturbances of the consciousness
- (e) Meniere's disease
- (f) Post-concussion syndrome

### **10.7 Conditions of the cardiovascular system**

- (a) The cardiovascular system should be free from diseases causing disability
- (b) Heart diseases
- (c) Vascular disease
- (d) Ischemic heart disease, angina pectoral history of coronary thrombosis or bypass grafting
- (e) Symptomatic abnormality of the rate of rhythm
- (f) dependence on pacemaker
- (g) Hypertension
- (h) Hypertension necessitating the use of antihypertensive drugs with side effects which adversely affect the seafarers' fitness
- (i) Arterial disease
- (j) history of intermittent claudication
- (k) aortic aneurysm
- (l) Cerebrovascular disease

- (m) History of cerebrovascular accident including transient ischemic attack
- (n) General cerebral arteriosclerosis including senility
- (o) Diseases of veins
- (p) Varicose veins, moderate to severe
- (q) Varicose ulcerations
- (r) Deep vein thrombosis or thrombophlebitis
- (s) Haemorrhoids, symptomatic
- (t) Varicocele, symptomatic

### **10.8 Conditions of the respiratory system**

**Any condition of the respiratory system- obstructive, restrictive or infectious– causing significant disability, for example;**

- (a) Bronchial asthma. Asthma requiring systematic oral corticosteroids disqualifies new candidates, but serving seafarers may be employed on board ships carrying a medical doctor
- (b) Pulmonary fibrosis
- (c) Gross deformity of the chest wall
- (d) Pneumothorax
- (e) Tumours

### **10.9 Oral health**

- (a) Infections of the mouth cavity or gums
- (b) Severe dental defects that interfere with proper mastication. Seafarers must be dentally fit

### **10.10 Conditions of the digestive system**

- (a) Peptic ulcer

- (b) History of gastro-intestinal bleeding/perforation
- (c) Recurrent appendicitis
- (d) Cholelithiasis, cholecystitis, cholangitis
- (e) Liver cirrhosis
- (f) Pancreatitis, recurrent
- (g) Intestinal stoma
- (h) Hepatitis
- (i) Perianal pathology

### **10.11 Conditions of the genito-urinary system**

- (a) Genito-urinary tract infections, specific and non-specific
- (b) Renal failure
- (c) Urinary tract obstructions
- (d) Prostatism
- (e) Removal of one kidney
- (f) Renal transplantation
- (g) Renal insufficiency, active
- (h) Urinary incontinence
- (i) Hydrocele, large, symptomatic
- (j) Gynaecological conditions likely to cause complications

### **10.12 Pregnancy**

The recognized medical practitioner should discuss with seafarers who become pregnant whether temporary restrictions to their medical certificates are appropriate or not.

### **10.13 Conditions of the Skin**

- (a) Infections of the skin, until satisfactorily treated

- (b) Eczema
- (c) Dermatoses
- (d) Manifestations of systemic disease (e.g. lupus, allergy)

#### **10.14 Conditions of the Musculoskeletal System**

Seafarers should have no defect of the musculoskeletal system that could interfere with the discharge of their duties (muscular power, balance, mobility and coordination should be unimpaired);

- (a) Osteoarthritis
- (b) Recurrent dislocation of a major joint
- (c) Symptomatic flat foot or halux valgus
- (d) A limb prosthesis would not be acceptable.

#### **10.15 Hearing**

- (a) Infectious or inflammatory ear conditions
- (b) Hearing capacity for experienced seafarers must be at least 30 dB (unaided) in the better ear and 40 dB (unaided) in the other ear within the frequencies 500, 1000, 2000, and 3000 Hz (speech and hearing distance 3 and 2 metres respectively). If there is any doubt about a candidate's hearing, a pure tone audio meter should be used.

#### **10.16 Eyes**

Progressive pathological conditions.

#### **10.17 Other**

- (a) Hernia
- (b) Severe speech impediment

- (c) Sleep disorders (especially insomnia, obstructive sleep apnoea, narcolepsy and periodic limb movement)

## **PART 2—CONDUCT OF MEDICAL EXAMINATIONS**

### **1.0 Guidance on conduct of the medical examinations**

#### **1.1 Pre-sea medical examination:**

A pre-sea medical examination provides an opportunity to prevent a person, for health reasons apparent at that time, from embarking on a seafaring career. It is therefore more stringent in nature than a periodic examination, bearing in mind that the objective is to head-off an unhealthy or unwise career choice. By its very nature this examination occurs only once and it is very important that the approved medical examiner conduct it thoroughly.

#### **1.2 Periodic medical examination:**

A periodic medical examination provides an opportunity to ensure that a seafarer remains fit for sea service by identifying medical conditions which may have developed since the seafarer entered the profession. It should be more flexible than the pre-sea examination, yet not so flexible as to permit unfit seafarers to work on ships.

Pre-sea and periodic medical examinations also provide the opportunity to take measures to correct or mitigate medical conditions which could adversely affect the seafarer's health.

## **2.0 Instructions on the Conduct of Medical Examinations:**

The following instructions are to standardize the medical examinations undertaken by all recognized medical practitioners.

- (a) The recognized medical practitioner must determine if the purpose of the examination is to determine if a person is fit for a seafaring career (pre-sea examination) or to determine if the person is fit to return to sea (periodic examination) and conduct the examination accordingly.
- (b) The identity of the person to be examined must be verified. The number of his or her passport or other relevant identity document that includes a photograph must be entered on the examination form.
- (c) The seafarer's intended position on board ship, and, as far as practicable, the physical and psychological requirements of this work must be established. This may lead to restrictions based on the nature of the voyage (for example, fit for inshore or sheltered waters service only) and the job to be held. Information on work history may be useful as it may lead to closer attention on potential occupational health hazards (for example, risk of cancer from certain chemical cargoes or risk of hearing loss from work in the engine room).
- (d) The seafarer's previous medical records, if available, must be reviewed.
- (e) Information must be collected directly from the seafarer on his or her previous medical history. Point-by-point questions on the details of previous diseases and injuries must be asked and the results recorded. Details on other diseases or injuries not covered must also be recorded. After the information is collected, the seafarer must sign the form to certify it is a true statement.

- (f) The seafarer's weight, height, pulse rate and blood pressure must be measured and recorded. The results of laboratory tests, ECG, chest X-ray and (if necessary) other examinations must be checked and recorded. In conducting pre-sea medical fitness examinations, a general analysis of blood is advisable.
- (g) Hearing, eyesight and colour vision must be checked and recorded.
- (h) The seafarer's vaccination record must be examined if appropriate. Advice must be given on immunizations taking into account the guidance in clause 3.0. If new vaccinations are given they must be recorded on the vaccination certificate required by regulation 3.0.
- (i) The results of the examination must be recorded and assessed to determine if the seafarer is fit for the work which will be undertaken. Part 1 contains guidance on medical conditions which must be taken into account when considering whether a person is fit or currently unfit for work at sea. The age and experience of the person to be examined, the nature of the duties to be performed and the type of shipping operation and cargo should be considered.
- (j) A Certificate of Medical Fitness must be issued stating whether the seafarer is considered medically fit or not. Any restrictions concerning work (i.e., the job the seafarer will perform) should be reflected in the description of the work he or she is fit to undertake.
- (k) If the seafarer is found temporarily or permanently unfit for service, he or she must be given an explanation of the reasons. If "temporarily unfit", advice should be given on the need to make additional tests, to obtain opinions from specialists, to complete dental or other treatment, rehabilitation and/or appropriate medical care. The seafarer should be informed when to return for another examination.

- (l) As appropriate, and if time permits, the seafarer should be counselled on life style (to limit alcohol intake, stop smoking, modify diet, lose weight, etc.), on the dangers and methods of prevention of malaria, hepatitis, HIV/AIDS and other communicable diseases. Printed health educational materials on drug and alcohol abuse prevention, smoking cessation, diet, communicable diseases prevention, and similar material should also be provided, if available.
- (m) The Medical Examination Form must be clearly marked “CONFIDENTIAL” and be retained for at least 10 years in the health establishment where the certificate of health was issued. The file should only be made available for medical purposes related to the performance of duties or the provision of medical care.
- (n) A copy of the completed and signed Medical Examination Form must be given to the seafarer, and the seafarer should be advised to bring it to the next medical examination or when he or she is treated for an illness or injury. If possible, a card indicating blood-type and other vital information should also be given to the seafarer to facilitate emergency treatment.
- (o) The serial number of the Certificate of Medical Fitness must be recorded, and the signed certificate must be given to the seafarer.

### **3. Guidance on Vaccination Requirements for Seafarers**

3.1 Seafarers should be vaccinated according to the requirements indicated :

- (a) in the World Health Organization publication International Travel and Health: Vaccination Requirements and Advice which is updated periodically; or
- (b) by the International Association of Medical Assistance to Travellers; or
- (c) by a recognized source similar to those listed in sub clauses 3.1 (a) and (b) that is acceptable to the Chief Executive Officer.

3.2 Seafarers must be issued with a vaccination certificate which prescribes the types of vaccination administered to the seafarer and the dates and time of vaccination.

## CHAPTER – 3

### Health and physical fitness

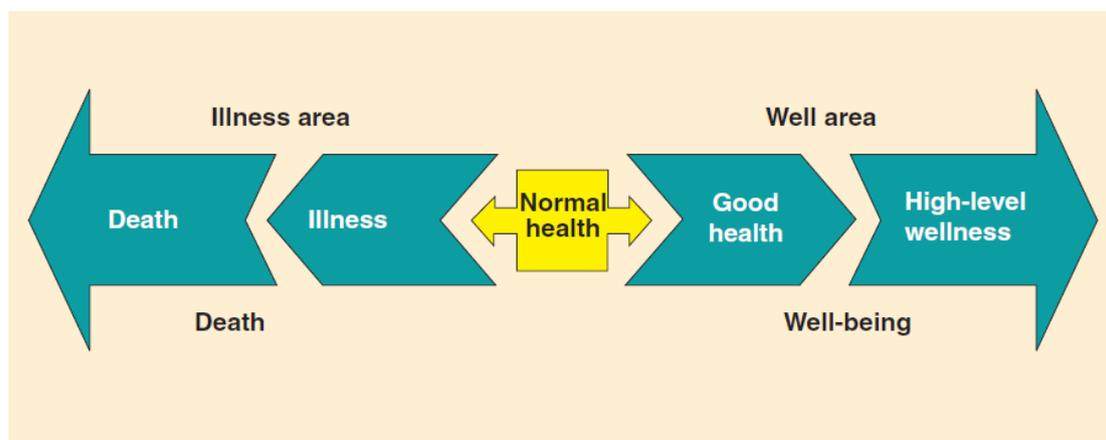
## CHAPTER 3

### Health and physical fitness

#### Meaning of Physical Fitness

Most authors define physical fitness as the capacity to carry out every day activities without excessive fatigue and with enough energy in reserve for emergencies. Emphatically this definition is inadequate for a modern way of life. By such a definition almost anyone can classify himself as physically fit. Physical fitness is the ability to carry out daily task with vigor and alertness without undue fatigue and ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies.

Fitness is a broad term denoting dynamic qualities that allow satisfying the needs regarding mental, emotional stability. Special consciousness, spiritual and oral fear and organic health are consistent with heredity. Physical fitness means that the organic system of the body is healthy and functions efficiently. Physical fitness implies efficient performance in exercises.



## **Importance of Physical Fitness**

Every individual must know the importance of physical fitness. In other words, one must have a fundamental knowledge of anatomy and physiology. This fundamental knowledge enables a person to understand physical fitness. It is the capacity of a person to function steadily and smoothly when a situation arises. It makes you feel mentally sharper, physically comfortable, and able to cope with the demands that everyday life makes upon you.

Increased physical fitness not only improves health, but also improves your performance at work. Its benefits are numerous. The person, who is physically fit, has greater amount of strength, energy and stamina. Fitness gives better protection from injury because strong well developed muscles safeguard bones, internal organs and joints.

It is necessary for every individual to be physically fit to perform their daily work with ease, and to take part in various activities effectively. Everyone should be fit enough through participation in physical activities to develop different physical fitness components.

## **The Need for Fitness Education**

Fitness is a state which characterizes the degree to which a person is able to function efficiently. Fitness is an individual matter. It implies the ability of each person to live most effectively within his potentialities. Physical activities help a man achieve high degree of physical conditioning. In schools, there is a compulsory physical activities programme for all boys and girls, so it would be interesting to find out which of the components have better physical fitness. There are

many physical fitness tests to evaluate the ability of the students to carry out daily tasks without undue fatigue.

### **Physical Exercise and Physical Fitness**

Exercise is the means to a vigorous and lengthy life. Inactivity will kill you. Many people say that exercise makes them feel better and more relaxed. A number of studies have shown that people improve psychologically as well as physically as a result of running programmes. There is a lot of circumstantial evidence to suggest that this relaxing effect is caused by the release of endorphin – morphine – like substances which occur naturally in the brain. Researchers say that if you make an investment in exercise, it makes you conscious of other reasonable health habits. Using or exerting body play refers to the resultant action or what the participants do during physical exertion. Games range from amusements or diversions to competition with significant outcomes governed by rules. Freedom from work or duties describes Leisure which may or may not be used for physical activity. Similarly, Recreation refers to and renews one's strength and spirits after toiling with or without activity. "Sport" encompasses all these diversions and physical activities that are done for pleasure and success.

### **Health Related Physical Fitness**

According to current thinking in the physical education profession, physical fitness is either health related or performance related. On keeping with wellness trend today and an emphasis on all aspects of healthful living in addition to stressing performance or motor skill related to fitness. This aspect of physical fitness concerns the development of qualities necessary to function efficiently, and maintains

a healthy life style. Each of the components of health related fitness gives cardio respiratory endurance, muscular strength, flexibility and body composition. Researchers say that health related physical fitness is concerned with the development of those qualities. They often protect against disease and frequently are associated with physical activity. Then health related physical fitness is important to everyone and should be stressed by physical educators.”

Spiraling health care costs. The benefit from participation in health and fitness activities has prompted many colleges, corporation and other organizations to establish programmes for their students and clients. They have found that such programmes promote good health, and also make economic sense, since poor health leads to illness, primitive death and absenteeism.

### **Performance related Physical Fitness**

Physical fitness is the total fundamental capacity of an individual to perform a given task. Researchers say that general physical fitness is the capacity of the body to perform work, to resist disease and infection and to resist physical stress imposed by such things as heat, cold, atmospheric pressure changes at high attitude or under water and the forces of jolts and vibrations”. Exercise is not always performed in a sport or training. When you paint your room or change a flat, you are exercising. These body changes influence your psychological function in every striking ways. If you eventually organize a realistic personal program of exercise, it is important that you understand these changes.

## **Components of Physical Fitness**

There is no single measure of physical fitness and no single way of achieving it. However, these are three major qualities which contribute to overall fitness, they are strength, stamina and flexibility. Researches show: “The achievement of total fitness depends upon combining these three main strands, strength, stamina and flexibility.” Total fitness refers to individual capacity to measure and live effectively in the environment. AAHPER fitness is a state which characterizes the degree and which the process is able to function. Fitness is an individual matter. It implies the ability of each person to live most effectively with potential ability to function and depend upon the physical, mental, emotional, and social and spiritual components of fitness, all of which are related to each other and are mutually independent. Researchers say that fitness means the development of components muscular strength, muscular endurance cardiovascular endurance and flexibility.”

### **Physical Fitness:**

Physical fitness is “the ability of an individual to live a full and balanced life. It involves physical, mental, emotional, social and spiritual factors and the capacity for their wholesome expression”. Physical fitness refers to practical performance of exercise that calls for a number of experiences. They are the feeling of happiness, confidence and self-satisfaction in the process of correct performance of movement, and unhappiness in the process of confusion and disappointment.

It is a positive quality, extending on a scale from death to “abundant life”. All living individuals have some degree of physical fitness which varies considerably in different people and in the same

person at different times. It is not as broad in its meaning as total fitness. It includes, adequate degree of health, posture, physique, proper functioning of vital organs, nutrition, and good health habits along with an adequate amount of endurance, strength, stamina and flexibility.

## **Fitness elements**

### **1. Strength**

Strength is the capacity of the whole body or of any of its parts to exert force. Muscular strength is the force that a muscle or group of muscles can exert against a resistance in one maximum effort. It is measured in units of pounds or kilograms.

### **2. Endurance**

Endurance is the capacity for protracted work, and is a measure of the ability to stave off fatigue. Endurance is the result of a physiologic capacity of the individual to sustain movement over a period of time.

### **3. Agility**

- Agility is the ability of the body or parts of the body to change directions rapidly and accurately. It is the ability to change directions rapidly and accurately.
- It depends essentially on strength, speed of reaction, coordination and movement, and big muscle coordination.
- Agility, like speed, is partially innate; yet, it can also be improved through practice. The acquisition of agility is very important to success in game activities requiring dodging, changing of direction, and quick starts and stops.

