

Maritime and Aquatic Life Support (MALS) Programs: 10 Years of a New Paradigm for Bridging the Competency Gaps

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≡ The Importance of Maritime and Aquatic Life Support ≡ (MALS) Programs

Aquatic environment which includes inland surface water, seas, and ground water is considered a harsh environment and humans have to strive for being in the water. Maritime environment is more military term and covers the oceans, seas, bays, estuaries, islands, coastal areas, including the littorals and their sub-surface features, and interfaces and interactions with the atmosphere. These interactions among humans and the environment, aquatic and maritime environments, considered a more complex situation in handling medical emergencies or life supports, especially medical transportation in the confined spaces inside the vessels and medical evacuations through other vessels by helicopters. Emergency Medical Act B.E.2551 (2008) led to establishment of the National Institute for Emergency Medicine (NIEM) Thailand which has a mission to develop, standardise, promote and strengthen the emergency medical system for everyone and for disaster preparedness. Maritime and aquatic emergency and disaster preparedness and response are also one of the goals of NIEM to develop once inland and both ground and helicopter emergency medical systems had been successfully developed.

≡≡≡ MALS Programs Conceptualisation ≡≡≡

MALS was coined for Maritime and Aquatic Life Support and has been originally developed in the Naval Medical Department principally by Division of Underwater and Aviation Medicine (DUAM), Naval Medical Department (NMD) in coordination with the National Institute for Emergency Medicine (NIEM) since early 2010 which was the beginning of the development of the MALS curriculum and gradually developing maritime and aquatic emergency medical services in Thailand by enhancing knowledge and skills on safe handling of maritime and aquatic medical emergencies for the healthcare teams.



Although DUAM's perceived knowledge capability is their diving casualty management, other common and important public health issues such as drowning and hazardous marine life are all considered parts of diving and navy medicine. The first consensus program had four core modules (later developed as the MALS chain of survival (Table 1). After the first pilot program with considerable success in Surat Thani province, southern Thailand with their recent flood disaster. Then, the program aimed to be the national curriculum with public health region and local integrations. Currently, this program has covered almost all regions in Thailand including regions with only inland water such as the Northeastern part of Thailand. Target attendees firstly are health program managers and senior healthcare providers and later covered their allied health care professions as a team such as emergency medical technicians (EMTs). The curriculum was originally developed with multilateral organisations at a conference in 2010 and had one public hearing later for the formulated content and curriculum in 2013. Then a manual called "Maritime and Aquatic Life Support Guidelines Manual" and also their logo (Picture 1 and 2) was published in 2014. The MALS educational consortium started non-official in-house and developed MALS curriculum as competency review and revision of the curriculum after the deployment of the programs and also regularly updated core knowledge content.

