Military Medicine Research in Malaysia

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ABSTRACT

Research in military medicine is well established and recognised in many developed countries. For example, military medicine research in the USA has even explored applications of regenerative medicine, reconstructive medicine, transplantation immunology and neuroscience, including traumatic brain injury and neuroprosthetics, with the aim of getting innovative therapies to their wounded soldiers. In expanding their military capabilities, research has become important to determine the expected outcomes of developed nations which involve many specialised areas in the field of medicine. Research in military medicine in Malaysia has also become more important lately. This paper highlights certain areas where research has been conducted in military medicine, mainly in underwater and hyperbaric medicine, aviation medicine and operational medicine. Areas for future research development of military medicine in Malaysian are also discussed.

Keywords: Military Medicine, Malaysia, Research

INTRODUCTION

Research in military medicine is well established and recognised in many developed countries. For example, military medicine research in the United States has even explored applications of regenerative medicine, reconstructive medicine, transplantation immunology and neuroscience, including traumatic brain injury and neuroprosthetics, with the aim of getting innovative therapies to their wounded soldiers. In expanding their military capabilities, research has become important to determine the expected outcomes of developed nations which involve many specialised areas in the field of medicine. Research in military medicine in Malaysia has also become more important lately. Medical research in military settings in Malaysia has become a significant niche area such as in underwater medicine, aviation medicine and operational medicine. However, it was only recently in the year 2012 that the Department of Military Medicine of Malaysian Armed Forces was established to focus on military medicine research as one of its main roles.

There are a number of definitions on the meaning of military medicine. However in general, as an according to the Article 3 Statue of International Committee of Military Medicine Updated 2009 [1], military medicine is defined as diagnostic, curative and surgical activities in all their specialities when performed for the benefits of individuals of groups pertaining to military personnel under conditions of wars and in times of peace. These include (a) Preventive medicine, hygiene and industrial hygiene, and industrial medicine in a military environment, (b) Technique for assessing physical and mental aptitudes required for various military functions, (c) Survey medicine in all military matters, (d) Specific forms of mass medicine, (e) Odontostomatology in a military environment, (f) Pharmacy in a military environment, (g) Activities of veterinary sciences; in particular hygiene of food and zoonosis prevention, or related to animal pathophysiology in a military environment, (h) Administrative, organization and logistic activities associated with mission pertaining to the various branches of military medicine and (i) Any studies and research networks relating to the activities as mentioned before, and some of the activities may be of benefit to civilians as well.

The purpose of military medicine is to develop and produce physically, physiologically and emotionally fit, protected and resilience forces, and effective and safe health care systems that extend towards a state of forces health protection and readiness to response to war, crises, humanitarian and disaster and nations building in order to achieve the national and military objectives.

HISTORICAL DEVELOPMENT OF MILITARY MEDICINE RESEARCH IN MALAYSIA

The Malaysian Armed Forces was formed after Malaysia declared independence from the British Government in 1957. It consists of tri-services of the Malaysian Army, Royal Malaysian Navy and Royal Malaysian Air Force and the main role is to protect the sovereignty of Malaysia. At the present time, there are about 130,000 active military personnel; supported by about 30,000 territorial military personnel. The Malaysian Armed Forces consists of combat troops, combat support troops and services support troops.

From the Beginning of the Royal Medical and Dental Corps until the Year 1990

The history of the Royal Medical and Dental Corps began after the establishment of the First Field Ambulance, and First Surgical and Transfusion Team in 1965. It was initially known as the Medical and Dental Corps. After a series of re-arrangement of the corps in the Malaysian Armed Forces. It was officially commissioned in 1967 and later was changed the name to the Armed Forces Medical and Dental Corps in 1988. The first armed forces hospital has been operational since 1969 in Terendak Camp, Melaka.

During the period of 1970 to 1990, many new units of the medical elements were established such as the Medical Battalion, Medical and Dental facilities, as well as the development of the Institute of Aviation Medicine in 1976 in the Royal Malaysian Air Force Base in Kuala Lumpur and Institute of Diving Medicine in 1978 in Melaka [2].

The Armed Forces Medical and Dental Corps was renamed as the Royal Medical and Dental Corps in 1997, and is one of the services support troops under the Malaysian Army organization which provide health service support to the tri-services of Malaysian Army, Royal Malaysian Navy and Royal Malaysian Air Forces. Its headquarters is the Health Services Division of Malaysian Armed Forces. At the present time, there about 587 commission officers and supported by almost 3000 non-commission officers including civilian staffs.