#### 4. Power

- Power is the capacity of the individual to bring into play maximum muscle contraction at the fastest rate of speed. Power is an explosive action, and is equal to the product of force times velocity, where force has to do with muscle strength and velocity with the speed with which strength is used in motor performance.
- Power is “A function of force and time ( $\text{Power} = \text{Work} / \text{Time}$ ) and is defined as the rate of performing work ( $\text{Work} = \text{Force} \times \text{distance}$ ). Since work is the product of force and distance over which the force is applied, power is that product divided by the time during which the force is applied.
- One’s ability to get his body mass moving in the shortest period of time is a measure of power. The physiologists refer to such events as being anaerobic (without oxygen); i.e., they are performed in such a short period of time that Oxygen is not required in producing the necessary energy.
- Power is the combination of strength with explosiveness (speed); maximum muscular force released at maximum speed. Power is a fundamental factor in jumping, throwing, kicking and striking, and is improved through increase in strength and practice.

#### 5. Speed

- Speed is the capacity of individual to perform successive movement of the same pattern at a fast rate.
- It is the rate at which a person can propel his body, or parts of his body through space. Speed is the ability to move from one place to another in the shortest possible time. It is primarily innate, yet it can

be improved through practice for technique and movement efficiency.

## **6. Cardio-Respiratory Endurance**

- Cardio-vascular endurance, also referred to as cardio-respiratory endurance and circulatory endurance, is a kind of physiological fitness demonstrated through an adjustment of the heart and lungs to prolonged physical exertion.
- It is the ability to carry on its functions efficiently under conditions of heavy work.
- It is the ability of the heart, lungs, and blood vessels to deliver essential nutrients, especially oxygen, to the working muscles, and to remove waste materials from the body.
- It is identified as the most important component in health-related fitness, cardio-vascular endurance is the ability of the heart, lungs and vascular system to function efficiently for an extended period of time. Directly related to this function is physical working capacity. A heart and circulatory system that function at a higher level, thus delivering more blood, are also making more O<sub>2</sub> available for working muscles. This process increases the child's ability to work at a greater intensity and over longer period of time without debilitating fatigue.

### **Clarification of Moderate Intensity Physical Activity**

Of all the factors contained within the FITT principle, intensity is probably the most difficult to measure. The physical activity guidelines for both adults and young people (the latter are detailed later) make

reference to the importance of exercise at least of moderate intensity. A person who is doing moderate intensity activity will usually feel:

- an increase in breathing rate, but conversation is still possible;
- an increase in heart rate, to the point where it should be easily felt at the wrist, neck or chest;
- a feeling of increased warmth, possibly accompanied by sweating on hot or humid days.

A moderate intensity activity can be continued for many minutes, and does not cause exhaustion or extreme fatigue in healthy individuals when continued for an extended period. It is important to understand that moderate intensity is relative to each individual's fitness level. For example, a fitter individual would need to perform activity at a higher absolute intensity than an unfit individual in order to feel the similar sensations of increased breathing, heart rate and temperature that are characteristics of moderate intensity activity.

### **Different Components of Physical Activity**

There are obviously many different types of physical activity that develop different aspects of physical fitness. The most important types of physical activity for health in children and adolescents are:

1. Activities involving cardiovascular (aerobic) work,
2. Activities involving strength and/or muscular endurance,
3. Activities involving flexibility, and
4. Activities involving coordination.

## 1. Cardiovascular (aerobic) activities:

Cardiovascular activities are also often called “cardio-respiratory” or “aerobic” activities because they require the body to transport oxygen using the heart and lungs. Cardiovascular endurance is the capacity of our body to perform tasks that require the use of large muscle groups usually for relatively prolonged periods of time (several minutes or more). With repeated endurance exercise, our hearts and lungs adapt to become more efficient at providing the working muscles with the oxygenated blood that they need to perform the task. One can improve one’s cardiovascular endurance using continuous activities such as walking, running, swimming, bicycling, paddling, dancing, etc. When one performs these kinds of activities, it is important to remember that:

- one must progress sensibly – if you have not done much of these kinds of activities before, you must start gradually with relatively low intensity and duration, and gradually build these up as you gain fitness.
- the activity chosen should be fun and easily accessible. This will improve the likelihood that you will stay with the activity and practice it regularly. If you do not enjoy the activity, it requires a lot of expensive equipment or you must travel a long way to do it, you will be less likely to stick with it
- Safety issues – these include issues such as wearing the relevant safety equipment (eg. helmet when riding a bike). In addition, one must be wary of high (vigorous) intensity activities where it may be necessary for the child or adolescent concerned (if they have a medical condition) to consult a doctor or exercise specialist prior to participation.

## 2. Muscular Strength and Endurance Activities:

Muscular strength is the capacity of muscle to generate tension and to overcome an opposing force. Muscle endurance is the capacity of a muscle to maintain its tension or its contractions for a prolonged period of time. These activities build and strengthen bones and muscles. We call upon muscle strength and endurance when we push, pull, lift or carry things like heavy shopping bags.

Muscular strength and endurance activities can be practiced:

- with one's own weight (rope skipping, climbing, push-ups, etc.)
- with the weight of a partner (wheelbarrow races, tug-of-war, wrestling with a friend, etc)
- or with activities like throwing a ball, paddling, rowing, weight lifting in a gymnasium, carrying things, etc.

When one does muscular strength and endurance activities, one must bear in mind the following:

- one must progress sensibly – if one is new to these kinds of activities, one must start slowly and with lighter resistance to avoid excessive muscle soreness and injuries
- For strength activities, it is not necessary to lift weights. There are plenty of activities that tax muscle strength without using weights. Examples include body weight activities such as push-ups, climbing, handstands, etc. Other very simple objects can also train muscle strength very well such as elastic tubing and bands, etc.

- Strength activities with excessive weight or resistance can be harmful during childhood as the body is developing and it is possible to damage growing cartilage and bones
- If one has any doubts, it is always a good idea to consult an expert such as a PE teacher, physical trainer, doctor, etc.

### **3. Flexibility activities:**

Flexibility is the ability of joints to move through a full range of motion. It is specific to specific body parts, and is a function of the type of joint(s) involved and the elasticity of the muscles and connective tissue (eg. tendons, ligaments) surrounding the joint(s). Flexibility is beneficial for all activities that involve bending, lunging, twisting, reaching and stretching. Some activities that improve flexibility are: gentle stretching of muscles, sports such as gymnastics and karate, yoga, Pilates, and any muscle strength or endurance activities that work a muscle through a full range of motion.

When you do flexibility activities, it is important to remember that:

- One must be patient. It takes time to see significant improvements in flexibility, often several weeks or sometimes months.
- One must never stretch to the point where you feel pain and movements. You should always be performed in a controlled manner without bouncing or jerkiness. You should NEVER push yourself to imitate someone else who is more flexible than you. This is asking for injury!
- You should stretch regularly (preferably several times a week or even daily). Reasons for this include the fact that you lose flexibility easily

if you do not continue to work out. Stretching regularly also assists in avoiding injury, and tends to decrease as you get older.

- It is a good idea to start flexibility exercises at a young age (as that is when we are most flexible) and to continue them for one's lifetime
- It is best to perform stretching when muscles and joints are warm and more pliable. Therefore, good times to stretch include after a warm-up, at the beginning of physical activity or after the physical activity is over as part of a cool-down. It is also important to know that flexibility is different between boys and girls (often superior in the latter), and also during the major growth phases of life. It is common to see large decreases in flexibility as the bones often grow faster than muscles and tendons.

#### **4. Coordination activities:**

+Motor coordination is the capacity to use the brain and nervous system together with the locomotors system to develop smooth and precise movements.

#### **Coordination activities include:**

- Balancing activities involving the body, such as walking on a beam or balancing on one leg;
- Rhythm activities, such as dancing to music;
- Activities involving kinesthetic awareness and spatial coordination, such as learning how to perform a somersault or learning a new dance move;
- Activities involving foot-eye coordination, e.g.; kicking or dribbling a ball as in football;

- Activities involving hand-eye, e.g.; racquet sports, throwing or catching a ball.

**Bear in mind the following points regarding coordination activities:**

- Be careful to avoid falls and other accidents as kids are often so engrossed in these activities. They lose awareness of their surroundings and other people in the vicinity.
- Coordination activities are excellent for motor development, especially in young children. And most children love them!
- The learning curve for these skills is different for each child – some learn faster than others.

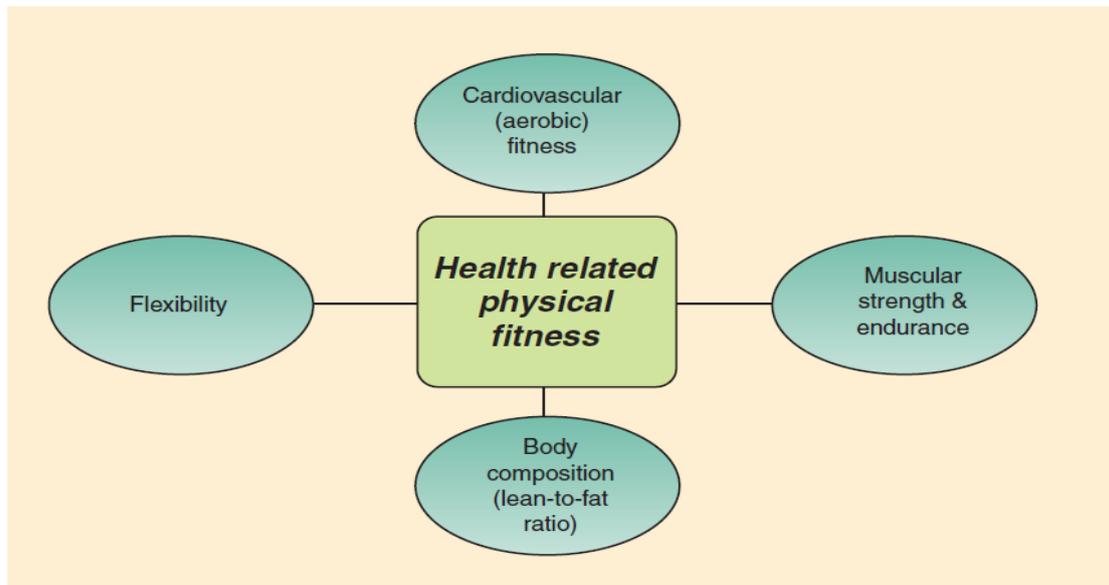
**Health-Related vs. Athletic Performance Physical Fitness**

It is important to make distinction between health-related physical fitness and athletic performance physical fitness. Health-related physical fitness refers specifically to those components of physical fitness associated with some aspects of good health and/or disease, and not necessarily sports performance. For example, good aerobic fitness and a relatively low amount of body fat are important components of health related physical fitness. In this situation, the individual may not have a high level of athletic performance physical fitness, but their favourable aerobic fitness and body fat confer a large amount of health-related fitness and protection against disease.

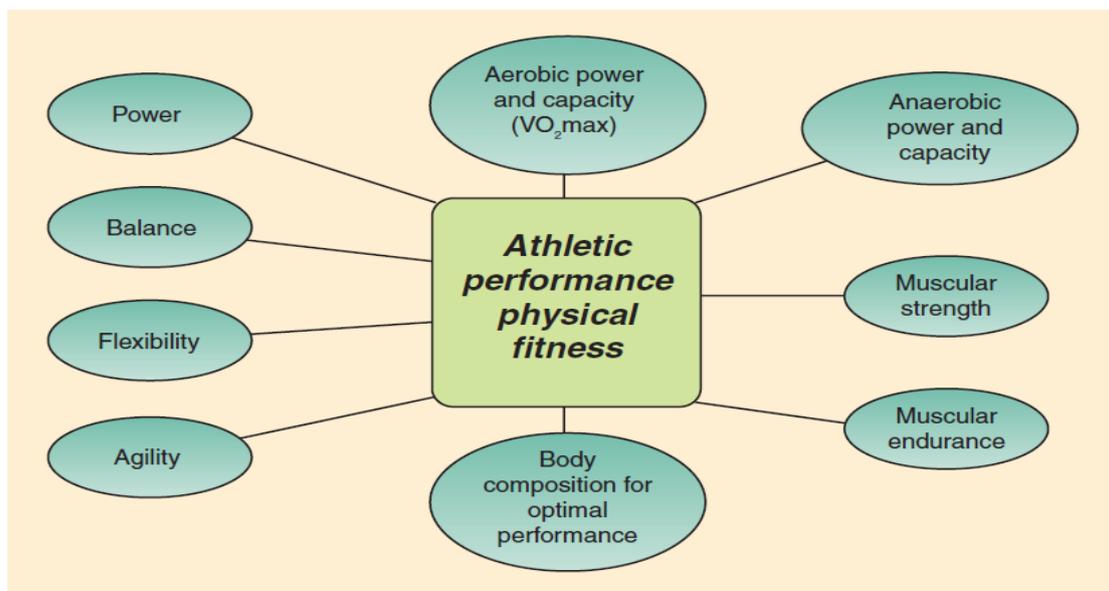
Athletic performance physical fitness is that portion of physical fitness directed towards optimizing performance in a certain sport. Each sport will require a balance of different facets of fitness for optimal performance. For example, gymnastics requires a high degree of agility

and flexibility whereas competitive long distance swimming requires a high degree of aerobic fitness. The adaptations within the body as a result of training for specific sports will almost always confer significant health benefits also for the athletes.

**Below Figures outlines some facets of health-related physical fitness and athletic performance physical fitness.**



**Aspects of health-related physical fitness.**



**Aspects of athletic performance physical fitness**

**If I want to maintain a fairly high level of 'all-round' physical fitness, what is an appropriate training program?**

A training program that includes five or six days of exercise per week, with 20-30 minutes of vigorous activity on each training day, and with one or two days of rest and recovery, is ideal for the non-specialist sportsperson. It is also worth emphasizing that to be of value, fitness training must be conducted on a regular basis. Fitness that takes weeks or months to acquire will be largely lost after just three weeks of inactivity. Fortunately however, fitness can be regained just as quickly as it is lost, if the break from exercise is not prolonged.

A big problem with today's busy lifestyle is finding the time to train. Many people find that a fitness program is easier to maintain if fitness training is involved in the daily routine; for example, setting aside an appropriate amount of time for training at much the same time each day. This way, training becomes as much a habit as putting on makeup or shaving. Some people also find that keeping a diary of fitness training (noting such things as when intensity or duration of activity is increased, how many kilometers they have run, etc) helps them to stay motivated.

**What are the types and intensities of training I should be doing for all round fitness?**

Physical fitness has many components. For general fitness, the most important types of activities are aerobic training, strength training (also called resistance training) and flexibility exercises. A good exercise program will include all of these aspects of training and will also help to improve (or maintain) fitness levels, balance and good posture.

The frequency, intensity, type of training and time spent on each fitness component are outlined below. One factor common to each component is progression. A program needs to be commenced at an appropriate level (usually quite low) and increased gradually as fitness improves. The body will not respond to a program that stays the same for many weeks.

It is also important to remember that we are individuals and that different people respond differently to any particular exercise intensity. Programs therefore need to be adjusted to suit each individual. If you are unsure of the best way to approach your fitness after reading the guidelines below, consult a qualified fitness leader or exercise physiologist at your local fitness gym or health club.

### **Aerobic Activity**

This is probably the most important component for general fitness and health. Aerobic fitness can be defined as the ability to continue to do fairly hard physical work (where the work may be any vigorous activity) over a prolonged period (e.g., for 30 minutes or more). A good predictor of a person's aerobic fitness is their 'maximal oxygen uptake'. Aerobic exercise includes walking, jogging, cycling, swimming, rowing and climbing (among many other activities). To improve aerobic fitness, it is appropriate to exercise vigorously for 20-30 minutes continuously, three to five times per week.

When commencing an aerobic program, 20 minutes of aerobic activity conducted three times a week, will improve fitness significantly. To obtain a training effect, you will need to exercise at a rate that requires you to breathe fairly heavily and that causes your heart to beat

much faster than usual. It is important to start at a low intensity and increase this over the following weeks as the exercise becomes easier. For example, 20 minutes of walking, jogging or a combination of walking/jogging may be sufficient to leave you rather breathless and fairly tired at the start of your program, but as the weeks go by, you may need to increase the pace or introduce jogging up some shallow hills to achieve a further increase in fitness. In order to continue to increase your fitness level, you will need to increase the time spent exercising aerobically to 30 minutes per session for up to five sessions per week.