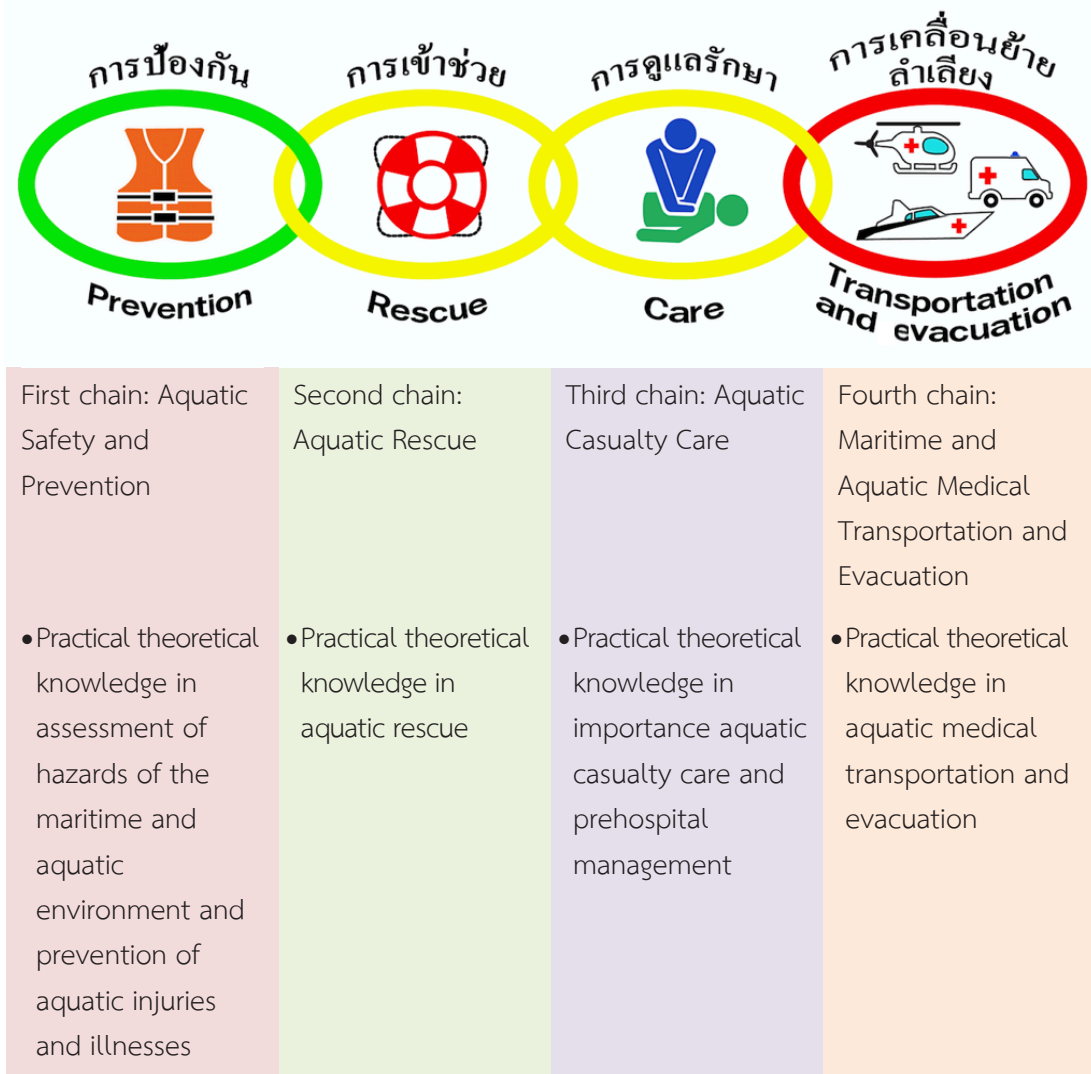


Picture 1. 2014 MALS guidelines manual which depicts 4 chain of survival (front cover) and their special aquatic environment (back cover)



Picture 2. MALS Logo (comprising of ring buoy, naval anchor surrounded by Naga and a star of life, that symbolizes maritime and aquatic emergency medical services and safety)

Table 1. The MALS chain of survival paradigm





<ul style="list-style-type: none"> • Practical skills in aquatic safety procedures and survivals 	<ul style="list-style-type: none"> • Practical skills in basic aquatic rescue skills using “reach, throw, no Go” theme and rapid extrication casualty from the water procedure 	<ul style="list-style-type: none"> • Practical skills in basic aquatic casualty care i.e. first aid and beyonds including positioning the casualties, wilderness medicine applications 	<ul style="list-style-type: none"> • Practical skills in aquatic medical transportation at or in boats, vessels, ports using special litters/stretchers including packaging, back boarding procedures. etc.
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MALS Core Programs Characteristics

MALS courses were originally developed for 3 courses which were MALS-HCP (Maritime and Aquatic Life Support for Healthcare Provider course), BMALS (Basic Maritime and Aquatic Life Support course), and AMALS (Advanced Maritime and Aquatic Life Support course). Program objectives are described in Table 2. MALS-HCP utilizes 30 hours (5-days) of compulsory and optional practical theories and best practices and skills which the targets audience are healthcare professionals and had additional focus on delivering healthcare to the aquatic casualties and patients. BMALS utilizes 16 hours as described in Table 1. which targets other healthcare teams including emergency medical technicians (EMTs). AMALS utilizes additional 16 hours as required as prerequisite of BMALS and additional focus on advanced rescue skills targeting public safety personnel including lifeguards. Additional hours from BMALS were added to MALS-HCP and AMALS which are more focused on providing medical procedural skills and advanced rescue skills respectively.

