

## **OCCUPATIONAL HEALTH PRACTICE IN THE SINGAPORE NAVY**

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### **ABSTRACT**

Occupational health practice in the military is challenging and also an important facet of the overall healthcare service delivery. This paper describes how it enhances the operational readiness of the Republic of Singapore Navy during peacetime and operations, the organisational framework of occupational health services and the foreseeable challenges.

### **INTRODUCTION**

The mission of the Singapore Armed Forces is to provide the interests, sovereignty and territorial integrity of the Republic of Singapore from external threats. For the

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Republic of Singapore Navy (RSN), this translates into the task of contributing to the security of the island republic and assuring her interests at sea. This paper discusses how occupational health enhances the operational readiness of the RSN during peacetime and operations, the organisational framework of occupational health services and the challenges that we face in this day and age.

## TRANSITION OF THE SINGAPORE NAVY AND MEDICAL IMPLICATIONS

The Republic of Singapore Navy (RSN) is a young, 40 year-old Navy that derived its roots beginning first with a handful of ships; that has now evolved with varying classes of ships with complementary functions – such as the missile corvettes, landing ship tanks, frigates, patrol vessels and submarines. Each has its own profile of health risks onboard. Supporting it are the shore-based units (such as workshops, operations centres, medical facilities, administrative offices) and the naval divers; and they too have their specific set of health issues.

The transition is not without medical implications. In the developing stages, the medical support structure targeted acute primary healthcare, training injuries and infectious diseases management needs. Occupational health programmes then were not prominent, and limited to rudimentary programmes and identifying the personnel that would go into combat and service-support vocations.

In the last decade or so, occupational health has become notable for the role it plays in the delivery of overall healthcare services within the RSN. There were various contributory factors. For instance, there is now a greater awareness of the relationship between health and work, and recognition that the human factor – i.e. his well-being, is crucial to the operational readiness of the military. While the disease pattern in Singapore has also moved towards a rising trend of chronic and lifestyle related diseases, the profile of occupational diseases/injuries has also shifted to a larger proportion of work-related disorders – thus more disease conditions seen at our military workplace has a work environmental component, and is not just based on the individual response. Thus, there is now an impetus towards disease and injury prevention. A ‘gung-ho’ attitude towards personal protective equipment by intentionally avoiding its use is now no longer acceptable. Another factor that has influenced this change is that of industrial health and safety legislation – that the possibility the military which has always been exempted could now be included. The level of societal tolerance towards

work-related diseases and injuries has apparently dropped with growing awareness of public safety.

## UNIQUENESS OF THE RSN WORKPLACE

The uniqueness of today's military workplace can be summarised into a single word - diversity. Firstly, there is a diversity of work environments. The navy personnel are required to operate on-shore, in the field, onboard ships, underwater and in hyperbaric environments. Secondly, there is also a diversity of work tasks ranging from combat, technical and service support vocations. Thirdly, with technological advancements, there is also the diversity of work equipment and weapons systems – systems that are becoming far more complex than the traditional basic weaponry. And finally, there is diversity in our people. We now have more females in the uniformed military. In addition, two unusual medical issues have emerged that have operational significance – a rapidly increasing prevalence of being overweight and myopia. Internal statistics have suggested a prevalence of up to 20% and 80% respectively in recent years.

## OCCUPATIONAL HEALTH PRACTICE

The RSN occupational health programme aims to protect and promote workplace health among RSN personnel (as evidenced by fewer work-related ill-health and reduced workplace hazard exposure), creating a positive influence on individual productivity and ultimately enhancing organisational operational readiness.

### ***1. Fitness for Deployment***

'Fitness for deployment' examinations (similar to 'fitness to work' examinations) tries to find the best match between the serviceman and his work. The work requirements have to be clearly defined and its health risks understood such that we would not jeopardise the serviceman's health. In addition, we also need to describe the physical and psychological attributes to best perform the deployment. For instance, hearing acuity is of great importance in sonar operators, and good visual acuity for combat divers. One of the biggest challenges is our limited human resource. The Singapore Armed Forces is a mix of conscript and professional military staff, and this is partly due to our small population of 4 million people. Our conscripts enlist between 18-21 years of age with a 2-year service duration. The turnover rate is thus relatively rapid,

and emphasises the importance of having an effective/efficient assessment of deployability fitness.

Our military has adopted a work capability index known as PULHEEMS. It is a capability grading from 1-5, for the following attributes:

- *General Physical* condition
- *Upper limb* function
- *Lower limb* function
- *Hearing* acuity
- *Right eye* visual function
- *Left eye* visual function
- *Mental* function
- *Social* function
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The PULHEEMS grading is prescribed based upon a matrix of a specific medical condition and its associated severity. One must thus meet the minimum grading set before the serviceman can be deployed into a particular vocation. The work environment and work tasks are regularly evaluated such that the appropriate PULHEEMS grade is set for a particular vocation. In general, there are PULHEEMS grading for sea deployability, shore deployability and deployability as divers. The deployability takes into account the medical selection criteria (which is tagged to the training) and retention criteria (somewhat less stringent than selection criteria and focuses more on abilities to fulfil the deployment requirements with workplace modification or closer medical monitoring). Such a system has helped to reduce the degree of attrition due to specific medical conditions.