Using a variety of exercise types, intensities and durations are important. So you should not get involved in doing the same exercise each time you train. This would quickly become boring and would not lead to all-round fitness. Although a warm up is not necessary before gentle jogging, cycling or similar aerobic activity, the 'cool down' period following the activity is the most appropriate time for stretching to improve flexibility .

### **Strength Exercise**

The aim of strength exercises is to improve muscular strength and muscular endurance. These two components are closely related. Many of the tasks that we carry out as part of daily living require a certain amount of muscular strength and endurance. Lifting the shopping bags into the car, walking up a set of stairs, pruning the hedge and so on all require some strength and muscular endurance, even maintaining a good posture while sitting requires muscular endurance. A strength program can also target muscles that are not used very often, and therefore become weak, causing muscle imbalances that can lead to injury or pain.

Increasing strength and muscular endurance can be achieved at any age, from childhood to well past retirement age. The overload principle is used to develop muscular strength and endurance. This means a gradual increase in work the muscle has to do, leading to a slow but steady improvement. Similar to aerobic fitness, it is important to start slowly and build up strength and muscular endurance over several months. Strength and muscular endurance can be improved through weight training, or by using your body weight as the source of resistance (exercises such as push-ups, dips, squats and crunches are appropriate) or, better still, with a combination of these. Initially, a program of 6-8 different exercises, targeting the major muscle groups of the body, is appropriate. Each exercise needs to be conducted a total of two or three times (2-3 sets).

A suitable load is one that can be lifted between 10 and 15 times (10-15 repetitions) within each set. The intensity of the strength workout can be varied by altering the load lifted and the number of repetitions conducted (e.g. occasionally use higher weights/lower repetitions and occasionally use lower weights/higher repetitions), the length of rest intervals between exercises and the number of sets performed. For best effect, resistance training should be conducted two or three days per week. Always allow at least one rest and recovery day between resistance training sessions. This is necessary because the actual strengthening process occurs during the recovery phase.

It is advisable to warm up before commencing resistance training by conducting some range of motion activities (such as arm swinging) and lifting the bar without weights, using the same actions that you are about to use with weights attached to the bar. The cool down period

(following resistance training) is a good time to stretch for improving flexibility.

### **How can I improve my level of flexibility?**

In addition to the potential for muscle wasting, inactivity results in a tendency for muscles to become less flexible, thus decreasing the range of motion of joints as we age (i.e. the joints stiffen). Regular stretching exercises and full range of motion activities (such as gently swinging the arms and 'high kicking') will reduce or delay the onset of inflexibility.

Stretching for flexibility is best done after completing your endurance or resistance training because the muscles are warm. As a result, they will be able to be fully stretched. Long and slow stretches are recommended (hold for 20-30 seconds), with each stretch taken to the point where a slight discomfort is experienced. Each stretch should be followed by a short rest, and then repeated several times. All the major muscle/tendon groups (legs, abdomen, arms, shoulders, wrists and so on) should be stretched. Stretching should be conducted several times per week, preferably after conducting and/or resistance training.

### **Are there any dangers associated with taking up a training program such as the one recommended here?**

Provided that you are in reasonable physical shape, there is no reason not to take up exercise aimed at improving physical fitness. Your physical condition should be taken into account when determining the level of fitness you are aiming for as well as the time period in which you wish to get in top shape. For example, you shouldn't expect to be able to run at the same pace at age 55 that you could at age 25 if you

have been physically inactive for some time. Moreover, if you have not been physically active for a number of years, it is a good idea to have your doctor check for underlying health problems that might flare up with unaccustomed vigorous exercise. For mature aged people (over 60), walking, weight training and stretching are still entirely suitable, but must be conducted at a level of intensity appropriate for each individual's health and fitness level.

There are dangers involved in engaging in weight training and some forms of flexibility training that are conducted inappropriately. A real potential for injury exists from incorrect technique when conducting these forms of exercise. It is recommended that you obtain a suitable guide on how to do these exercises correctly. Alternatively, you might join one of the many fitness clubs that are now available in every city and even in many country towns, to obtain expert advice on safe resistance and flexibility training.

Training hard in the heat of the day can lead to heat illness. It is better to avoid training in very hot weather, if you can. It is also essential to drink plenty of fluids such as water or sports drinks. There are some risks associated with particular activities. For example, road cycling greatly increases the danger of being involved in a road accident, and a cyclist has no protection compared to the occupant of a motor vehicle. For this reason, stationary bikes in your own home or the local gymnasium may offer a safer form of cycling. There is an increased risk of 'orthopaedic' injury (such as sprains and strains) from activities that involve running; but studies have shown that the overall health benefits of regular running outweigh this risk, particularly if the running is conducted on soft surfaces (such as grass) rather than hard surfaces (such

as bitumen or concrete). You should ensure that your footwear provides good support and protection against the impact forces caused by running.

For some people, there is also the risk of overtraining. This is mainly a problem for elite sports people or others who are required to be extremely active for long periods. However, overtraining can also affect very enthusiastic social runners or tri-athletes, as well as those who exercise for weight control. Physical training is a double-edged sword: just enough will promote fitness and health, whilst too much can significantly reduce the effectiveness of your immune system. Many elite athletes find that they suffer from colds and other infectious illnesses when they are in full training. The solution to the overtraining syndrome is simple: reduce the intensity and/or duration of training and do not attempt to train again at the level that caused the problems.

**CHAPTER – 4**  
**THE HUMAN FATIGUE IN MARITIME TRANSPORT**

## **CHAPTER 4**

### **THE HUMAN FATIGUE IN MARITIME TRANSPORT**

#### **INTRODUCTION**

The word fatigue is used to describe a range of disorders and sufferings, varying from a general state of lethargy to a specific work, induced burning sensation within one's muscles. Physiologically, "fatigue" describes the inability to continue functioning, including lack of sleep, at the level of one's normal (IMO, STW37/INF.5, Nov. 2005). The tendency of developing conventions and guidelines by international organizations in order to manage and mitigate fatigue in maritime industry is a clear evidence of above statement. Several analyses on international accident reports indicate that fatigue has been a direct or indirect contributory factor. Due to the nature of life and work of seafarers, fatigue is present in maritime transport section. There is competitive economic pressure to increase ship utilization as well as competitive pressure to decrease size of crew. This will increase the work load of Master and crew on board ships.

The IMO and ILO have particular interest on seafarers, and watch keepers working hours. In order to control the working hours on board, IMO has set certain rules in the STCW and SOLAS conventions; and the ILO in its turn has addressed this problem in ILO convention 180- which now incorporated into International Maritime Labour Convention (MLC) 2006. There are also a number of codes and guidelines addressing fatigue mitigation and management, such as MSC/Circ.1014, June 2001.

## **DEFINITION OF FATIGUE ACCORDING TO IMO**

The International Maritime Organization (IMO) has defined fatigue as the diminution in the physical or mental capacity as a result of physical, mental or psychological exertion, which has weakened the physical abilities, including strength, speed, response time, hand-eye coordination and decision-making.

There are many symptoms of fatigue, including general lethargy in an individual's activity, inability to perform a certain function as part of the natural abilities of a person or feeling muscular weariness resulting from a particular labour. All these symptoms are widely prevalent among people in everyday life; however, their severity varies depending on a person's stamina. Generally, the intensity of these symptoms relatively increases with the increase in work pressure over the normal limit. Similarly, the response to fatigue differs from one person to another with the differing conditions and situations. Under certain circumstances, an action can be considered fatiguing, while it may not be so in other circumstances. For instance, if a person runs for fear of danger, he/she will suffer from severe fatigue, whereas if the same person runs the same distance for the purpose of sports, he/she may not feel tired. Therefore, it is difficult to find a specific definition to fatigue.

### **Causes of Fatigue**

Fatigue is a common problem in shipping industry, has defined fatigue as "A reduction in physical and/or mental capability as the result of physical, mental or emotional exertion which may impair nearly all physical abilities, including: strength, speed, reaction time, coordination, decision making, or balance" (IMO in MSC/Circ. 1014 June 2001).

## Work Schedules

### Circadian Rhythm:

This is the natural body's rhythm, called internal body clock, and is repeated almost every 24 hours. The circadian rhythm affects many functions of the body, such as body temperature, digestion, hormone levels and most importantly sleeping behaviour. Generally, the physiology of human body is designed so that to work during the days and sleep at nights. Most of the functions of human body are at their maximum activity during day time and at their minimum activity at night.

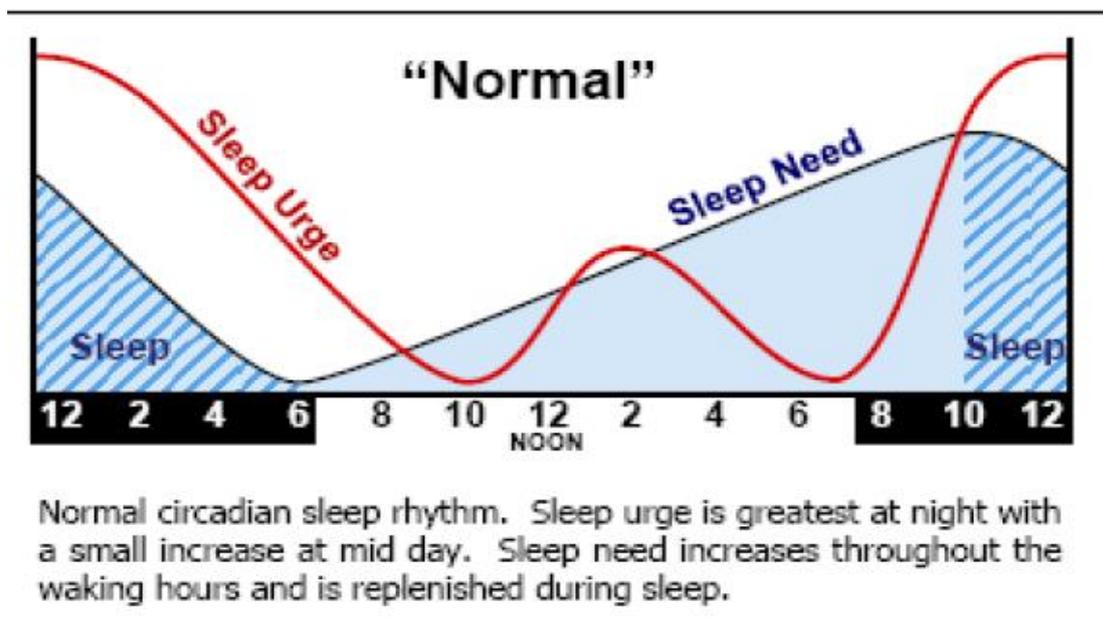


Figure 1: adopted from internet [www.rideforever.org](http://www.rideforever.org) (July 2007)

The disruption of circadian rhythm may adversely impact on the quality and quantity of sleep, task performance, and create a sense of personal dislocation and imbalance. This is a common problem in the seafarers as they are mostly shift workers.

### Sleep Issues:

Human body requires restorative sleep in order to be alert; it has four elements:

1. Duration; an average adult requires 7 to 8 hours sleep in a 24 hour period.
2. Continuity; the sleep period must be continuous and without interruptions.
3. Quality; five stages of any sleeping cycle must be complete as each stage provides a different benefit.(see table 2.1)
4. Time of day; sleeping during the night has higher quality than during the day.(see figure 2.1)

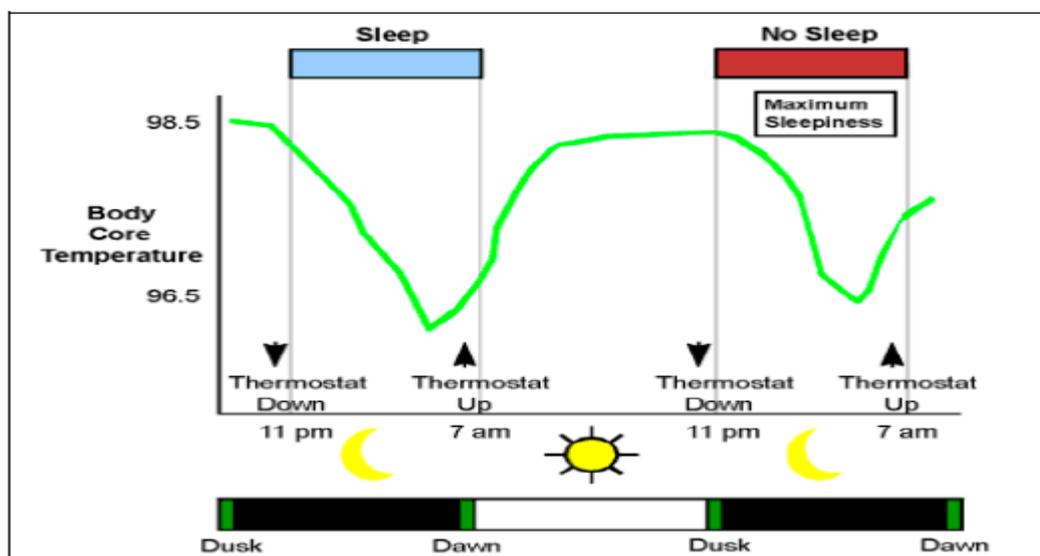
**During the sleeping session, the human body cycles through different levels of sleep.**

**Table 1: Stages of sleep**

Stage	Duration	Description	Effects	Notes
1. Transition	10 Minutes	Phase between waking & sleeping	Asleep without knowing it	Micro sleep and Automatic Behavior Syndrome
2.Light sleep	15 Minutes	Light level of sleep	Feel briefly alert and refreshed	50% of all sleep is in this stage
3.Delta sleep	15-20 Minutes	A deeper sleep		
4.Deep sleep	20-70 Minutes	Deepest stage of sleep	Will feel groggy if awoken; occurs early in the night	Sleep Inertia
5.REM sleep	After 70-80 Minutes of sleep	Dreaming state		Rapid Eye Movement

## Irregular Schedules:

Those mariners, who work at night and sleep during daytime, has a reduced alertness during their work due to the natural tendency of the body (circadian rhythm). In this case, the day time sleeping is not restorative, since the body tries to stay awake during day time. The body can adjust to a change in schedule, but it takes a few days for the adjustment. If there is an abrupt change in the shift schedule, it puts the body out of synchronization with the rhythm of body's circadian.



**Figure 2: Human body core temperature cycle.**

## Environmental Factors

- **Motion:**

It must be said that it is much more difficult to work in a moving environment than a stationary environment, and the energy consumed to perform a task is much higher; for example, the ship motion could cause sleep disturbances. By using a simulator, Wilson found that performance and cognitive processing were substantially degraded. Motion-induced

fatigue is in fact of significant importance. It may increase the incidence of mistakes which could remain unnoticed.

- **Vibration:**

Whole-body vibration could affect personal comfort, efficiency at work and even personal safety and health. Vibration could be transmitted to the human body in different ways. First from the surface of the body, second from a part of the body that is in contact with the ship, e.g. feet or buttocks and third from the individual part of the body. Vibration could have other indirect effects on human's performance.

- **Noise:**

Noise has two distinct effects on human body, one is the long term impact which is the hearing loss. The other is the short-term impact which is fatigue; it reduces human performance. The noise has been defined by scientists as unwanted and undesirable sound. The noise has physiological effect and an impact on human performance due to fatigue.

- **Lighting:**

Lighting is the key to maintain human biological clock, i.e.; the circadian rhythm. The sun light provides this light even on cloudy days. Some crew members on board merchant ships spend the majority of their times without being exposed to natural sun light; therefore, they are only confined to electric lightings. This can lead to shift of sleep patterns and fatigue. One thing is the electrical lighting, which is normally installed on board ships. If it is not strong enough, fatigue will rise.

## **Consequences of Fatigue**

Field studies and laboratory tests indicate that fatigue affects performance, safety, health and physiology of humans. Almost all the risk factors which have been addressed in previous sub-sections are present in maritime environment. This project summarizes the consequences of fatigue as follow:

- **Accidents and Injuries**

Number of hours worked during last 24, 48 and 72 hours before the casualty is highly important in the occurrence of the casualty. In personal injuries which are related to fatigue, in average the mariners have worked 7.7 hours prior to accident and in non-fatigue related personal injuries, the mariners have worked only 3.2 hours prior to the injury. 33% of personal injuries and 16% of ship casualty accidents have fatigue as a casual or contributory factor.

- **Performance**

Fatigue is usually defined operationally in terms of performance decrements. There are not enough researches in the field of maritime domain but the relationship between fatigue and performance among seafarers can be considered almost the same as other transport sectors. The human performance is affected by a number of factors, including the nature of a specific job, the job role and life stress experienced. The mariners experience various physical and environmental stressors, such as weather, ship vibration and noise. The impact of these factors may be very large and unfortunately unpredictable, since for example bad weather can affect the entire crew in terms of sleep and balance.