Table 2. Program objectives

Upon completion of the training provided by all programs, participants will be able to

- Assess risk/hazards and aquatic safety for rescuers and healthcare teams and take appropriate preventive measures such as using personal floatation devices (PFD)
- Recognise common and important aquatic injuries and illnesses including drowning, diving injuries and injuries from aquatic organisms
- Establish basic aquatic survival skills
- Establish basic (and some advanced) rescue skills
- Establish aquatic casualty care skills
- Perform appropriate emergency medical management for aquatic injuries and illnesses



- Establish skills in packaging and removal of casualties from the water with and without spinal backboard and specialised equipments
- Establish transportation skills in the maritime and aquatic vessels and boats

Additional objectives for MALS-HCP

- Further and advanced recognition and management of aquatic injuries and illnesses including management of the medical components of disasters and multiple or mass casualty incidents (MCIs)

Additional objectives for AMALS

- Further advanced aquatic rescue techniques and skills

==== Core Competencies in the MALS Training Programs ====

All of the programs will be provided by following core competencies with additional competencies for specific programs.

Fundamentals of aquatic casualty care, aquatic safety and their prevention

Fundamentals of aquatic casualty care, aquatic safety and their prevention is a 3-hour program consisting of 2-hour didactic program that is designed to introduce the concept of the MALS chain of survival paradigm and aquatic safety preparedness and their prevention strategies and 1-hour all groups of skill practices program of basic aquatic skill for aquatic survival.

Aquatic rescue

Aquatic rescue is a 5-hour program consisting of 1-hour didactic program and a divided group of practicing basic aquatic rescue skills in a manner of a laboratory rotation.

Aquatic casualty care

Aquatic casualty care is a 7-hour program consisting of 3-hour didactic program and a 4-hour divided group of practicing aquatic casualty care skills (in a manner of a laboratory rotation) programs.

Medical transportation and evacuation of aquatic casualties

Transportation and evacuation of aquatic casualties is a 5-hour program consisting of 1-hour didactic program and a 4-hour divided group of practicing medical transportation skills (in a manner of a laboratory rotation) programs.

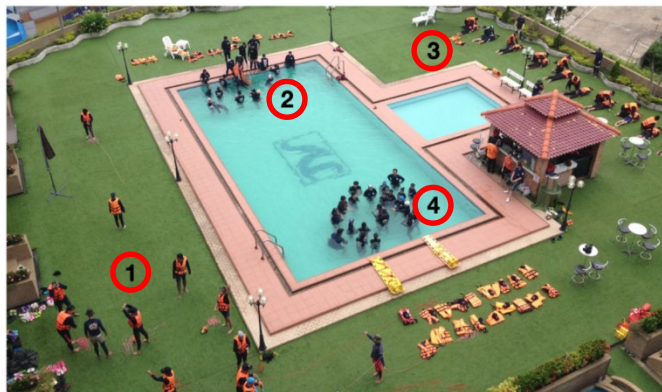
All of the practicing skills are using a manner of laboratory rotation stations (Table 3) and Picture 3 and 4. Additional and required practical knowledge and skills will be provided for each program of MALS-HCP and AMALS depending on their level of providers and professions.

Table 3. MALS practice skill program stations

- Aquatic survival skills (Picture 3)
- Basic aquatic rescue skills (Picture 4, Station 1)
- Advanced aquatic rescue skills (Picture 4, Station 2)
- Aquatic casualty care skills (Picture 4, Station 3)
- Aquatic packaging, backboarding and transportation skills (Picture 4, Station 4)



Picture 3. MALS Aquatic Survival Skills



Picture 4. MALS 4 Skill Laboratory Rotation Stations (1# shows basic aquatic rescue skill by throwing a bag of rope. 2# shows advanced aquatic rescue skill by rapid extrication of aquatic casualty. 3# shows aquatic casualty care skills by managing recovery positions. 4# shows back boarding procedure)

MALS instructor program

MALS instructor program has also been introduced and designed to disseminate MALS instructors to all regions which will support MALS training in their planning.

