



INTRODUCTION

It is believed that how one eats will affect not only their job performance but also performance of activities in daily life. Mental alertness and clarity, physical energy and stamina are dependent on the essential micro- and macronutrients obtained from a well-balanced diet.

Crews are subject to many environmental factors that impede or impair their ability to perform their jobs with the same efficiency of a person with a similar occupation on land. In addition they do not have the same availability of the variety and freshness of food which further challenges their job performance. When working and living at sea there are many factors encountered that impede dietary choices. Factors such as cold storage, pantry capacity and shelf life, amongst others, reduce the availability of fresh products. On long journeys when port stops are few and far between seafarers may have limited access to the variety and quality of foods that create a well-balanced diet and must resort to packaged foods of less plentiful nutrition.



The preserving and packaging process compromises the quality of the nutrients in food, and so the more a diet relies on packaged foods the less nutritious the food intake becomes. The effect of reduced nutrient intake on seafarers' work capability and energy at the latter part of the voyage may also impact personal and crew safety.

There are additional concerns besides the issue of actual work performance that should be considered with the restriction of fresh fruits and vegetables, fresh dairy and meat such as the health and wellbeing of sailors. This can be compounded by the need for mass food production as healthiness may not be a high priority in food preparation. The culture onboard ships may also have an impact on food choices individuals make. Cooks have to battle with budget, space issues and mass-food production issues, and thus may not always provide the most nutritious meals to the crew onboard.

Terms/Definitions

Malnutrition: Ingesting too much or too little of a, or several, nutrients that manifests as impairment, illness or disease.

Micronutrients: Vitamins and minerals that are essential in minute amounts for human growth and metabolic functions.

Macronutrients: Nutrients required by the body in large amounts, such as protein, fat and carbohydrates, for healthy growth and maintenance.

Diet: The usual foods eaten by a person on a day-to-day basis.

Human Performance: Completion of a task, cognitive, physical, or psychophysical, to the expected standard of accuracy, efficiency and completeness.

Cognitive: "Brain work". The mental processes of perception, memory, judgment, and reasoning/thinking.

Psychomotor: movement or muscular activity associated with mental processes.

DISCUSSION

Level of Concern

Seafarers are exposed to a high level of psychosocial stress as a byproduct of the lifestyle and work conditions they encounter due to the nature of their jobs. This stress combined with a poor diet and minimal exercise results in a population of employees at high risk for a number of physical and mental challenges and impairments.

Uniquely, mariners have no chance to get away and refresh and revitalize after a hard day at work as their non-working time is spent under the same roof and within the same confines as their work time. Long haul shipping routes challenge the mental, physical and cognitive health of these workers. Maintaining a healthy and balanced diet will assist other problem areas such as weight control, mood, coping with psychosocial issues such as isolation, distance from ones family, and aide in the maintenance of cognitive performance. All of these factors, when impaired, can lead to decreases in performance which may translate into a safety concern.



The following topic areas will be discussed below in their relevance to mariner's lives and how diet affects or is affected by various external factors at sea.

- Human Performance
- Nutritional Culture at Sea
- The Third Status

Human Performance

Human error may arise as a result of performance, fatigue, and behavior. Diet impacts all of these factors, and so this section will explore how they are affected by one's diet.

Performance is affected by numerous variables. An individual's diet provides the essential micronutrients and macronutrients necessary for their physiological processes and cognitive process to function at the level demanded by their lifestyle. Inadequate dietary intake, be that too much or too little, can result in a negative impact upon performance.

IMO guidance on fatigue suggests that crew should eat well-balanced regular meals. This is a sound recommendation for maintaining healthy levels of energy throughout the work hours and for obtaining healthy sleep during off time, but perhaps not so easily followed when at sea for extended periods. Note also that no one food supplies all the essential nutrients in the amounts needed. Therefore, it is important to eat a variety of foods each day.

Malnutrition is associated with behavioral and cognitive deficits. Kruesi & Rapoport (1986) performed a review of literature which studied the relationship between diet and behavior. They found that, generally, in studies comparing fasting versus fed states, mental performance was better in the fed than the fasting trials. During testing undertaken on rats, low-protein, high-carbohydrate diets over several days led to aggression in rats, and certain nutrients are affected by the time of day they are given, such as caffeine, and its effect on cognitive performance.