- **Health**

Fatigue, linked to ill health, is a common factor in worker's consultations with General Practitioners. Prospective studies have shown that there is a clear relation between negative work conditions, fatigue and subsequent illness. Shift work is a normal practice on ships. Sleep deprivation and disturbed sleep are the most common effect of shift work which may lead to fatigue and ill health. The quality and quantity of sleep can be reduced. The long term effect is not well known, but some papers mention gastrointestinal disorders as common sickness in shift workers. There is evidence of night shift workers complain of heart burn, abdominal pain and peptic ulcer.

### **Is Fatigue Common Among Seafarers?**

When considering fatigue risk factors the maritime domain is a unique surrounding. It includes all the risk factors which were mentioned before. Fatigue risk factors are not as widespread in any other transport sectors as in maritime industry. Technical advances and commercial pressures lead the industry towards more reduction of manpower on board ships. This will intensify fatigue problem in the industry.

### **Seafarers' point of view:**

There is a simple questionnaire to acquire some answers to the questions which were raised during the course of the research. The questionnaire was distributed among 640 students of a Maritime Training Institute and officers employed on ships owned by a company in the Middle East. The respondents are of mixed nationalities including, Pakistanis, Ghanaians, Ukrainians, Indians and Filipinos. This company

has been chosen because its crew is a good representative sample of present seafarers around the world. The company normally runs its ships with one deck officer and one engineer officer in excess of the requirement of SMD. However there are certain limitations on the data which has been gathered by this survey: The word "fatigue" has been repeated several times in the questionnaire, which could have affected respondents mind at the time of answering. The respondents usually work on ships with average crew of 22. The name of the shipping company and training institute has been omitted intentionally to avoid sensitivity. Total number responded within 45 days was 204; out of which 18 were disregarded for various reasons, mostly because the respondents had less than 20 months service at sea as an officer or they failed to complete part A of the questionnaire.

It was explained to the respondents that there is no obligation in answering the questionnaire; however it may be useful if they do so. In preparing the questionnaire utmost effort has been made not to relate any questions to the respective company. Wherever there was a relation it was up to the respondents if they want to answer or not. The questionnaire contains thirteen questions. The respondents need mention neither their names nor their nationalities but they should indicate their age, rank, sea service, certificate of competency, department and type of shift system employed on their ship. Master and all deck officers are considered in one group and chief engineer, other engineers and electronic officers in another group. The deck officers are engaged in 3 shifts system (4 on 8 off) while at sea and 2 shifts system in port. The engineers are engaged on day work.

## **10 Types of Personal Injuries Seafarers**

Getting injured or hurt while working on ships is very common. It is hard to find a seafarer who has not been through an accident and hurt himself. A recent report conducted by a maritime organization states that more than 70% of personal injuries take place because of sheer negligence and failure in following safety procedures. Injuries on ships range from minor to the most gruesome types; some even leading to fatalities. Though seafarers are aware of these injuries, most of them tend to ignore safety procedure. However, in order to ensure one's personal safety, along with safety of the ship and its crew, it is imperative to remember some very common personal injuries while working on board ships.

### **1. Eye Injury**

Protection of eyes is of paramount importance while working on ships. Shipboard jobs such as welding, chipping, painting, and working with hazardous material such as oil and chemicals pose great danger to the eyes of ship personnel. Appropriate goggles or protective equipment should be worn while carrying out such jobs.

### **2. Hand and Foot Injury**

Working on ships requires handling hot and sharp objects. A variety of gloves are used to protect hands of the seafarers; however, several accidents have occurred in the past because of using loose or wet/oily gloves. Hand injuries have occurred because of accidents due to trapping of gloves on drum ends or machinery, slipping of objects, loss of grip, etc. Moreover, inappropriate footwear such as sandals and flip-

flops give little protection to feet from falling loads, hot work and hazardous materials. Such inappropriate footwear can also lead to trips and falls. It is therefore important to wear proper personal protective equipment for protection of hands and feet.

### **3. Injuries from Falls and Trips**

Injuries due to trips and falls occur due to slippery floor, oily surfaces, openings in the floor, tool/ spare parts lying on floor etc. Accidents because of falling from heights, tripping off the rails, and slipping over ladders have also been commonly reported in the past.

### **4. Head Injury**

Head injuries are caused due to failure to duck, when stepping over coamings and, thus, hitting the head on the door frame or bulkhead. Such injuries can also happen while working on machinery systems or due to slipping and falling. Make sure you are wearing helmets all the time while working or entering confined spaces.

### **5. Injuries from Deck Operations such as Mooring and Cargo Handling**

Working on decks during mooring and cargo operations provides the circumstances for potentially serious accidents. Seafarers should never stand in a bight of a rope or near a rope under tension. Also, while handling cargo operations, all safety precautions should be followed.

### **6. Burns and Scalds**

Burns and scaldings are commonly caused by hot pipelines, steam and fire. They are also caused by shocks from faulty electrical

equipment. Hot oils, steam, chemicals and similar hazardous materials should always be handled with care to avoid such accidents.

### **7. Injury from Electric Shock**

Unattended electrical connections and exposed wires can lead to fatal accidents on board ships. Seafarers should be extremely careful while handling electrical connections and no electrical equipment should be handled without proper knowledge or assistance. Moreover, personal electrical equipment shouldn't be connected to the ship's electrical system without the permission of a responsible officer.

### **8. Injury from Misuse of Tools/ Machinery/ High Pressure Equipment**

Injuries can occur due to misuse of tools or while not following the correct procedures for operating machinery systems. Moreover, using incorrect tools, unattended machinery, and incorrect methods also leads to injuries. Failure in using protection when handling high pressure equipment can also cause serious injuries.

### **9. Cuts**

There are several sharp equipment and tools on ships. To avoid cuts, all these tools should be handled with care and must not be left lying around where someone may accidentally cut themselves. Broken glasses, grinders and sharp knives/ tools should be properly disposed or stored in secured places to avoid cuts.

## **10. Back Injury/ Manual Handling**

Injuries due to strained muscles are common on board ships. Manual handling of loads leads to several back injury to seafarers. Heavy loads shouldn't be lifted alone. Manual handling injuries can be avoided by using the right technique to lift loads.

**CHAPTER – 5**  
**Foods, Nutrition and Health**

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### **Foods, Nutrition and Health**

#### **Introduction**

Food is a basic part of people's existence. Through the centuries, we have acquired a wealth of information about the use of food to ensure growth of children and youth, to maintain good health through life, and to meet special needs of pregnancy and lactation and to use it to recover from illness. When you study food composition, you will know the nutritional contribution of foods. You may have been told that certain foods are very important for maintaining good health, while others are harmful. As you study the science of Foods and Nutrition, you will need to examine the ideas you have about foods very carefully and accept or reject these in the light of the knowledge you will acquire. Whatever you learn in this area should be used and applied in your personal life.

A large part of our food heritage is scientifically beneficial, and needs to be retained; some aspects may need to be modified in the view of the changes in our lifestyle. Food is an important topic of conversations, articles in newspapers and magazines, as also of advertisements. Some of this information may be correct, but a large part of it may not be. As you learn this subject, you will be able to spread the knowledge gained to those around you, so that they discard false ideas about food, which interfere with their food selection and affect their health. Food, nutrition and health are intimately connected aspects of our life. Let us start our study by defining these and related terms.

## OBJECTIVES

After reading this part, you will be able to:

- explain the functions of food;
- enumerate the sources and functions of the nutrients;
- relate the nutritional requirements in terms of Recommended Dietary Allowances (RDAs) to nutrition and health.

## Definitions

Food nourishes the body, and may also be defined as anything eaten or drunk, which meets the needs for energy, regulation and protection of the body. In short, food is the raw material from which our bodies are made. Intake of the right kinds and amounts of food can ensure good nutrition and health, which may be evident in our appearance, efficiency and emotional well-being.

Nutrition has been defined as food at work in the body. It includes everything that happens to food from the time it is eaten until it is used for various functions in the body. Nutrients are components of food that are needed by the body in adequate amounts in order to grow, reproduce and lead a normal, healthy life. Nutrients include water, proteins, fats, carbohydrates, minerals and vitamins. There are several nutrients in each of the groups: proteins, fats, carbohydrates, minerals and vitamins; hence the plural form of these words has been used. Thus there are over 40 essential nutrients supplied by food, which are used to produce literally thousands of substances necessary for life and physical fitness.

The study of the science of nutrition deals with what nutrients we need, how much and why we need these and where we can get them.

Nutrition is the result of the kinds of foods supplied to the body, and how the body uses the food supplied. Adequate, optimum and good nutrition are expressions used to indicate that the supply of the essential nutrients is correct in amount and proportion. It also implies that the utilisation of such nutrients in the body reflects the highest level of physical and mental health which is maintained throughout the life-cycle.

Nutritional status illustrates the state of our body as a result of the foods consumed and their use by the body. It can be good, fair or poor. The characteristics of good nutritional status are an alert, good natured personality, a well-developed body, with normal weight for height, well developed and firm muscles, healthy skin, reddish or pink color of eyelids and membranes of mouth, good layer of subcutaneous fat, clear eyes, smooth and glossy hair, good appetite and excellent general health. General good health is evident by stamina for work, regular meal times, regular sleep, normal elimination and resistance to disease.

Poor nutritional status is evidenced by a listless, apathetic or irritable personality, undersized poorly developed body, abnormal body weight (too thin or fat and flabby body), small and flabby muscles, pale or sallow skin, too little or too much subcutaneous fat, dull or reddened eyes, lusterless and rough hair, poor appetite, lack of vigor and endurance for work and susceptibility to infections. Poor nutritional status may be the result of poor food selection, irregularity in schedule of meals, work, sleep and elimination.

The WHO (World Health Organization) has defined health as the state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Malnutrition means an undesirable

kind of nutrition leading to ill-health. It results from a lack, excess or imbalance of nutrients in the diet. It includes under and over-nutrition. Under-nutrition is a state of insufficient supply of essential nutrients.

Malnutrition can primarily be due to insufficient supply of one or more essential nutrients; or it can be secondary, resulting from an error in metabolism, interaction between nutrients or nutrients and drugs used in treatment. Over-nutrition refers to an excessive intake of one or more nutrients, which create stress in the bodily function.

Diet refers to whatever you eat and drink each day. Thus it includes the normal diet you consume, and the diet people consume in groups (hostel diet). Diet may also be modified, and used for ill persons as part of their therapy (therapeutic diets).

Nutritional care is the use of nutritional knowledge in planning meals and the preparation of these meals in an acceptable and attractive manner to feed people. It involves an assessment of the existing meal patterns and improving these in an acceptable manner. While the nutritional plan may be general for a group of people, the actual execution is individualized to suit the person's needs and background. Thus one has to use a lot of ingenuity to succeed in making nutritional care effective in practical terms.

Health refers to the condition of the body. Good health implies not only freedom from disease, but also physical, mental and emotional fitness.

**Functions of Food:**

Food has an important physiological function which provides energy. The body needs energy to sustain the involuntary processes essential for continuance of life, to carry out professional, household and recreational activities, to convert ingested food into usable nutrients in the body, to grow and to keep warm. The energy needed is supplied by the oxidation of the consumed food.

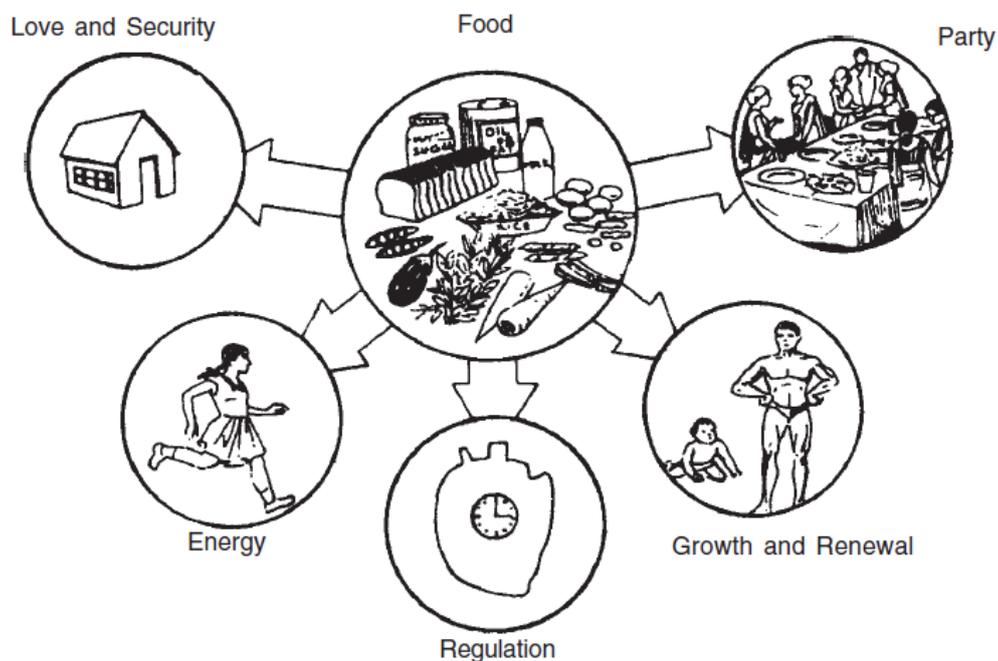
The foods we eat become a part of us. Thus the second important function of food is building the body. A newborn baby weighing 2.7- 3.2 kg can grow to its potential adult size of 50–60 kg if the right kinds and amounts of food are eaten from birth to adulthood. The food eaten each day helps to maintain the structure of the adult body, and to replace worn out cells of the body. The third function of food is to regulate activities of the body. It includes regulation of such varied activities as:

- Beating of the heart
- Maintenance of the body temperature
- Muscle contraction
- Control of water balance
- Clotting of blood
- Removal of waste products from the body

The fourth function of food is the social function, which improves our body's resistance to disease. Food has always been a central part of our social existence, a part of our community, social, cultural and religious life. Special foods are distributed as a benediction or Prasad in the religious functions in homes, temples and churches. Feasts are given at specific stages of life such as birth, naming ceremony, birthdays,

marriages, etc. Most of the religious festivals also call for feasts and feeding of specific segments of the population. Certain menus are associated with most of these feasts in each region.

As food becomes an integral part of our social existence, this function is important in daily life. Refreshments served at meetings create a relaxed atmosphere. The menu for such gatherings should bring the people together, rather than dividing them. This basic aspect should be considered in planning menus for such occasions (Figure 1.).



**Figure 1.:** Functions of food.

The fifth importance of food is its Psychological Functions. In addition to satisfying physical and social needs, food must satisfy certain emotional needs. These include a sense of security, love and attention. Thus familiar foods make us feel secure. Anticipating and fulfilling needs are expressions of love and attention. These sentiments are the basis of the normal attachment to a mother's cooking. Sharing of food is

a token of friendship and acceptance. In friendly gatherings, we try unfamiliar foods and thus enlarge our food experiences. It must be noted that even a nutritionally balanced meal may not be satisfying to the individual, if the included foods are unfamiliar or distasteful to him/her. With time and repeated experience, strange foods become familiar and new tastes are formed.

These aspects are important in food acceptance, and must be considered in planning meals, which are not only nutritionally adequate, but also enjoyable for the group for whom they are intended.

### **Functions of Nutrients**

The foods which we use daily include rice, wheat, vegetables, fruits, milk, eggs, fish, meat, sugar, butter, oil, etc. These different foods are made up of a number of chemical components called nutrients. These are classified according to their chemical composition. Each nutrient class has its own function, but the various nutrients must act in unison for effective action. The nutrients found in foods are — carbohydrates, proteins, fats, minerals, vitamins and water. Fiber is also an essential component of our diet. The functions of nutrients are given below.

**Carbohydrates:** Starch found is found in cereals, sugar in sugarcane, and carbohydrates in fruits. The chief function of carbohydrates is to provide energy needed by our body. Those not used immediately for this purpose are stored as glycogen or converted to fats and stored, to be mobilised for energy supply when needed.

**Fats:** Oils, found in seeds, butter from milk, and lard from meat, are examples of fats found in foods. They are concentrated sources of

energy, carriers of fat soluble vitamins and a source of essential fatty acids. If excess fats are taken in the diet, these are stored as fat reserves in the body. Energy taken in excess of a body's need is stored as fats in the body.

**Proteins:** Casein from milk, albumin in egg, globulins in legumes and gluten in wheat, are examples of proteins occurring in foods. The main function of protein is the building of new tissues and maintaining and repairing those already built. Synthesis of regulatory and protective substances such as enzymes, hormones and antibodies is also a function of food proteins. About 10 per cent of the total energy is supplied by proteins in the diet. Protein, when taken in excess of the body's need, is converted to carbohydrates and fats and is stored in the body.