There were not many military medicine research contributions during this period of time except for a few papers on operational medicine, which were published in local medical journals during the Malaya Emergencies periods. These papers were on infectious diseases such as malaria [3] and leptspirosis [4] which were the main occupational hazards to the military personnel during the military deployment in operational areas in the deep jungle near the borders of Malaysia – Thailand.

The Period from the Year 1990 to 2010

The 96 Armed Forces Hospital, which is a 164-bedded armed forces hospital at the Royal Malaysian Navy Base in Lumut, Malaysia was established in 1996. Besides providing basic medical specialities mostly to the Navy and their dependents, the acquisition of a multi-place three - compartment recompression chamber which is able to accommodate 14 persons at any time in the Department of Underwater and Hyperbaric Medicine was a major establishment for this hospital. This operational centre was later upgraded to be the Institute of Underwater and Hyperbaric Medicine (IUHM) in 2002, and become a referral centre for diving health support and diving emergencies for military and civilians in Malaysia [5]. There was a collaboration with the Divers Alert Network (DAN) to establish a 24-hour emergency hotline to the non-military diving community. Hyperbaric Oxygen Therapy (HBOT) was also introduced for the first time and this treatment was mostly for non-healing ulcers and was made accessible to civilian patients. This institute conducts the International Diving Medical Officer Course yearly for local and international medical officer. Several studies were conducted and published in local and international journals based on the development and cases treated in the recompression chamber.

Among the scientific papers published, was a case report of Pulmonary Overinflation Syndrome (POIS) in an underwater logger [6]. Another publication was on the trend of diving causalities from 1994 to 2004 which showed these casualties were contributed by the underwater logger (mostly foreigners) who did underwater logging activities in man-made lakes in the northern region of Peninsular Malaysia [7].

During that time, several medical officers were sent to do post graduate studies in local universities and also overseas such as in Singapore (Occupational Medicine), Philippines (Public Health) and USA/Australia/New Zealand (Underwater Medicine) and most of these published papers were contributed by them.

The Institute of Aviation Medicine[8] was officially commissioned in 1976 and provides aviation health services support such as aircrew medical examinations to all the flying units of the Malaysian Armed Forces as well as from government agencies. It conducts physiological training such as the altitude chamber hypoxia indoctrination training. The establishment of the Advanced Tactical Flight Stimulator (AFTS) 400G Trainer in 2005 has the capability of pulling up to 12G with four inter-changeable cockpit modules. This institute was also involved in the selection process of a Malaysian Space Flight Participant known as Program Angkasawan Negara. Several papers and studies have been presented in local and international medical conferences.

Operational Medicine Curriculum as one of the subs in military medicine was introduced in the Masters of Public Health – Occupational Health Specialisation of Universiti Kebangsaan Malaysia since year 2009. This curriculum has provided exposure to civilian post-graduate students in operational medicine for collaboration and networking to do medical research in military settings in future.

During this period, most research were conducted in military niche areas which were not available in civilian sectors such as underwater medicine, aviation medicine and operational medicine, and most of the research papers and presentations were by individual contributions.

CURRENT DEVELOPMENT OF MILITARY MEDICINE RESEARCH IN MALAYSIA

At the present time, the development of the infrastructure and organisation of health services support continues, as well as research development in military medicine. Two new armed forces hospitals were established10, the Tuanku Mizan Armed Forces Hospital in Peninsular Malaysia, commissioned in 2009 and Kota Kinabalu Territorial Armed Forces Hospital in East Malaysia, commissioned in 2013.

The Tuanku Mizan Armed Forces Hospital in Kuala Lumpur is a tertiary referral hospital for sick military personnel, their dependents as well as Malaysian Armed Forces Veterans and their dependents in Malaysia. This 282-bedded modern hospital is equipped with major specialisation clinical services. The hospital offers health services in niche areas, such as:

(1) The Department of Military Medicine: This department is a pioneer in military medicine research on soldiers health readiness in Malaysian Armed Forces.

(2) Centre of Excellence in Sports Injuries: This hospital is a referral centre for sport injuries particularly in arthroscopic surgery and offers the arthroscopic surgery course to orthopaedic surgeons from Ministry of Health Malaysia and private hospitals. There are papers published in medical journals for this niche specialisation [11,12].

(3) Centralised Laboratory Services: This laboratory facility offers the latest laboratory equipment in genomic and stem cell harvesting, and is currently conducting a research in regenerative medicine with Universiti Kebangsaan Malaysia.

(4) Hyperbaric Oxygen Therapy (HBOT): This therapy provides adjunct treatment mostly to non-healing ulcers and other related diseases to military personnel and civilians in Kuala Lumpur. Some research has been conducted with local universities to explore the benefits of HBOT in certain diseases.