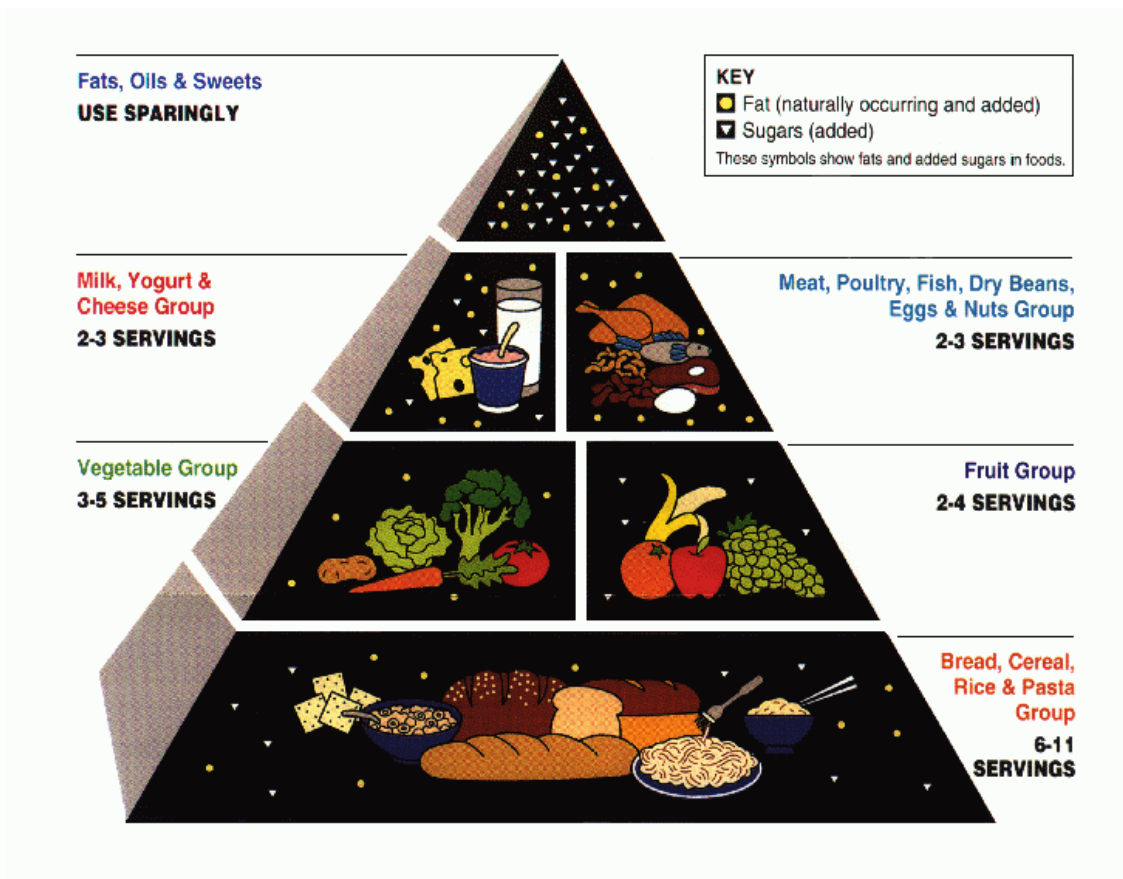
When carbohydrates such as rice, pastas and fruit are ingested, they are broken down and absorbed into the blood stream. At this stage they are in the form of glucose which is a form of sugar found in the blood. The blood then circulates them to muscles, fibers, tissues and organs in need. Glucose is then passed through a process which creates energy, or if it is not used it is stored for use later. Glucose is the fuel source of the brain. Depleting blood glucose levels will in turn result



in reduced efficiency and performance of cognitive functions. Below is a pictorial representation of the symptoms of low blood sugar. Performance suffers as a result of all these symptoms.

Carbohydrates and protein have different effects on performance depending on the nature of the task. High carbohydrate meals produce increases in cognitive functions, and high carbohydrate meals also produce lots of energy. A high protein meal will produce better peripheral or, psychomotor response time, but this is only apparent two hours after the protein is ingested. (Blundell et al, 2003). High protein also helps to build muscle which may be beneficial for those crew members doing more physical based work.

A review by Jun Zhu discovered that many seafarers are malnourished. While the role of nourishment in human error at sea has not been clearly defined, interest in this relationship exists, and is being pursued (Zhu, 2006). Zhu claims that seafarer malnutrition is the main contributing factor to human error and maritime accidents that result from these errors.



Nutritional culture at sea

An article by Sundgren (2005) explores the attitudes of crew toward their present diet, and the idea of improving the food available to them for health benefit. Sundgren claims that mariners are conservative to changes. A cookbook to encourage healthier eating habit called “Food at Sea” was developed and marketed. Reception of the idea was not all positive. A quote by Vinter (in charge of book production) in the article (responding to the poor reception) states that “real men don’t eat salad, they smoke and drink booze...” He calls this mind frame the Tarzan Syndrome. Basically, the Tarzan Syndrome is exhibited by men whose behavior is determined by their maleness. For example, they may engage in risky behavior to gain attention and popularity. A lesson may be learned from Popeye, who promotes the merits of leafy greens and the nutrients they provide to keep a sailor strong and sharp.



There is a need to push for improved prerequisites for a healthier lifestyle onboard ship so that those who are predisposed to disease may more easily take preventative measures to stay healthy as opposed to the unusually unbalanced, and high fat diet on board. A high incidence of nicotine usage on ships compounds these issues.

The Third Status

As discussed in an article by Zhu (2003), the third status is a state between health and disease. It is a state pre-disease onset when a person is in a condition of malnutrition, either under- or over-nourished, and their body is stressed. This will most likely develop into a disease or illness unless the individual is able to recognize that they are malnourished, and rectify their food choices to support a change in the direction of good health.

SUMMARY

There will always be unique challenges facing mariners. A shift toward improving the conditions they must live in gives mariners opportunity to have a more comfortable stay during their shifts at sea.

Monitoring one's health and keeping on top of deficiencies and illness as they appear in regular checkups will facilitate the maintenance of the individual's health status on the healthy side. Taking advantage of the improvements to ship food supply, and other improvements that assist in maintaining health at sea will improve the quality of life of a sailor, and help them to perform their job efficiently, and accurately.



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