**Minerals:** The minerals calcium, phosphorus, iron, iodine, sodium, potassium and others are found in various foods in combination with organic and inorganic compounds. Minerals are necessary for body-building, for building of bones, teeth and structural parts of soft tissues. They also play a role in regulation of processes in the body, e.g., muscle contraction, clotting of blood, nerve stimuli, etc.

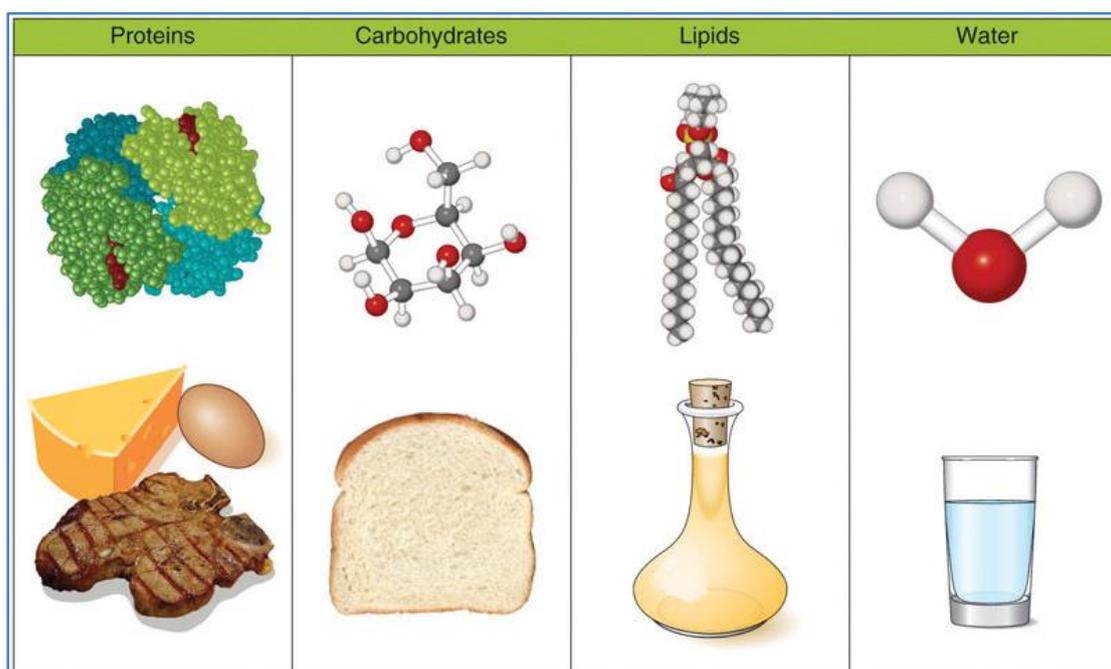
**Vitamins:** Fat-soluble vitamins A, D, E and K and also water-soluble vitamins C and B group are found in foods. These are needed for growth, normal function and processes of the body.

**Water:** We get water in foods we eat and a major part from the water we drink such as beverages. Water is an essential part of our body structure; it accounts for about 60 per cent of our body weight. Water is essential for the utilisation of food material in the body and also for elimination of

food waste. It is a regulator of body processes such as maintenance of body temperature.

All individuals need the same nutrients for the same body function. The only variation is in the amounts of each nutrient required according to age, size, activity, etc. For example, all persons need energy for work, but a man, who carries loads may need more energy than a man, who works in an office at a desk job. As you know, we get the nutrients from the foods and the beverages we consume. Most foods contain the nutrients in varying amounts. Let us understand the nutrient composition of the foods we use every day.

### Food Composition



Most food contains more than one nutrient. The nutrient contents have been determined by analysing these in the laboratory. The composition of over 650 Indian foods has been determined. The food composition tables give the concentration of nutrients in 100 g of the edible portion

(E.P.) of the food. Therefore, it is important to know how much of the food purchased is edible. In some foods, such as milk, butter, sugar, the edible portion is 100 per cent. In fruits and vegetables, it varies from 65 per cent in bananas to 98 percent in tomatoes. The values for nutrients given in food composition tables are averages of the results obtained by analyzing a large number of samples of each food. Therefore, the figures in such tables give a fairly good idea of the composition of each food.

Foods are grouped in the food value tables, on the basis of the plant part from which the food is derived, for example, seeds, roots, leaves, fruits, etc. Animal foods are grouped on the basis of species and the product used.

It is interesting to note that there are inherent similarities in the composition of foods in each group. In Table 1.1, the composition of various foods has been presented to illustrate this point. For example, the protein content of cereals varies from 7 to 12, and that of dals and legumes from 17 to 25 per cent. This information has important applications in practical usage of tables. It is possible to predict the overall nutrient content of combinations used if we know the amounts of individual foods used. If the composition of a particular food is not found in the tables, you can roughly predict its nutrient contribution, by knowing the group to which it belongs.

You may observe from Table 1.1, that cereals and dals do not contain vitamins A and C. Therefore you will realise how important it is to include vegetables and fruits, which are rich source of these two vitamins, in our daily menu of cereals and dal. Most of the vegetables and fruits, as you will observe from Table 1.1, are low in calories. Oils,

fats and sugars are mainly sources of calories. Thus you get an idea of the contribution of various foods by studying Table 1.1.

Most of the analytical work on Indian foods was carried out in various laboratories under the auspices of Indian Council of Medical Research. A compilation of results is published as the Nutritive Value of Indian Foods, by the Indian Council of Medical Research (ICM3021R). A number of new varieties of food with high contents of certain nutrients, have been developed at research centres under the auspices of the Indian Council of Agricultural Research. You get a number of these foods in the market and use these in your dietary. The nutritive value of these new varieties of foods need to be included in the book on Nutritive Value of Indian Foods.

It is good to remember that the nutritive value of natural foods does not vary a lot from one country to another. But there is a great variation in the composition of prepared foods such as bread, biscuits, cakes, etc., due to variation in recipes and the basic ingredients used from one region to another.

**Table 1.1: Food Composition at a Glance1**

(Approx. Group Values per 100 g. E.P.)

<b>Foods</b>	<b>Moisture</b>	<b>Calories</b>	<b>Protein (g)</b>	<b>Vit. A (mcg.)</b>	<b>Vit. C (mcg.)</b>	<b>Minerals &amp; Vit. B-Comp</b>
Cereals— rice, Wheat, bajra, Jowar	10	340	7 to 12	—	—	Some
Dals, legumes	10	340	17 to 25	—	—	Some <sup>2</sup>
Milk	85	70	3	48	—	Some <sup>3</sup>
Eggs	75	170	13	960	—	Some
Meat— fish, poultry	75	100-190	18	Some	-	Some
Leafy & Orange- yellow Vegetables & Fruits	90	20	2	1.800	30	Some
Fruits— Vit. C-rich	85	50	1	Some	50	Some
Other vegetables	90	30	2	Some	Some	Some
Other Fruits	85	50	1	Some	Some	Some
Roots & tubers	60-85	50-100	1	Some	Some	Some
Oils & Fats	0	900	-	750 <sup>4</sup>	-	-
Sugar, jaggery	0	400	-	-	-	-

1. Rich source of iron and B-complex.
2. Rich source of calcium and riboflavin.

3. Ghee contains this amount and vanaspati is fortified to provide this amount of Vit. A.

### **Food Exchange Lists**

In 1950, the American Diabetes Association and the American Dietetic Association collaboratively developed a system of food lists to help diabetic patients to select foods in their diets. Similar food lists were prepared in other countries to help diabetics to choose their foods. In India also food lists were prepared based on the foods available and our meal pattern. Since India is a large country, there are three major agencies that have evolved their food exchange lists. These agencies are dietetic departments of major regional hospitals, the Home Science colleges, which train dietetic students, and the dietetics department of the National Institute of Nutrition.

Each of the lists includes a group of foods, which supplies about the same calories in the portion indicated. Each food choice within a list is called an exchange. It represents an amount of food that has about the same macronutrient value as other foods in the same group. The exchange lists are very useful tools in diet, planning in hospitals and in personal diet management in the home.

### **Nutrient Density**

It refers to the quantity of one or more nutrients supplied by food in reference to its calorie content. For example, if one compares the protein content of iso-caloric portions of dal, bread and milk, one can see that dal has the highest nutrient density for protein, milk next and bread the least.

	Calories	Protein
Dal	85	5.5
Milk	85	4.0
Bread	85	2.4

Thus, nutrient density is an important aspect to be considered in selection of foods, especially in diets of children, pregnant women, nursing mothers and in therapeutic diets for patients. Nutrient dense foods like low-fat milk, beans, dals, amla, oranges, carrots, spinach, chapatti, etc., do help balance less nutrient dense choices we often make, like mithai and chips. The latter tend to supply energy as sugar and fat, but little else.

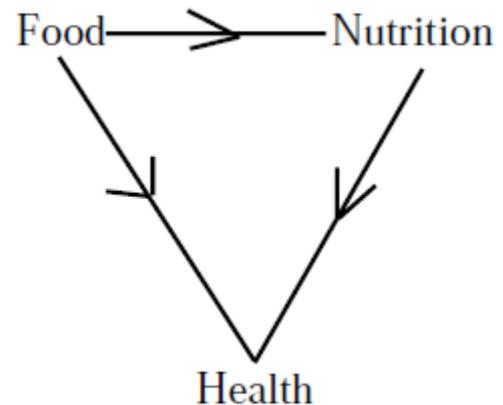
### **How will you be a responsible nutrition student?**

First, you should use what learn in nutrition and benefit yourself. It will help you to look better, feel better and work effectively. By practising what you learn, you will set a good example for others. Secondly, take care of nutrition of your family. You should help the children in the family to develop good food habits, the adults to make good food choices in eating, and seniors to meet their changed needs. Thirdly, as a professional you will be able to help people, who seek your advice, to make appropriate changes to improve their food choices to improve their well-being. Lastly, as a member of the community, you can influence the choice of foods served in social events.

## INTER-RELATIONSHIP OF FOOD, NUTRITION AND HEALTH

Earlier in this section, you have learnt about the meaning and functions of food. You have also read the definition of health in previous unit. Let us now learn about nutrition in detail and understand how food and nutrition are related to health.

**Nutrition** is a scientific discipline in which food is a major focus of interest. The simplest definition of nutrition is the study of what happens to food once it enters the mouth and thereafter. A more formal definition of nutrition is study of processes



by which the living organism receives and utilizes the materials necessary for growth, renewal and maintenance of body components. All foods contain some essential substances which perform important functions in our body. These essential substances contributed by our food are called nutrients. These nutrients help us to maintain our body functions, that is, to grow and to protect our organs from diseases and infections. The health of a person depends on the type and quantity of food stuff consumed. Good nutrition is essential for a person to grow and develop normally and to remain healthy throughout life. When a person does not eat proper food, there are chances of the body not developing normally. There are chances that some organs of the body may start malfunctioning or there may be some disease. Poor nutrition may also influence the mental and social wellbeing adversely.

**Good nutrition is a prerequisite for good health**

## Assessing Personal Health

You may remember that when you were younger your mother or grandmother made you swallow that teaspoonful of cod-liver oil because she said it was good for you. You don't have to have a PhD to know some of the basic ways you can adapt your life to be healthier. However, the mainstream media inundates the American population with health cures and tips, making it confusing to develop the best plan for your health. This section will equip you with tools to assess and improve your health.

One of the easiest places to begin a personal health assessment is by examining the results from your last physical. Often a person will leave the doctor's office without these results. Remember that the results belong to you and having this information on hand provides you with much of what you need to keep track of your health. During a physical, after obtaining weight and height measurements, a nurse will typically examine blood pressure. Blood pressure is a measurement of the forces in the arteries that occur during each heartbeat. It is a principle vital sign and an indicator of cardiovascular health. A desirable blood pressure is 120 over 80 mmHg.

In most circumstances, once you have the results in hand of your health indicators, it is good practice to file them in a binder so you can compare them from year to year. This way you can track your blood-cholesterol levels and other blood-lipid levels and blood-glucose levels. These are some of the more general measurements taken, but in many instances blood tests also examine liver and kidney function, vitamin and mineral levels, hormone levels, and disease markers. Your doctor uses

all of these numbers to assess your health and you can use them to play a more active role in keeping track of your health.

Hearing and vision are additionally part of a general health assessment. If you wear glasses, contacts, or a hearing aid, you already are aware of how important it is to know the results of these exams. If you have not experienced vision or hearing problems yet your likelihood of experiencing them markedly increases over the age of forty. Another component of overall health is oral health. The health of your teeth, gums, and everything else in your mouth are an integral component of your overall health. This becomes apparent when a person experiences a tooth infection, which if left untreated, other teeth also may become infected.

Other indicators of health that you can measure yourself are body mass index (BMI) and fitness. BMI refers to an individual's body weight (in kilograms, or kg) divided by the square of their height (in meters) and the unit of measurement is  $\text{kg}/\text{m}^2$ . You can calculate this yourself or use one of the many BMI calculators on the web. BMI is a standardized measurement that indicates if a person is underweight, of normal weight, overweight, or obese, and is based on data from the average population. It has some limitations. One limitation is that it does not take into account how much of your weight is made up of muscle mass, which weighs more than fat tissue.

This personal health assessment has focused primarily on physical health, but remember that mental and social well-being also affect health. During a physical, a doctor will ask how you are feeling, if you are depressed, and if you are experiencing behavioral problems. Be

prepared to answer these questions truthfully, so that your doctor can develop a proper treatment plan to manage these aspects of health.

Taking charge of your health will pay off and equip you with the knowledge to better take advantage of your doctor's advice during your next physical. Health calculators, such as those that calculate BMI, ideal weight, target heart rate among many others, and personal health assessments will help you to take charge of your health, but they should not take the place of visiting your doctor.

### **Lifestyle Assessment**

A lifestyle assessment includes evaluating your personal habits, level of fitness, emotional health, sleep patterns, and work-life balance. Many diseases are preventable by simply staying away from certain lifestyles. Don't smoke, don't drink excessively, and don't do recreational drugs. Instead, make sure you exercise. Find out how much to exercise by reading the 2008 Physical Activity Guidelines for Americans. There is a wealth of scientific evidence that increased physical activity promotes health, prevents disease, and is a mood enhancer. Emotional health is often hard to talk about; however a person's quality of life is highly affected by emotional stability. Harvard's Women's Health Watch notes six reasons to get enough sleep: Sleep promotes healthy brain function, while lack of sleep can cause weight gain and increased appetite, decrease safety (falling asleep while driving), make a person moody and irritable, decrease health of the cardiovascular system and prevent the immune system from functioning well Finding balance between work and life is a difficult and continuous process, involving keeping track of your time, taking advantage of job

flexibility options, saying no, and finding support when you need it. Work-life balance can influence what you eat too.

### **Diet Trends and Health**

In the past, health was regarded merely as the absence of illness. However, a growing understanding of the complexity and potential of the human condition has prompted a new way of thinking about health. Today, we focus on the idea of wellness<sup>1</sup>, which involves a great deal more than just not being sick. Wellness is a state of optimal well-being that enables an individual to maximize their potential. This concept includes a host of dimensions—physical, mental, emotional, social, environmental, and spiritual—which affect one’s quality of life. Striving for wellness begins with an examination of dietary choices.

### **Dietary Food Trends**

Hundreds of years ago, when food was less accessible and daily life required much more physical activity, people worried less about obesity and more about simply getting enough to eat. In today’s industrialized nations, conveniences have solved some problems and introduced new ones, including the hand-in-hand obesity and diabetes epidemics. Fad diets gained popularity as more North Americans struggled with excess pounds. However, new evidence-based approaches that emphasize more holistic measures are on the rise. These new dietary trends encourage those seeking to lose weight to eat healthy, whole foods first, while adopting a more active lifestyle. These sound practices put dietary choices in the context of wellness and a healthier approach to life.

## **Functional Foods**

Many people seek out foods that provide the greatest health benefits. This trend is giving rise to the idea of functional foods, which not only help meet basic nutritional needs but also are reported to fight illness and aging. According to the Academy of Nutrition and Dietetics (AND), formerly known as the Academy of Nutrition and Dietetics, functional foods may reduce the risk of disease or promote optimal health. The AND recognizes four types of functional foods (“Functional Foods,” 2009). They are: conventional, modified, medical, and special dietary use foods.

The first group, conventional foods, represents the simplest form of functional foods. They are whole foods that have not been modified. Examples include whole fruits and vegetables (which are abundant in phytochemicals and antioxidants), yogurt and kefir (which contain natural probiotic bacteria that can help maintain digestive system health), and dark chocolate (which contains antioxidants).