## ***2. Controlling Hazards at Work***

Every workplace and tasks has its own unique set of hazards. The military environment has the added challenge of being deployed for operational missions – where operational leverage and success is prioritised over training health and safety levels. Nevertheless, we believe that operational risk may be alleviated with effective occupational health and safety programmes integrated within our daily routines. All workplaces and tasks require a risk assessment (always qualitative, sometimes quantitative) and have documented risk control measures.

One of the risk assessment matrix (RAM) methods, which utilises the concept of a Base RAM and On-Scene RAM, is used as a standard within the RSN units. Military exercises for example, would have a Base RAM. This could be further modified with the institution of control measures. An On-Scene RAM is further conducted just prior to

the activity to take into account various environmental/personal factors such as weather, sea-state and competency level of the involved serviceman as well as to ensure that the documented control measures are in place, and whether additional control measures are required.

Most of activities and training use the RAM methodology qualitatively. In some instances, a quantitative RAM is required, and this occurs most often when environmental permissible exposure limits for hazards are available. In our context, the more common hazards are that of chemicals, noise, heat stress, vibration and radiation (ionising and non-ionising radiation).

Workplace risk control measures are integrated into the operating systems as far as possible. As an added measure of safety, relevant occupational health and safety programmes are implemented. The most common programmes are centred around hearing conservation, control of hazardous substances (especially chemicals and biohazards) and prevention of musculoskeletal injuries. It is notable that chemical safety is often not clear-cut, especially since the health impact may not be obvious (unless there is acute overexposure) and may have a long latent period before any clinical manifestation. Examples of chemical concerns include the storage and handling of hydrocarbons for ships/vehicles, lead exposure in indoor shooting ranges, confined space issues and management of explosives.

### ***3. The Man-Machine Interface***

Our defence force is undergoing a major transformation into a 3G force. By '3G', we mean the 3rd generation military, and the launch of such a concept began with the reduction of National Service liability of our conscripts from 2 ½ to 2 years. The underlying basis for such a change was the recognition that the integration of advanced technology allowed the optimisation of training time without compromising our operational capability or readiness. We have (and will continue to develop) new combat platforms and new weapons systems.

Human factors engineering, otherwise referred to as the man-machine interface engineering considerations feature prominently in such projects. The work layout for the operator for optimal performance, takes into account the anthropometric measurements of our local population. Occupational health standards may sometimes not be met in certain weapon systems because it is just not possible from the engineering perspective or the exponential increase in costs. In such instances, a risk assessment is undertaken and the appropriate environmental and personal protective measures would be integrated into the use of such equipment to minimise the health risks.

## OCCUPATIONAL HEALTH ORGANIZATIONAL FRAMEWORK

The occupational health organisational framework rides on the well-established safety and medical organisations. This has proven to be synergistic by minimising duplication in programmes, sharing of resources and sharing of knowledge/expertise.

Structurally, the occupational health and safety organisation comprises of echelons. At the policy level, we have a central Naval Occupational Health Working Group with representation by the Safety Inspectorate, Medical Services, Formation Occupational Safety/Health representatives and Logistics and Training Departments. At the lower echelons, the ground units' Safety Officers and Medical Officers provide the environmental and medical surveillance by being the 'eyes and ears' on the ground. Enforcement of safety standards are accomplished by the Safety Inspectors. The environmental hygienist capability resides centrally with the medical units. The Occupational Working Group reports to the RSN Safety Board represented by the most senior commanders within the Navy.

## CHALLENGES AND EMERGING ISSUES

### *1. Emerging Occupational Health Issues*

There is an increasing awareness of the health implications from chemical exposures, task-related musculoskeletal disorders, work stress, electromagnetic radiation and indoor air quality issues within the ships/submarines as well as shore units.

It is notable that the more complex work environments sometimes cannot be extrapolated from the industrial situation, and hence it would be incorrect to just adopt the industrial health and safety environmental exposure or biological norms. For instance, certain industrial chemical environmental standards to our ships may not apply as the former is based upon health risks from 8-hour daily exposures; and when personnel also live within their workplace, the standards will need to be adjusted to take into consideration possibly 24-hour exposures.

It is also a challenge identifying all the health hazards within our workplace. In addition, there is also the possibility of interactions involving various exposures albeit between chemicals or even chemicals with other physical hazards, further complicating the risk assessment process.

To overcome some of these limitations, occupational health considerations are incorporated in the human factors engineering part of the design phase of various

systems as far as possible. The risks of operating such equipment are determined, alleviated where practicable, and the necessary control requirements factored as part of the operating procedures.

## **2. Occupational health research**

Occupational health research is becoming increasingly recognised as an important component of the overall occupational health delivery process. A large part is primarily epidemiological. It could be described as continuum from:

- Epidemiological research – where the risk factors and risk assessments for specific diseases/injuries/vocations are identified; then
- Evaluating the effectiveness of various occupational health programmes;
- Refining a better job fit – to have a set of selection criteria to optimise individuals' abilities while putting in place job modifications to better suit the individual; and finally
- Enhancing the individual for better task performance

## CONCLUSION

Occupational health and safety, through its impact on protecting and enhancing the well-being of our personnel, has proven to be an important force multiplier towards the overall operational readiness of the Republic of Singapore Navy.

## REFERENCES

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