===== MALS Training Program Results =====

The network of public health regions in Thailand with the support from NEIMS has facilitated the growing of MALS training with trained providers disseminated into almost all regions of Thailand. The number of personnel trained was estimated to be over thousands. Although the rate of fatal drowning is declining, MALS program would not want to claim all the credit but partly it made an impact on the result and also because of multiple strategies in drowning prevention. MALS programs have also had positive feedback from the attendees and their commands. Positive feedback also included healthcare teams having more confidence in aquatic emergency medical response. The MALS program has also partly inspired further aquatic safety programs for children and many merit makers which is a preventive drowning strategy of Thai Bureau of Non-Communicable Diseases (BNCD), Department of Disease Control (DDC). The Nurse Specialty in Emergency Nurse Practitioner and Bachelor of Science Program in Emergency Medical Operation (Paramedics) has also gained attention the importance of MALS program in their scope of studies.

MALS competency review and their revision

Established MALS competencies and recent literature and relevant guidelines and/or positional statements of relevant multilateral organisations with multidisciplinary teams were regularly updated, but not using Delphi method on expert consensus because of some limitations. These will be encouraged in establishing MALS education consortium for further research and recommendation. MALS educational consortium has recently incorporated MALS-HCP and BMALS to be MALS and still using the number of hours and curriculum of BMALS for both healthcare providers and allied healthcare teams.

Establishment of MALS educational consortium

MALS educational consortium was first established in 2018 at DUAM, NMD and later, addition of multiple causes of knowledge from others were integrated with a few from outside the Royal Thai Navy. Further multidisciplinary personnel with expertise in various fields in-depth and educational activities are needed to review MALS competency and their revision.



Barriers and Lesson Learned

Large number of trained attendees participated by taking multiple courses, shared in the public health region of the Ministry of Public Health which has been enhancing coordination across the border of each province. Although these were a few physicians who participated in the programs and were in quite difficult to reach, there were no barriers, instead it worked well for the course that had multidisciplinary teams. Time constraints also played a part on common feedbacks from the attendees due to enormous amount of new learning outcomes. It may be appropriate to have internet-based or e-learning practicing skills for objectives which can be assessed without the presence of instructors and may be used as a prerequisite to the course which will have additional reduction in number of hours in the course. MALS also included all important aquatic injuries and illnesses coverage which will cover all the topics in one program required for the teams to recognise and be able to manage injuries and illnesses according to the updated guidelines. Practicing skills for MALS were a crucial part take at least two-third in the learning activities and designed to be in a manner of laboratory rotation which all the attendees will rotate to all the stations. We also found out that these stations and aquatic activities have increased attention and their teamworks. Nevertheless, when comparing the numbers of trained personnel to the real amount of healthcare teams facing with the aquatic casualty, they were still extremely low. Integration of MALS program into training curricula of the various healthcare professions both in the university and colleges will further bridge the current competency gap of the healthcare teams.

Future directions

Future directions has been formalised to have MALS as a competency for healthcare providers and teams and a recommended prerequisite for integrations of further specialty training programs according to locals and responsible scenes such as challenging aquatic environments and disasters. Medical interface with aquatic technical rescue has been proposed as an important measure of survivability of the casualties. Swift-water and flood modules are among the first as flood disasters are among the commonest natural disasters in Thailand. Surf water, diving rescue, maritime vessel modules are other modules for challenges of unique aquatic and maritime environments. Helicopter EMS (HEMS) in the maritime environment is another integration of interaction of the maritime vessels and helicopters through the airspace as well as a method of air medical transportation required for medical evaluation of the casualties.



Conclusions

MALS was coined for Maritime and Aquatic Life Support and the MALS program is another alphabet soup course that was developed in the Naval Medical Department, Royal Thai Navy aimed to bridge the competency gap and also bring aquatic safety in handling maritime and aquatic environmental challenges. Integration of this program into their training or continuing education for both practicing healthcare professions and professional developments will help in dealing with maritime and aquatic injuries and illnesses and preparedness.

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