(5) Hospital Base for Chemical, Biological, Radiation, Nuclear and Explosion (CBRNE): This hospital is in the implementation phase for CBRNE requirements and is working in collaboration with other government agencies such as NBC Defence Centre of Malaysian Armed Forces and HAZMAT Team Malaysia.

The Kota Kinabalu Territorial Armed Forces Hospital is situated in the Sepanggar Bay Submarine Base. This hospital is equipped with modern medical facilities that include a 10-men hyperbaric recompression chamber and 1-transportable chamber. It acts as a referral centre for maritime and submarine medicine and also provides health service support in East Malaysia13. Research on submarine medicine has become a priority since there are two Scorpene submarines with submariners in operational capabilities. A few studies have been conducted on the pattern of diving illnesses in East Malaysia, as well as some studies on health concerns and performances of submariners with the Science and Technology Research Institute for Defence (STRIDE) of Malaysia.

At the same time, research on occupational hazards and associated risk factors are being conducted on infectious diseases such as leptospirosis and malaria among military personnel who are being deployed in operational areas in northern Malaysian – Thailand border. There were an increasing number of cases of infected leptospirosis and malaria among military personnel in years 2012 and 2013, which were related to poor compliance of drug prophylaxis, lack of personnel awareness and enforcement. Newly emerging Malaria Knowlesi, which is related to monkeys has also been reported among military personnel who were deployed in the jungle near the neighbouring borders in the northern region of Peninsular Malaysian and in East Malaysia. There is a collaboration between Malaysian Armed Forces, government research centre and research university to develop dengue and leptospirosis vaccination in the future. Studies on physical hazards such as whole body vibration among armoured vehicle drivers[14], death due to lightening strikes [15] and death due to Malaria after a peace keeping mission were also published in local medical journals [16].

The involvement of medical elements of Malaysian Armed Forces in United Missions for military deployment overseas began as early as1960's and continue till now [2]. Malaysian Armed Forces has been participating in health development programmes in Afghanistan since year 2010. The Malaysian Contingent International Security Assistance Force (MALCON ISAF) was formed and medical teams from the Royal Medical and Dental Corps were deployed every 6 months to provide health development programmes to the community in Bamyan Province of Afghanistan. During the second group deployment of the MALCON ISAF in 2011, many health programmes were successfully implemented; including the supply of clean water by using a portable water filter which was designed by one of the medical teams by using 100% local materials. This simple innovation design was later named as the Bamyan Do It Yourself (DIY) - Bio Sand Filtration (BSF) System. This design was developed based on a field study which showed that the drinking water in that region was contaminated and had caused waterborne diseases. This filtration system has managed to reduce the number of water borne diseases, and has been installed in schools and many sites in that province. A year later, the Malaysian Armed Forces collaborated with a local Malaysian water company to develop a new BSF system, known as JERNIH (Jointly Developed, Efficient, Robust, Novel, and Innovative & Handy Water Purification System) which is highly efficient, robust and transportable and was displayed during LIMA exhibition in March 2013. It has been used recently in humanitarian missions to supply clean and safe drinking water during the massive flood in East Coast of Malaysia and to disaster areas after Super Haiyan Typhoon struck the islands of Philippine in 2013.

These operational and humanitarian experiences, as well as research findings. were shared through conferences presentation, media coverage, as well as written documentation in books and published articles in medical journals.

FUTURE DIRECTION OF MILITARY MEDICINE RESEARCH IN MALAYSIA

Military personnel carry a higher risk of morbidity and mortality in their work compared to the civilian population due to war-related injuries and non-war related injuries. The history of Malaysia has shown that during World War II and during Malaya Emergencies against communists, many military personnel died due to battle injuries and some died due to consequences of infectious diseases such as malaria and leptospirosis during deep jungle operations. However, it has been observed recently that the trend of mortality and morbidity has changed to non-communicable diseases due to unhealthy life styles. The Ministry of Health of Malaysia has recorded that the mortality and morbidity among the Malaysian population is becoming increasingly due to cardiovascular related diseases. The Malaysian Armed Forces has also recorded similar trends among its military personnel related to cardiovascular diseases as one of the significant mortality and morbidity causes after motor-vehicle accidents. This paradigm shift has a significant impact on the health concerns among Malaysian Armed Forces military personnel on health readiness as well as on planning the future direction of military medicine research in Malaysia.