**Modified foods** have been fortified, enriched, or enhanced with additional nutrients or bioactive compounds. Foods are modified using biotechnology to improve their nutritional value and health attributes. Examples of modified foods include calcium-fortified orange juice, breads enriched with B vitamins, iodized salt, cereals fortified with vitamins and minerals, margarine enhanced with plant sterols, and energy drinks that have been enriched with herbs (ginseng or guarana) or amino acids (taurine). It is important to consider that the health claims of some modified foods may be debatable, or entirely fraudulent. Check

with a health professional regarding the effects of modified foods on your health.

Medical foods are designed for enteric administration under the guidance of a medical professional. (During enteric administration, food is treated so that it goes through the stomach undigested. Instead, the food is broken down in the intestines only.) Medical foods are created to meet very specific nutritional requirements. Examples of medical foods include liquid formulas for people with kidney disease, liver disease, diabetes, or other health issues. Medical food is also given to comatose patients through a gastronomy tube because they cannot eat by mouth.

Special-dietary use foods do not have to be administered under a doctor's care, and can be found in a variety of stores. Similar to medical foods, they address special dietary needs and meet the nutritional requirements of certain health conditions. For example, a bottled oral supplement administered under medical supervision is a medical food, but it becomes a special dietary use food when it is sold to retail customers. Examples of special dietary use foods include gluten-free foods, lactose free dairy products, and formulas and shakes that promote weight loss.

## CHAPTER 6

### THE ART AND THE SCIENCE OF SWIMMING

## CHAPTER 6

### THE ART AND THE SCIENCE OF SWIMMING

#### Introduction

The process of becoming an efficient swimmer involves using both the body and the brain to feel and understand what is going on. When a swimmer feels fluid movement through the water, and understands the cause and effect of specific actions, that swimmer is prepared to pursue efficient swimming.

The art of swimming is all about feeling effective movement through the water. It is probably best described as being at one with the water. A good example of the art of swimming is when good swimmers refer to feeling fishlike in the water. The movement achieved by efficient swimmers is fluid, like the strokes of an artist's brush. It is also graceful, as a swimmer uses balance, rhythm and posture, much like the art of dance. And, it is powerful, like musical harmony, as the combined actions of the swimmer's body produce a greater result to each action alone. The art of swimming means a swimmer is able to feel the water, rather than fight it.

The science of swimming is all about understanding movement through the water. There is a lot of physics at work in swimming. By understanding these principles, a swimmer can learn to apply them to the water. Coach Doc Counsilman, revered as "the father of modern swimming," describes the ingredients in successful swimming as "water, brains and guts." Using the science of swimming, a swimmer can study

movement through the water as an equation, and can begin to figure it out. The science of swimming means a swimmer is able to understand how to produce the most propulsion with the least effort.

Because good swimming is a matter of feeling and understanding, the most beneficial practice engages both body and brain. Swimming drills are examples of this kind of practice. Drills are extremely useful tools because they encourage the swimmer to approach swimming as both an art and a science.

## **BODY POSITION**

As human beings, we are comfortable and agile moving about on land. We have mastered vertical balance. To be a good swimmer, we must become equally comfortable and agile in the water. We have to master horizontal balance, or floating. Just as we are able to shift forward and from side to side to do things better and easier on land, we must learn this skill in the water. Learning to float well is an essential skill for swimming efficiently. Our spine and core strength are keys in allowing us to stand erectly, and they are equally crucial in floating correctly. Swimmers are well served by giving special attention to learning how to stabilize their core in the water. Developing this skill allows the swimmer to be in control of how he or she floats. It reduces drag, improves feel for the water, and increases access to power. It encourages the swimmer to achieve the important feeling of swimming downhill.

## **KICK**

The role of the legs in swimming is to provide forward momentum, rhythm, and counterbalance to other actions of the stroke. While the large muscles of the legs are an invaluable resource to swimmers, they demand a great deal of oxygen. It is therefore worthwhile to develop good kicking skills. Swimmers should strive to develop both a productive and a sustainable kick. A productive kick can relieve the upper body of some of the workload. A sustainable kick is economical in terms of energy expenditure. Although a consequence of kicking is that the legs will float better, this should not be the primary focus of kicking. Kicking should be used for forward motion, not to correct floating problems. Kicking well requires a swimmer to have relaxed feet and ankles, fluid motion, and above all to keep the feet connected to the water.

## **ARM STROKE**

The power phase of the arm stroke, or what the arms do underwater to move us forward must be worked on in three dimensions: length, width and depth. Although the path of the arms is unique to each stroke, the arms have three basic functions in all strokes. The arms are the primary tools we use to maximize the length of our stroke. Longer strokes mean fewer strokes. Fewer strokes mean less energy to cover a certain distance. The arms are also used to move the body forward, in the straightest, most direct path to our destination. Using sculling or sweeping motions, the arm action increases speed as it travels through the stroke, causing the body to advance. Most importantly of all, the arms are used to direct our hands so we can best feel the water. Hands that are able to feel the water are able use the water like a handle. With a

firm hold on the water, the swimmer can best move his or her body forward past the point at which the hands are anchored.

## **RECOVERY**

The recovery follows the underwater arm stroke, returning the arm to its starting point in front for another stroke. In all strokes except breaststroke, recovery is the phase when the swimmer's arms can rest momentarily. Learning to relax during recovery is an important skill to develop in working towards the most economical swimming style. Alignment of the recovery is often overlooked as a factor in swimming efficiency. A misaligned recovery can lead to a misaligned arm stroke, requiring constant correcting to be done, at the expense of forward motion. An aligned recovery is also an excellent preventive measure in remaining pain and injury free in the vulnerable shoulder area. Lastly, a relaxed and aligned recovery works to balance the rest of the stroke. Even though the recovery does not itself move a swimmer forward, it is by nature connected to the other actions of the stroke. It is important to recover in a way that complements and perpetuates the forward motion of the stroke.

## **BREATHING**

Replenishing the body with oxygen is an integral part of any sport, but in swimming, the added challenge of doing so while in the water makes breathing a primary aspect of swimming technique. Swimmers must learn to breathe rhythmically to best fuel their bodies. In addition, they must learn to inhale and exhale within the line of the stroke to avoid disrupting the forward motion of their swimming. In general, timing the

inhale with the stroke's recovery, and timing the exhale to the power phase makes breathing fit into the forward motion best, without creating insurmountable drag. This timing also places the exhale to the part of the stroke that demands the most exertion. So as in other sports, and in life in general, the swimmer can summon more power by expelling air while applying force. Some scholars of swimming believe that the rhythm of swimming should actually be determined by a swimmer's natural breathing rhythm. This theory makes breathing the central focus in developing the most effective stroke rate, pace, and strategy. Whether you are sprinting a 50 or swimming a mile, breathing technique is a factor in your ability to swim better.

## **LEVERAGE**

Although we use our limbs to press against the water, the power to use them comes from our core. Like a ceiling fan, with its blades turning, what is propelling the movement is the motor in the middle, or in the case of the swimmer, the core. This core-centered power is visible in many forms of athletics. If you observe a baseball pitcher preparing to throw the ball, you find out that it is the pitcher's arm which throws the ball. Yet if you look at the pitcher's hips and shoulders, you find that as the ball leaves the hand, the same side hip and shoulder snap forward. It is actually the core that is powering that pitch. You can observe this same core leverage in action with the batter as well. You can see it in a golfer, a boxer, and an ice skater, among others.

Leverage is also present in the limbs while swimming. To access available leverage, swimmers must learn to stabilize their joints, especially the elbows and the knees. Observe fish. They don't have

elbows or knees. If our goal is to swim as efficiently as fish, we have to learn to stabilize our joints, and not allow them to collapse and weaken our levers.

## **COORDINATION**

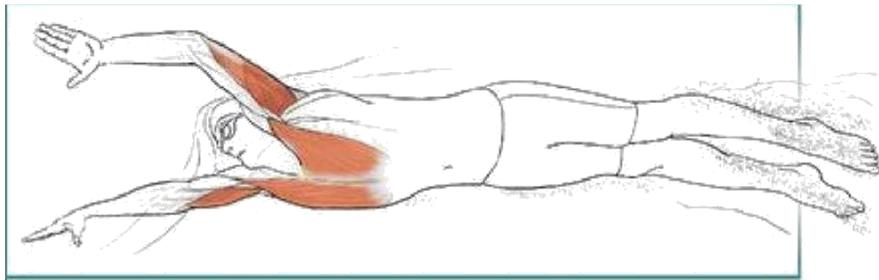
The numerous actions that make up swimming are each pieces in a puzzle, that when fitted correctly together, create fluid, graceful and powerful forward motion. Each action has its purpose, and its relationship to the whole. While it is important to develop each action in itself, connecting them together so they work in harmony is what efficient swimming is all about. We must learn to use our kick with our arms, not just in addition to our arms. We must learn to breathe within the line of the stroke, so the necessary act of breathing does not interrupt our forward motion. We must learn to deliberately use good body position to access leverage, which affects the arm stroke, recovery, breathing and kick.

Swimming efficiently is a matter of coordinated action. We must learn to time each action so that it complements the other elements of the stroke, rather than working against them. We must strive to develop our weakest actions, and make the most of our strongest ones. All of this must be done with one goal in mind: to move through the water with less effort so it can be done faster and longer.

### **Freestyle**

As the hand enters into the water, the wrist and elbow follow and the arm is extended to the starting position of the propulsive phase. Upward rotation of the shoulder blade allows the swimmer to reach an

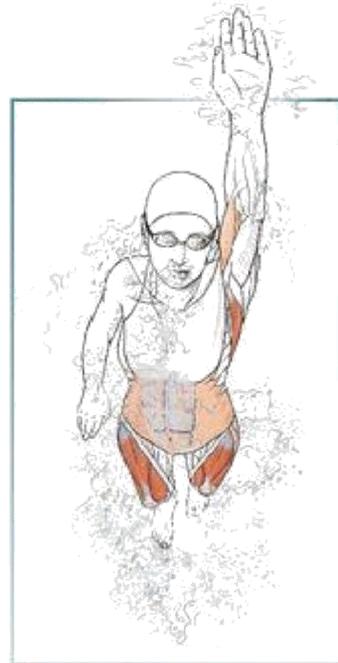
elongated position in the water. From this elongated position, the first part of the propulsive phase begins with the catch. The initial movements are first generated by the clavicular portion of the pectoralis major. The latissimus dorsi quickly joins in to assist the pectoralis major. These two muscles generate a majority of the force during the underwater pull, mostly during the second half of the pull.



The wrist flexors act to hold the wrist in a position of slight flexion for the entire duration of the propulsive phase. At the elbow, the elbow flexors (biceps brachii and brachialis) begin to contract at the start of the catch phase, gradually taking the elbow from full extension into approximately 30 degrees of flexion. During the final portion of the propulsive phase, the triceps brachii acts to extend the elbow, which brings the hand backward and upward toward the surface of the water, thus ending the propulsive phase. The total amount of extension taking place depends on your specific stroke mechanics and the point at which you initiate your recovery. The deltoid and rotator cuffs (supraspinatus, infraspinatus, teres minor, and subscapularis) are the primary muscles active during the recovery phase, functioning to bring the arm and hand out of the water near the hips and return them to an overhead position for

reentry into the water. The arm movements during freestyle are reciprocal in nature, meaning that while one arm is engaged in propulsion, the other is in the recovery process.

Several muscle groups function as stabilizers during both the propulsive phase and the recovery phase. One of the key groups is the shoulder blade stabilizers (pectoralis minor, rhomboid, levator scapula, middle and lower trapezius, and the serratus anterior), which as the name implies serve to anchor or stabilize the shoulder blade. Proper functioning of this muscle group is important because all the propulsive forces generated by the arm and hand rely on the scapula's having a firm base of support. Additionally, the shoulder blade stabilizers work with the deltoid and rotator cuff to reposition the arm during the recovery phase. The core stabilizers (transversus abdominis, rectus abdominis, internal oblique, external oblique, and erector spinae) are also integral to efficient stroke mechanics because they serve as a link between the movements of the upper and lower extremities. This link is central to coordination of the body roll that takes place during freestyle swimming.

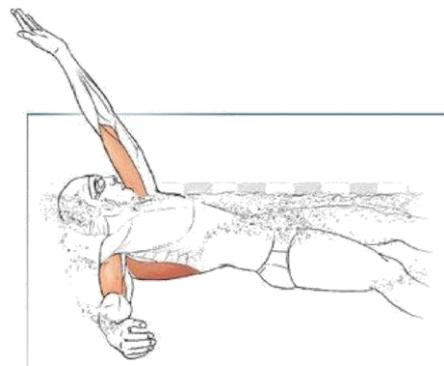


Like the arm movements, the kicking movements can be categorized as a propulsive phase and a recovery phase; these are also referred to as the downbeat and the upbeat. The propulsive phase (downbeat) begins at the hips by activation of the iliopsoas and rectus femoris muscles. The rectus

femoris also initiates extension of the knee, which follows shortly after hip flexion begins.

The quadriceps (vastus lateralis, vastus intermedius, and vastus medialis) join the rectus femoris to generate more forceful extension of the knee. Like the propulsive phase, the recovery phase starts at the hips with contraction of the gluteal muscles (primarily gluteus maximus and medius), and is quickly followed by contraction of the hamstrings (biceps femoris, semitendinosus, and semimembranosus). Both muscle groups function as hip extensors.

Throughout the entire kicking motion, the foot is maintained in a plantar flexed position secondary to activation of the gastrocnemius and soleus and pressure exerted by the water during the downbeat portion of the kick.



## **Backstroke**

Although backstroke is unique in body positioning among the competitive strokes, the stroke phases can still be divided into a propulsive phase that consists of hand entry into the water, a catch component, a finishing component, and a recovery phase. Rotation at the shoulder puts the hands in a position in which the little finger is the first to enter the water. Combined with extension of the elbow, the swimmer is in an elongated position to begin the underwater propulsion phase of the stroke. A difference between backstroke and freestyle or butterfly is that the initial catch component is dominated by the latissimus dorsi. The pectoralis major makes a smaller contribution. Despite these differences,

the latissimus dorsi and the pectoralis major are still the prime movers, and are active to some degree throughout the entire propulsive phase. Although the wrist flexors are still an integral part of the entire propulsion phase, the wrist is maintained in a neutral to slightly extended position. Through a combination of pressure forces from the water and activation of the biceps brachii and brachialis, the elbow transitions into approximately 45 degrees of flexion at the start of the catch. By the end of the catch, the elbow may be flexed as much as 90 degrees just before transitioning into the finishing component. As with the finishing component in butterfly, more emphasis is placed on forceful extension of the elbow, placing high demand on the triceps brachii during the final portion of the propulsive phase.

The role of the stabilizing musculature during backstroke is similar to the role that it plays in freestyle, largely because of the similar reciprocal arm movement and the integration of body roll into both strokes. The kicking motion seen in backstroke is a combination of movements that we have seen in freestyle and butterfly kicking mechanics. Like freestyle, backstroke uses reciprocal kicking movements. The major difference is that the position of the swimmer causes most of the force to be generated during the upbeat portion of the kick as opposed to the downbeat in freestyle. Backstroke also uses the dolphin kick off the start of a race and off each wall. The muscle recruitment patterns are the same in each case; the only change is in the direction because of the swimmer's body position.

### **Backstroke Technique Checklist Mechanics:**

The backstroke is similar to the freestyle stroke in that the arms stroke reciprocally and are supported by a trunk rotation and a leg kick. Obviously, the major difference between the backstroke and the freestyle is that the backstroke is performed supine. In the backstroke, the shoulder is vulnerable to injury similarly to the freestyle, and the relationship between the arm and the body orientation is important to note. The phases are the same for the two strokes. The beginning of the pull-through is marked by the hand entry of the swimmer with the arm extended above the head. The arm becomes submerged, and with the hand, they press toward the feet. The mid pull-through phase begins when the humerus is perpendicular to the body. The arm continues to move towards the feet, and at the end of the late pull-through, the elbow straightens out with a slight downward press before lifting out of the water to start the recovery phase. The elbow is fully extended throughout the recovery phase, and travels straight over the top of the water and overhead to the point of hand entry.

The timing of the body rotation as it relates to the arm entry and early pull-through is important. To maximize performance and minimize shoulder vulnerability, the body should be rotating in synchrony with the arm. In other words, if the humerus is oriented 30° below the surface, the torso should be rotated a similar amount below the surface at that time. However, oftentimes this is not the case, because it is typical for the timing of the body rotation to lag behind the arm mechanics. Common symptoms of a late body rotation are a hand entry that crosses inside the shoulder width and a hand entry with the back of the hand. In this

situation, in which the arm stroke leads the body rotation, the humerus is hyperextended. For the body rotation and arm motion to be in sync, it is important that the body rotation is initiated at the mid-recovery phase so that at hand entry, the shoulders are horizontal in the water. The body rotation continues as the arm is submerged and the early pull-through is started. The swimmer should rely on the leg kick and the late pull-through to properly execute the body rotation.