The Health Services Division of Malaysian Armed Forces is currently in the implementation phase of its Balanced Score Card - Rebranding Program Initiatives 18. This program began since early this year after the successful implementation of the Balanced Score Card - Back to Basic Programme Initiative for the year 2011- 2013. The implementation phases are based on the Strategic Map on Health Services Support to the Malaysian Armed Forces. The visions of these Balanced Score Card Initiatives are to provide good, effective, efficient and safe healthcare to Malaysian Armed Forces that match the international standards, while the mission is to conserve the fighting strength of the Malaysian Armed Forces by enhancing the health readiness, health support capabilities and providing quality health care.

There are seven targeted objectives for the Balanced Score Card - Rebranding Programme Initiatives such as (1) Fit and Ready Soldier, (2) Happy and Satisfied Family, (3) Able Sick Centres, (4) Tertiary Military Hospital, (5) Deployable Medical Battalion, (6) Effective and Efficient Medical Logistic Support System and (7) Happy and Satisfied Care Giver.

Currently, several projects have been implemented by aiming to achieve these seven objectives of the Balanced Score Card – Rebranding Programme Initiatives; which are: (1) Establishment of the Department of Military Medicine as well as the military medicine research programme, (2) Development and implementation of the Military Lifetime Health Record (MLHR), (3) Health rehabilitation programme, (4) Enhancing the maternal and child health program and (5) Centralised laboratory and pharmaceutical services.

Military medicine research is a priority nowadays and one of the sub-initiatives for the Rebranding Programme on Fit and Healthy Soldiers Initiative. As part of the military medicine research and development planning, the Department of Military Medicine was established in phases since the year 2012, and one of the main roles is to initiate research in military medicine in Malaysia. This department will act as the excellence centre for military medicine on soldier health and readiness including deployment and international health as well as health promotion and health rehabilitation programme. This department will also act as the Health Informatics Centre (e-Health, Global Health Surveillance and Health Intelligence) as well as the implementation of the Military Lifetime Health Record (MHLR) system. The future plan is to upgrade the department to the Institute of Military Medicine in Malaysia with expanded roles to the other Armed Forces Hospitals.

Recent studies on Senior Officers of the Malaysian Armed Forces during periodic medical examinations for the year 2013 revealed a worrying finding that 9.9% out of 741 military senior officers had BMI of 30.0 kg/m2 and above, 15.4% had Hypertension, 12.5% had Diabetes Mellitus Type II and 28.3% had elevated cholesterol levels. A few sudden deaths among military officers were recorded due to cardiovascular related diseases during local deployment and United Nation missions. This is an example that the research on these areas of concern can be conducted through the Military Lifetime Health Record (MLHR) System [19] that was launched recently.

This MHLR which is an integrated information system, will consolidate the health information data regarding the past and current health status of each military personnel in the Malaysian Armed Forces. These captured data will be analysed to identify the health problems and issues, and from there preventive measures and intervention as well as new or amended policies can be drafted and implemented to ensure that the military personnel in the services are healthy, fit and ready for deployment. The findings from this research can be presented and published accordingly.

Human resources development planning is very important to improve military medicine research in terms of qualified researchers and writing skills. Currently officers have been sent to pursue post graduate studies in PhD, DrPH and advanced specialisation in local and international universities. They are encouraged to present at medical conferences and publish their research scientific findings in local and international journals. It is compulsory to publish their thesis or dissertation reports in medical journals. The establishment of the National Defence University of Malaysia [20] in Kuala Lumpur in 2006, where the Faculty of Medicine and Defence Health is one of the faculties available since 2009, caters to local and foreign military cadets to purse their military careers in Medicine. The university is planning to provide curriculum in Masters in Military Medicine for post-graduate students and this is expected to be launched soon together with the launching of the Malaysian Journal of Military Medicine.

Integration and networking activities are also being conducted with the Ministry of Health (MOH) Malaysia and local government and private universities by doing research among military personnel and their work in military settings. Cooperation with other local research institutes such as Institute of Medical Research (IMR), Science and Technology Research Institute for Defence (STRIDE) and National Institute of Occupational Safety & Health (NIOSH) must continue.

CONCLUSION

As a conclusion, military medicine research is very important and vital in any military field and environment. Research in military medicine is still new in Malaysia as compared to other developed countries and there are a lot of improvements to be done. The installation of the latest infrastructure and modern technologies in the administration and organisation will ensure many opportunities for research in military medicine to be conducted in Malaysia. Integration, cooperation and networking in research among government sectors, universities and private agencies can be increased to contribute more in the future. Cooperation and networking on research should be expanded to military partners in the ASEAN countries as we share the same environment, hazards and culture for the benefit of the military partnership in the South East Asia region.

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