Variations across swimmers in the mechanics of the early pull-through phase can also affect the degree of shoulder vulnerability. After the hand enters the water, the early pull through can vary in depth, palm orientation, and direction of the initial motions. Although observations of today's elite backstrokes show that their palms rotate toward the feet very shortly after hand entry and their arms stay to the side of the body, many swimmers have been taught to press downward immediately after entry to have a deep pull. A deep, early pull-through can lead to a humeral hyperextension because the body is not rotated enough—or soon enough. If a swimmer is experiencing shoulder pain in the early pull-through phase of backstroke, and the swimmer is observed to have a straight arm and deep initial pull, then some stress on the shoulder may be relieved with a suggestion to keep the pull more shallow and the arm closer to the body.

At the end of the late pull-through, it is important that the hand exit the water with the thumb first. Lifting the arm out with the pinky first will result in excessive humeral internal rotation. This will increase the pinching of the supraspinatus on the undersurface of the acromion.

The hand then rotates during mid-recovery so that the hand can enter the water with the pinky first and the palm rotate out.

### **Muscle Activity**

The muscle action during the backstroke, by mere virtue of the swimmer being on his or her back, is widely different from that of the other strokes. The muscles most active during the powerful pull-through are the teres minor, and the subscapularis; and obviously, these two muscles were not designed for power. Even during the peak moments of pulling, the latissimus dorsi reveals 30% less action than does the teres minor, and the subscapularis in swimmers with normal shoulders. So, not only is the backstroke swimmer at risk because of the aforementioned humeral hyperextension and levering of the humeral head anteriorly. But these athletes require the small rotator cuff muscles to perform as power muscles.

In addition, during pull-through, the teres minor and subscapularis are constantly active at approximately 30% maximum voluntary contraction. Thus it appears that these two rotator cuff muscles are functioning as power drivers as well as endurance muscles.

At the same time as the depressed activity in the teres minor in the backstrokes with painful shoulders, the rhomboids also exhibit less action. Apparently, the scapula is not retracted properly in early recovery and hence there may be less clearance for the humeral head under the acromion. A third rotator cuff muscle, the supraspinatus, demonstrates suppressed activity toward mid pull-through in the swimmers with painful shoulders. Given the decreased action in three of the four rotator

cuff muscles, one can reasonably conclude that there could be difficulty in depressing the humeral head for adequate clearance of the acromion during pull-through.

## CHAPTER 7

### Leadership, Communication and Time Management

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### Leadership, Communication and Time Management

#### Leadership Styles:

Management literature states leadership styles as: autocratic leadership, bureaucratic leadership, charismatic leadership, democratic leadership or participative leadership, laissez-faire leadership, people-oriented leadership or relations-oriented leadership, servant leadership, task-oriented leadership, transactional leadership, transformational leadership.

Each style of leadership impacts organizational performance differently. Some of them help organizations to evolve and achieve success; others only hinder their development and are a source of dissatisfaction and demotivation. For example, laissez-faire is a hands-off approach where no one sets any objectives, directions, restrictions etc., hence the lack of motivation, poor work practices and lack of performance. Another leadership style which can have a negative impact upon the performance of an organization is the autocratic style.

It is an extreme form of leadership where the leader exerts extreme power upon the staff, offering them very few opportunities of saying what they think or of involving themselves actively in the way the activity is developed. Therefore, the level of performance is very low. On the other hand, transformational leadership, one of the most modern and most successful styles of leading, is the style in which the leader plays the role model, he inspires his followers and challenges them to be more involved in their work. Transformational leaders communicate

with their people, delegate responsibility, and try to know their staff, to understand their strong and weak points in order to find the best way to optimize their performance, thus optimizing entire organization's performance.

Transformational leaders can change an employee from a worker who carries out tasks into a valuable team member. Thus, they can modify the way employees think and feel about their work and the organization by creating an ownership mindset. Transformational leadership can help employees trust the company and its mission, and thus stop questioning the objectives of the organization and work harder to achieve results. A transformational leader can elicit a stronger sense of commitment from the staff, which will have a positive impact on effectiveness and efficiency of their work and consequently of the organization. Transformational leaders believe in delegating responsibility, getting the staff involved in important decisions and showing confidence in their ability to make the right choices. According to Bass, there are four key dimensions of leadership that are used to accomplish the transformation of subordinates, and of the organization: attributed charisma and idealized influence, inspirational motivation, individualized consideration, intellectual stimulation. Attributed charisma and idealized influence (initially called charisma) is the main feature of this type of leadership. It refers to the leader gaining trust and confidence of others by showing conviction, commitment, ethics, involvement etc. Inspirational motivation implies communicating the vision positively, with confidence, showing energy and enthusiasm in order to create an appealing and convincing vision. As for individualized consideration, transformational leaders see every employee as an individual having

specific needs and qualities, having strengths and weaknesses. Transformational leaders value each individual contribution. For transformational leaders, creativity, continuous improvement and training (intellectual stimulation) are the only ways to achieve sustainable competitive advantage.

They constantly change and adapt the way of doing things in order to stimulate the others and they also encourage new ideas and suggestions coming from their subordinates.

Transformational leaders have a strong impact upon those who follow them. They encourage new approaches and the development of their subordinates, thus receiving from their followers more than the follower intended to give. Their leadership skills can correct poor practices or internal conflicts between employees. What is very important is that transformational leaders encourage their people to take ownership for their work, thus making them more attentive and dedicated to what they are doing.

## **COMMUNICATION**

### **Definition and History**

Communication is all around us; it is part of our identity, and we use it in every interaction. It is done in different ways using different tools and techniques. Nevertheless, the most dominant part is the classical verbal communication; which is also what most people will think about when they hear about communication, but it is also about the non-verbal communication through our body language and our behavior. We can use it to manipulate others, by using different techniques and

behaviors. This can be done on purpose or subconsciously. This communication maybe the most effective tool for any situation in the world and allows us a great variety of possibilities to “communicate” by using our experience and knowledge about the outcomes of different ways of transferring a message or meaning to another party. Communication is not only used by humans, but also in the animal kingdom. Some animals have developed a unique way of communicating like the insects that can exchange information through pheromones, which inform members of the same species about specific situations. Therefore, there are different pheromones for alarm, food trail, sex and many others. Another example of a very different way of contacting members of the same species is the communication through vibration that is used by animals like spiders and elephants. Here, the animals stamp on the ground sending vibrations through the ground which can then be encoded by their peers in distance. The “classic communication” through “noises” like dogs, elephant and many other animals, is hearable for humans. There is another sort of communication which is out of the hearable frequencies for humans, as bats and wales can be seen as a very similar technique as the human verbal communication. In the animal kingdom, messages can be generally exchanged through hearing, smelling, feeling, seeing and tasting. At the first sight, this seems to be much more than for humans, but this is only partially true as humans can also notice communication in all of these categories but only to a very low extent and mostly subconsciously like the pheromones that humans spread. To link the animal communication back to the topic, one can see different groups of animals as an organization. A very good example is the bees and the ants that are living in big colonies. As these colonies

consist of a very high number of members, it is important for them to communicate effectively. Therefore, every member in these colonies is attributed to fulfill a specific “job” or responsibility. This can be seen as a great example of an effective community communication in the animal kingdom. There are members responsible for the maintenance of their “home”, others are responsible for the food collection, and others are the “babysitters” of their procreation. This is highly comparable to organizations with different departments in order to split the work up by creating experts in different operational areas.

Having described the very special techniques of the animals as well as those techniques used by humans, one should not forget the importance of written communication. It was essential for the world to develop as it is today. Thousands of years before Christ, people developed methods to communicate in writing. The Phoenicians developed an alphabet and the Egyptians developed the hieroglyphs in order to send or transmit messages to people far away. Through this development, it was possible to exchange information without personal contact. About 800 BC, the Greeks used their first pigeons to send messages, which can be seen as the first postal service in the world. These pigeons were used to proclaim the winner of the Olympics. At those times, that meant a great advantage in war scenarios and preparation as they could exchange strategies over far distances much faster than their enemies. Furthermore, the overall communication changed drastically as people suddenly were able to exchange with people over far distances without being forced to actually travel all the way.

In the course of time, more and more techniques were developed like the smoke signs by the Indians, the heliographs– sending messages by using mirrors which reflected the sunlight by the Romans, and of course the books which were majorly invented to record and collect knowledge to share it with each other. This exchange of knowledge was extremely important in those times, as it represented the opportunity to learn from other cultures and experiences. That was especially effective, as many books were collections of war experiences and strategies. From these contained cases of war scenarios, externals could learn from these situations to be better prepared for their own battles. Exchange of knowledge and written down recipes as well as experience collected in books was a very important achievement was medicine. People were able to learn from each other in different fields of knowledge and especially in the field of medicine. This saved many people’s lives. The same is true for the agriculture, as many people were struggling with their food production. Again, the different channels of communications created a global network, which helped them to share new ideas to let their fields grow.

By the time, communication was a commonly used tool in most parts of the world. People started to recognize the enormous power communication represented for them individually. In the definitions of communication, one can read that symbols and use them to transfer information as in wars. Through symbols, people of the same group feel associated and strong as a unit. Today, one of the most frequently used symbols is the emoticon, which is mainly sent through SMS, replacing our body language. Many leaders in history understood the potential of symbols, and made heavy use of it by creating a feeling of commitment

and involvement. Additionally, they used common salutations to foster this commitment. Hitler was one of the most remarkable and greatest leaders, in regard to his communication brilliance, who has ever existed. He perfectly understood the importance of a multi-communicative system, taking into account externals (consultants) advices. Being aware of that, he created a culture of strong beliefs and values, which he shared with its members. That common culture full of shared values and understandings was the base for his success as a leader. He knew what people needed in the post first world war period, and made use of it. Mentioning his great abilities to attract followers through different forms of “behavior”, it has to be said that he was one of the most dangerous leaders using his power for mass killing trying to eliminate a whole race. The author only illustrates his example to analyze his great ability to attract followers not going into detail about the result of his work.

In Burton’s analysis “The Forest of Rhetoric”, he talks about Hitler’s as follows,

Germany of post-World War I was demoralized and disorganized. Adolph Hitler's rhetoric was successful not only because of his personal charisma and his mastery of delivery, but because he spoke at the right time, the German people wanted a way out of its economic morass and its cultural shame, and Hitler provided them both with his strong, nationalistic oratory. Had Germany been doing better economically, Hitler's words would have bounced harmlessly off the air (Burton, 2005).

He had all-important qualities for a communicative genius. He was a master in using symbols, like the logo of the Nazis, embodiment of vision, speaking skills and great performance. All these ingredients enabled him to succeed in his plans by having his followers on his side, through communication.

Giving a brief overview about the development of communication I will now come to the topic of internal communication. Living in a fast moving world full of competing organizations, effectiveness is the most important word for most organizations. The highly competitive environment shows its power every day. Companies cannot allow themselves any kind of error as the competitors are just lurking for their customers. Customer's loyalty is also an expensive and hard-to-get "service". All over the world organizations are spreading, and the big players out rule the small firms. Many small businesses and single shops have no possibility to compete and keep up with big organizations and chains. Subsequently, many companies expand, and the number of employees in those organizations rises. This is one reason why internal organizational communication is getting more difficult as the complexity reaches its peak. Leaders are daily confronted with the questions of "how", "what" and "when" to communicate in order to be as effective as possible.

Searching for a definition of communication, one can find an endless number of different experts and also non-experts who are trying to define it. Nevertheless, here is a neutral one, simply stating the basic idea of communication, highlighting additionally the tremendous importance of the elements of symbols and signs. It explains the basis of communication, having at least two parties who do understand a

common “language” consisting of symbols, signs, gestures, traditions and behaviors. It is a “process by which information is exchanged between individuals through a common system of symbols, signs, or behavior” (*Webster Dictionary*).

## **Organizational Communication Structure**

Communication is the exchange of information and the transmission of meaning. When one reads about organizational communication, he/she will find many different types of communication, which are usually interlinked with the overall structure of the organization. One can always differ between internal and external communication, therefore; it is essential to highlight once more that this book will exclusively concentrate on the internal procedures. The level of hierarchy within a company also influences the type of the internal communication flow. Usually, a formal communication comes along with hierarchical companies, and flat organizations allow a higher level of informal structure. Therefore; this book will present the different structures by clustering them into “formal” and “informal”.

### **Formal Communication:**

It deals with the sharing of official information between members through a predesigned channel and chart of flows, very often equal to the organizational chart. It consists of a given organizational structure, showing the detailed flows of internal communication. Further details are usually written down in a manual, the organizational chart itself or other policies in order to present the official streams that have to be

followed. Formal Communication is very often split into three types “Downward”, “Upward” and “Horizontal” representing the direction of the information flow. Downward streams are commonly used for instructions, directions and feedback given from the top management to the employees. The upward flow most often asks for guidance, data and direction, needed by the employees or all kind of reports prepared for the management as well as possible improvement ideas presented to the board. The horizontal stream finally, is needed and used by employees in order to cooperate with their colleagues. It could be necessary for the coordination during a project or simply the daily business. Subsequently, it facilitates their office work. A very typical direct communication structure can be seen in the “Chain Network”, which defines a clear flow of information.

To exchange information within these streams, one can choose between the verbal form, which is done through presentations, conferences and speeches, or the written form which represents the bigger percentage, done through emails, internal papers, chats and notice boards and also different information systems which are applied.

### **Informal Communication:**

It is compared to the formal one, an open system without a pre-given skeleton. It is usually the tool for sharing information based on private or personal interest. It creates a very open and information sharing friendly environment, enabling employees to exchange their different feelings, experiences and stories. Subsequently, it is an important factor for the development of a relaxed and comfortable working atmosphere.

Typical open communication networks without pre given communication structures, is the “Circle Network”, “Gossip Network”, “Probability Network” and the “Cluster Network” (Jablin & Putnam). The last enables every member in the network to share and use all available information on an equal level. This type of communication flow is very effective as it represents the highest level of satisfaction for employees. It is multi-dimensional flow, which facilitates a very flexible and quick response system. It is a great supplement to the necessary formal channel and creates a faster solution-finding environment through the free expression of everybody’s ideas. Mentioning also the negative aspects of intense informal communication, it should be observed and monitored by management as it can create internal disputes and the original sender can often not be identified. Secondly, as a very personal based communication flow, it is also the channel through which rumors and unconfirmed information share. So it will be in the management’s interest to stop possible conflicts.

As a final remark, it is important to understand that informal communication flows within a company should never be seen as a substitute for an ineffective formal one. Informal can be seen as an additional flow which is essential for employees to feel content which is important for their motivation. It is essential to exchange not only business related information, but also to share private concerns with trustful colleagues. This part of communication is a driving factor in order to increase the quality of the working atmosphere leading to a higher quality of the organizational results.

## **SITUATIONAL COMMUNICATION**

It is interesting to see in what kind of organizational situations communication ascribes a special role and in how far different situations demand different communication. Communication is an exchange of facts, ideas or opinions by two or more persons. When one looks at company intra-communication, he can recognize different situations and scenarios that are asking for different actions and various strategies mainly caused through different levels of urgency. When we compare the communication style of an organization going along with its daily business, to the communication behavior during a phase of change, we will recognize a difference. A process is a very important situation, which needs a clear coordination of all involved parties. As a change, the coordination of the communication during these times can be seen as the topic number one. For a company to successfully go through a changing process, it is necessary to keep all members up to date about all required information. People need to be informed about what is going to happen and how it will affect them in order to keep or establish an effective environment, which results in the company's success. This is not only true for every organizational situation, but especially for such a changing phase. Effective employee communication is a leading indicator of financial performance. Studies have shown that the most effective employee communication programs provided a 91% total return to shareholders compared to the least effective programs, which only provided about 60%. Furthermore, those companies, which have implemented a very effective employee communication program, had four times higher rate of employee engagement.

What is very important in a process of change is also to not only communicate what is changing and how it is going to be changed, but also to state what will stay the same to give the affected parties some points of reference and things they can stick to. Mentioning the situation of change within the last paragraphs, it is time to deal with another type of situation, which is very similar to the changing process. It is about communication during crisis. Although one can see many similarities between the crisis situation and the situation of change, there are some distinctive characteristics. This comes also from the fact that crisis represents a very extreme example of a change as it represents the highest level of urgency. Crisis is a time of intense difficulty, trouble and danger, in which important decisions must be made. This danger a crisis describes for an organization, is the reason why such a situation asks for very clear, concrete and structured communication. Time plays a highly important role in these times as it is crucial to exactly understand the problem and the impacts on the organization before the management actually can start with the problem solving process and communication. Everything has to be done quicker. The motto during a crisis is the longer you wait to act, the higher the price, and therefore organizations should do their best to be prepared for a possible crisis to save time. What leaders have to understand is that crisis is not a myth. Crisis has become a part of our daily life. What Zaremba writes: “Crises happen, and when they do organizations must be prepared to communicate effectively and open with their internal and external stakeholders” (*Crisis Communication*, 2010). One can see that different situations ask for different priorities when it comes to communication. This is not only true for situation, but also for the tools of communication. As one can

experience it in his/her private life, people communicate differently when they use different tools of communication, as a phone call does not offer the possibility of using one's body language.

### **Ways of Communication**

This part deals with oral and written "tools" as well as the individual art of performing communication. As everybody knows, different situations ask for different tools which are closely related to adopting the communication type with specific situations. These tools can be split into technical and personal tools. The first cover all techniques and method as well as channels used for communication; the second are personal skills used for the message sender, like rhetoric or human sensitivity.

- **Oral Communication:**

Oral communication enables the communicating parties to use their oral skills to support their messages. By using ones, voice and the variation of its tone can be one of the advantages of an oral communication. Sometimes, the voice of the opponent gives us a feeling about his/her mood or feelings. As it is a very direct and personal way of communicating, it usually enables a faster response to the opponent words. Furthermore, through an oral communication people can make use of pauses or other verbal techniques that cannot be used in a written form. Although rhetorical techniques are also possible in written communication, it is rather a tool to be used in oral communication and also a very strong one. As there are many situations and ways to communicate orally, there are six types of communication. Face-to-Face, Interview, Presentation, Telephone, Pubic Speech and Meeting.

Face-to-Face communication is by far the most important one and usually also the most effective one. Unfortunately, it requires a lot of time and resources so that face-to-face meetings have become really rare in today's competitive business world. Most of the face-to-face meetings have been replaced by email conversations and telephone calls. Face-to-face conversations are very effective as the involved parties have the chance to directly stress possible misunderstandings, and involves the non-verbal communication of body language and gestures that cannot be transferred through other types of communication where they concerned parties do not see each other. As we have learned only 7% of a face-to-face conversation is conveyed by the words and another 38% are transmitted by the tone. The remaining 55% of the information are transferred through the body language, which helps us to recognize the importance of face-to-face meetings. Furthermore, a face-to-face meeting includes the physical appearance, which can be used in order to support ones professionalism. This is also true for interviews, presentations, public speeches and meetings, which also give the listener the possibility to observe the opponent.

Nevertheless, an interview usually has a pre-given structure or guideline of the direction of the dialogue. Subsequently, it is not as open as a face-to-face meeting, and is typically characterized by a question and answer type of communication. Due to this fact, the involved parties very often have the possibility to prepare themselves according to the topic, thinking about possible arguments or questions. This last point is also true for a presentation. A presentation is usually a formal situation in which the presenter tries to delivers a message, knowledge or information on a specific topic to an audience. As the presenter knows

about the topic a long time before he/she can perfectly prepare to deliver a very powerful and strong presentation. This setting can be seen as a face-to-face situation although it is usually monologue until a question and answer round at the end is opened. A great advantage of a presentation is the possibility to use materials to support one's message. As a presenter one can use any kind of supporting material (audio, video, products...) to enhance the presentation.

Although a presentation is very similar to a public speech there are still some differences to be found. A public speech is usually very formal with a greater distance to the audience. Speeches are usually used for three purposes (Aristotle), for entertainment, to encourage and to inspire. According to these situations, a speaker usually adopts his/her words, rhetorical techniques and message. The presenter also adopts his or her presentation according to the audience, so that the most effective method is used, which includes words, phrases, tone, stories, behavior and much more. Another difference is that at the end of a speech, one will usually find no question and answer part but much rather simple applause which at the same time represents a very little feedback compared to the presentation where the audience usually gives very productive feedback from which the presenter can learn for his/her future.

In a meeting, one can find usually different people with different skills, and a chairman who is leading the conversation. In organizations, such meetings usually consist of different experts who present their opinion to a specific topic or show the current situation of their department. In comparison to the presentation and the public speech, a meeting includes more the one "speaker" who communicates on a rather equal level compared to a presenter and an audience. A meeting has a

clear schedule and topic, which is gone through in order to give an overview to the others. Here it is usually not about convincing others of something, but about sharing knowledge. Today the amount of video meetings (conferences) is rising as it often saves time and costs. Subsequently, these meetings always handle time efficient, asking all participants for a clear and short formulation that sums up all arguments, which they others can understand.

The last type of communication that was not mentioned so far is the telephone conversation, which differs from the others, as it is the only one without physical proximity. This condition asks for different behavior of the message sender. As the important part of the observable behavior of the communicating parties falls away, all communicators have to focus on the verbal part only, as it is with podcasts or voice mails. Here the voice is the only element the opponent can analyze. The focus lies on the wording, the tone of one's voice and the “verbal behavior” (Skinner, 1957). By verbal behavior, Skinner understands the way people are communicating. This includes the rhetorical part, but also the way we react spontaneously to our opponent words in a conversation, like pauses, astonishment and other characteristics, which can be interpreted over a telephone conversation. As humans are rather visual creatures, we instantly start to picture our opponent even if we do not know him/her. We start to imagine a person that fits to the voice we hear, according to our experiences. Therefore, telephone conversations or other audio bases communications often delude our perception. Knowing this, every person should be aware of how he/she is perceived in audio based conversation.

- **Written Communication:**

When it comes to written, internal communication many companies have developed their own structures. The most regular used written communication today includes emails, internal post and chats, where different kind of information can be forwarded through these systems. Letters and reports are very often forwarded through the internal post, as they are rather important and should be given in hard copy and rather formal communication tools as we have heard. On the other side, we have email conversations that take over the biggest part of written communication. It is usually used as a fast way to send and respond to various issues, and can in general be seen as the informal tool most often used in today's businesses. A very similar system is the chat, which is nevertheless an even more informal way of communicating. In most companies chats are mainly used to communicate with colleagues or other members on the same hierarchical level. Therefore, emails are the most widely used form of written communication for complex issues. Also the CSR (Corporate Social Responsibility) politics of many companies have been the reason for a rising email conversation, to save paper and the printer ink as long as it is possible.

As it was partially mentioned in the part of the oral communication, written communication is very much dependent on the authors ability to set up a clear and strong message by using different techniques. As the only thing the receiver will find in the message are words, it is crucially important to choose the right wording and the right writing style. As there is only the receiver who will interpret the meaning of the message for him/herself it is the author's task to create a message that can be understood by everybody in the same way, anticipating

possible misunderstandings. This is strongly connected to the task of understanding others' frames of references in order to be able to set up the best and most effective tailored message. If the author is aware of how the audience is going to interpret his/her text or notice, he/she will be able to understand parts of their minds giving him the possibility to adjust the message to their understandings.

When we look at the characteristics of a notice, which is a formal tool, we can say that this kind of written communication is usually used when many people have to be given the same information. Therefore it is one of the mass communication tools and demands a careful creation, as it will be seen by many different people. It has to be neutral in gender, age and cultural, which seems to be a matter of course. Managers are still faced with new situation of accusations. As it is with the frames of references, one cannot always anticipate what other people interpret or understand from a message especially coming from different cultures.

Typically, a notice is very easy to understand and easy to read to prevent any kind of misunderstandings. Very often it consists of a description of the addressees, the reason, the details of the issue/event and a contact person for further questions. It is a short and simple tool to give hard facts about an upcoming issue/event to a large amount of people.

A report, another example of written communication, is a tool to share and forward knowledge about a specific situation of organizations, often prepared by all departments to give the management and the leader an overview of different developments and trends. A report requires a lot of careful research, collection and analysis of the concerned data, in

order to summarize the most important findings. Usually it is structured into a well-organized presentation of the findings, being followed by a conclusion, recommendations and further suggestions. The most important characteristic of a report is the way of putting everything in a nutshell to make the arguments short and simple. As the part of recommendations and suggestions is really important, the author who should be an expert in what he/she is reporting has the responsibility to use his writing skills to stress the main points that are important for the company. This should also be done through prioritizing those points by giving clear and strong arguments for their importance. All these facts, especially the issue that it represents important data of the organization makes a report to a very formal tool.

As one can see and most people will have experienced, it is usually more difficult to set up a written message as it restricts people to use their verbal skills to deliver a message. To go further, as we have heard in the part of oral communication, face-to-face meetings additionally offer the possibility to use non-verbal communication to transfer meaning to another person. When it comes to the communication of leaders, it is not only important to the communication itself but also the personal characteristics that shape the overall communication they are performing. The next chapter will present a few examples of great leadership coming from different areas.

## **Time Management**

### **Ten Strategies for Better Time Management**

The term Time Management is a misnomer. You cannot manage time; you manage the events in your life in relation to time. You may often wish for more time but you only get 24 hours, 1,440 minutes or 86,400 seconds each day. How you use that time depends on skills learned through self-analysis, planning, evaluation, and self-control.

Much like money, time is both valuable and limited: it must be protected, used wisely and budgeted. People who practice good time management techniques often find that they:

- Are more productive,
- Have more energy for things they need to accomplish,
- Feel less stressed,
- Are able to do the things they want,
- Get more things done,
- Relate more positively to others, and
- Feel better about themselves.

Finding a time management strategy that works best for you depends on your personality, ability to self-motivate and level of self-discipline. By incorporating some, or all of the ten strategies below, you can more effectively manage your time.

#### **1. Know How You Spend Your Time**

Keeping a time log is a helpful way to determine how you are using your time. Start by recording what you are doing for 15-minute intervals for a week or two. Evaluate the results. Ask if you did

everything that was needed, determine which tasks require the most time, determine the time of day when you are most productive, and analyze where most of your time is devoted – job, family, personal, recreation, etc. Identifying your most time-consuming tasks and determining whether you are investing your time in the most important activities can help you to determine a course of action. In addition, having a good sense of the amount of time required for routine tasks can help you be more realistic in planning and estimating how much time is available for other activities

## **2. Set Priorities**

We spend less time on activities that are not important (regardless of their urgency) in order to gain time to focus on activities that are not urgent but important. Focusing on these important activities allows you to gain greater control over your time and possibly reduce the number of important tasks that do become urgent. One of the easiest ways to prioritize is to make a “to do” list. Whether you need a daily, weekly or monthly list depends on your lifestyle. Just be careful not to allow the list-making to get out of control and do not keep multiple lists at the same time. Rank the items on your “to do” list in order of priority (both important and urgent). You may choose to group items in categories such as high, medium and low, number them in order, or use a color coding system. Keep in mind that your goal is not to mark off the most items; rather you want to mark off the highest priority items. Having a prioritized “to do” list allows you to say “no” to activities that may be interesting or provide a sense of achievement but do not fit your basic priorities.

### 3. Use a Planning Tool

Time management experts recommend using a personal planning tool to improve your productivity. Examples of personal planning tools include electronic planners, pocket diaries, calendars, computer programs, wall charts, index cards and notebooks. Writing down your tasks, schedules, and memory joggers can free your mind to focus on your priorities. Auditory learners may prefer to dictate their thoughts instead. The key is to find one planning tool that works for you and use that tool consistently. Some reminders when using a planning tool are:

- Always record your information on the tool itself. Jotting notes elsewhere that have to be transferred later is inefficient.
- Review your planning tool daily.
- Carry your planning tool with you.
- Remember to keep a list of your priorities in your planning tool and refer to it often.
- Synchronize electronic planners with your computer and recharge the batteries in your planner on a regular basis.
- Keep a back-up system.

### 4. Get Organized

Most people find that disorganization results in poor time management. Professional organizers recommend that you first get rid of the clutter. A frequently used method is to set up three boxes (or corners of a room) labeled “Keep” – “Give Away” – “Toss.” Separate the clutter by sorting items into these boxes. Immediately discard items in your “Toss” box. Your “Give Away” box may include items you want to sell, delegate, or discontinue so find a method to eliminate these items such as

a yard sale, charitable donation, or gifts to friends or family members outside your home. With the clutter gone, the next step is to implement a system that allows you to handle information (e.g., tasks, papers, e-mail, etc.) less, only once, when possible. Basically you have five options for handling information:

- Throw it away, delete it, or otherwise get rid of it.
- Delegate it: give it to someone else to do, file, or respond.
- Act on it yourself. Then throw it away.
- File it temporarily until it needs action or until additional information is received. Follow-up: a “tickler” file can be useful for holding temporary information.
- File it permanently where you can easily find it later.

## **5. Schedule Your Time Appropriately**

Even the busiest people find time for what they want to do. Scheduling is not just recording what you have to do (e.g., meetings and appointments), it is also making a time commitment to the things you want to do. Good scheduling requires that you know yourself. Using your time log, you should have determined those times during the day when you are most productive and alert. Plan your most challenging tasks for when you have the most energy.

Block out time for your high priority activities first and protect that time from interruptions. If you know you will have waiting time or commuting time, schedule small tasks such as writing a letter, jotting down a shopping list, reading or listening to educational audiotapes to capitalize on the time loss. Try to limit scheduled time to about 3/4ths of

your day, leaving time for creative activities such as planning, dreaming, thinking, and reading.

## **6. Delegate: Get Help from Others**

Delegation means assigning responsibility for a task to someone else, freeing up some of your time for tasks that require your expertise. Delegation begins by identifying tasks that others can do and then selecting the appropriate person(s) to do them. You need to select someone with the appropriate skills, experience, interest, and authority needed to accomplish the task. Be as specific as possible in defining the task and your expectations, but allow the person some freedom to personalize the task. Occasionally, check to determine how well the person is progressing and to provide any assistance, being careful not to take over the responsibility. Finally, don't forget to reward the person for a job well done or make suggestions for improvements if needed.

Another way to get help is to "buy" time by obtaining goods or service that save you a time investment. For example, paying someone to mow your lawn or clean your house, using a computerized system, or joining a carpool to transport your children to their extracurricular activities can allow you free time to devote to other activities.

## **7. Stop Procrastinating**

You may be putting off tasks for a variety of reasons. Perhaps the task seems overwhelming or unpleasant. Try breaking down the task into smaller segments that require less time commitment and result in specific, realistic deadlines. If you're having trouble getting started, you may need to complete a preparatory task such as collecting materials or

organizing your notes. Also, try building in a reward system as you complete each small segment of the task.

## **8. Manage External Time Wasters**

Your time may be impacted by external factors imposed by other people and things. You can decrease or eliminate time spent in these activities by implementing some simple tips listed below.

- Use voice mail and set aside time to return calls.
- Avoid small talk. Stay focused on the reason for the call.
- Stand up while you talk on the phone. You are more likely to keep the conversation brief.
- Take any necessary action immediately following the call.
- Set aside times of the day for receiving calls and let others know when you are available.
- Keep phone numbers readily available near the telephone.
- Establish blocks of time when you are available for visits.
- Tell the visitor politely that you cannot meet with them at this time and schedule the visit for a more convenient time.
- Set a mutually agreeable time limit for the visit.
- When someone comes to the door, stand up and have your meeting standing.
- Know the purpose of the meeting in advance.
- Arrive on time.
- Start and end the meeting on time.
- Prepare an agenda and stick to it. Use a timed agenda, if necessary.
- Don't schedule meetings unless they are necessary and have a specific purpose or agenda.

- Set aside a specific time to view and respond to your mail and e-mail, but don't let it accumulate to the point that it becomes overwhelming to sort.
- Turn off instant messaging features on e-mail.
- Handle each item only once, if possible. Practice the options for dealing with clutter listed earlier.
- Sort mail near a garbage can, and delete junk e-mail immediately from your electronic mailbox.
- Answer written messages by responding on the margins or bottom of the page.
- Establish a master calendar for each family member to post their time commitments.
- Make each family member responsible for consulting the master calendar for potential conflicts.
- Create a central area for posting communications such as appointment reminders, announcements, and messages.

## **9. Avoid Multi-tasking**

Recent psychological studies have shown that multi-tasking does not actually save time. In fact, the opposite is often true. You lose time when switching from one task to another, resulting in a loss of productivity. Routine multi-tasking may lead to difficulty in concentrating and maintaining focus when needed.

## 10. Stay Healthy

The care and attention you give yourself is an important investment of time. Scheduling time to relax, or do nothing, can help you rejuvenate both physically and mentally, enabling you to accomplish tasks more quickly and easily. Learn to manage time according to your biological clock by scheduling priority tasks during your peak time of day, the time your energy level and concentration are at their best. Poor time management can result in fatigue, moodiness, and more frequent illness. To reduce stress, you should reward yourself for a time management success. Take time to recognize that you have accomplished a major task or challenge before moving on to the next activity.

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**Dr. Hamada Eid Nawar Alantably**

[dr\\_hamadaeid2012al@hotmail.com](mailto:dr_hamadaeid2012al@hotmail.com)

00201143681845

<https://www.facebook.com/hamada.alantably>



MARIDA PATANI  
VALLETTA