

Medical training of seafarers: International Maritime Health Foundation (IMHF) Expert Panel Consensus Statement

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ABSTRACT

Background: Medical emergencies and on-going medical conditions on board may seriously impair seafarers' health and safety, and also negatively impact on future work prospects for seafarers. When a seafarer gets ill or injured on a ship, medical treatment often relies on the competences on his colleagues on board. The aim of this project was to establish a consensus-based minimum standard for medical education for seafarers, in order to ensure competency for adequate management of ill-health on board.

Materials and methods: International Maritime Health Foundation (IMHF) conducted a workshop on medical training of seafarers. A research-based approach to gain consensus on core learning outcomes/competences developed by the Tuning Project, has been used. This method was used by Tuning (Medicine) to gain consensus on core learning outcomes for primary medical degrees (Master of Medicine) across Europe.

Results: The result of the project is a set of learning outcomes/competences in medical training for merchant seafarers.

Conclusions: The project resulted in a set of learning outcomes/competences on medical training of the seafarers that will be submitted to the relevant bodies of International Maritime Organization (IMO) in the process of the development of model courses 1.13, 1.14 and 1.15.

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Key words: medical training, seafarers, learning outcomes

INTRODUCTION

Established in June 2018 as a non-profit scientific foundation with scientific objectives and international activities, the International Maritime Health Foundation (IMHF) has the responsibility for the maintenance of the scientific journal 'International Maritime Health'. Its objective is to pursue the development of science, to increase and disseminate knowledge of maritime medicine and adjacent

fields. It also initiates and supports scientific and research activity, contribution to improvement of safety, hygiene at work and health of seafarers and other persons who work at sea worldwide [1, 2]. IMHF's intention is to assemble scientific and academic expertise, to continually monitor and address relevant health issues and developments, in order to help solve or ameliorate problems in the maritime environment [3]. IMHF considers that consensus documents

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that are the result of the work of expert panels from different countries or several organizations, will be of significant benefit to maritime industry. Such consensus documents summarise current knowledge and guidelines on topics, and draft operative protocols and recommendations identifying current gaps and providing next steps. Appropriately, International Maritime Health Foundation's Expert Panel (IMHF EP) is a group of medical professionals concerned with all aspects of seafarers' health, including prevention and treatment of medical conditions on board.

Medical emergencies and various medical conditions on board may seriously impair seafarers' safety and health, as well as future work aspects [4–12]. Therefore, IMHF EP intends to participate in the development or revision of International Maritime Organization (IMO) model courses 1.13, 1.14 and 1.15 in accordance with the provisions of the Revised Guidelines for the development, review, and validation of model courses (MSC-MEPC.2/Circ.15) [13, 14].

The quality of medical help on board depends on the competence of the onsite responder, established structures and procedures, medical manuals used, medical equipment on board and the quality of available tele-medical assistance service (TMAS), including e-health applications; medical training being the core element of such a system of medical help [15–18]. All those elements must be completely coordinated and interoperative [19]. Synergy within the rescue chain including rescue services, other medical assistance services and ashore medical facilities, is needed. Between all agencies, there must be a mutual understanding and this must be reflected not only in training, but also in equipment (Ship's medicine chest) and procedures established (Medical Guide for Ships) [20–25]. All aspects of medical support form links in a chain of survival, and deficiency in any link may have a profoundly negative effect on the present care and future health of a seafarer [26].

The IMHF EP holds that although a model course should not go beyond what is required in the The International Convention of Standards of Training Certification and Watchkeeping for Seafarers (STCW), it should address the common best practice and state-of-the-art technology and, in this case, treatment guidelines. Present-day medical state of the art provides an array of options, even for first aiders, that were not available, when the present IMO model courses were developed [27].

Rapid scientific advances constantly require adaptation in the training and education of professional as well as non-professional first aiders [28]. Medical guidelines usually require continuous review in order to reflect the scientific advances made encompassing new procedures and new equipment [29–33]. Changes to medical guidelines inevitably should mandate changes to the curriculum of medical training too [34]. In order to comply with the Maritime Labour

Convention (MLO), 2006, as amended, title 4 requirements, IMHF EP deems it mandatory to include new procedures into the model courses. Finally, and most importantly, new and more continuous learning methods, should be considered.

SUCCESSFUL MODELS FOR CREATING GLOBALLY TUNED EDUCATION PROGRAMMES AND THEIR APPLICATION IN MODEL COURSES

Until recently, the main obstacle to creating universally acceptable training programmes in national medical education were the differences in training programmes and methods of education [35]. Modern globalisation and advances in educational sciences now are enabling different learning traditions and systems to be coordinated and to provide the same results [36, 37].

Outcome-oriented learning is such a system where various parties with different teaching traditions agree not on the training programmes but on the learning outcomes, so all students come out of the education process with the same competences, regardless of the program they undergo [38]. The European Union funded projects MEDINE 1 and MEDINE 2 were projects where such a process was applied to European medical education, enabling free movement of doctors through Europe [39, 40]. Several methods for defining the learning outcomes were used in those projects including a tuning process where outcomes are tuned by all stakeholders, providing an agreeable and most realistic outcome [41, 42].

A research-based approach to gain consensus on core learning outcomes/competences was developed by the Tuning Project, and used by Tuning (Medicine) to gain consensus on core learning outcomes for primary medical degrees (Master of Medicine) across Europe [43, 44]. That work was undertaken as part of the MEDINE Thematic Network for Medical Education in Europe, 2004–2007, and supported by funding from the Life Long Learning Programme of the European Commission [45]. The results have been widely accepted and influential. For example, the 'Outcomes' section of the third version of Tomorrow's Doctors from the UK General Medical Council (GMC), draws heavily on the Tuning (Medicine) outcomes, which are also referenced in that document [46].

IMHF EP proposes that before the existing curricula on medical training of seafarers are revised, such a system should be applied in the revision of the existing learning competences first. Learning outcomes based on agreed competences and achieved through a tuning process that will include all stakeholders, will enable not only an adequate training programme curriculum for model courses but also globally tuned results of seafarers' health training and their competences in maritime health.

Creating/revising learning outcomes/competences first, will also enable standardised approach in providing TMAS globally as it will define expected competences on both sides of the TMAS (providers and receivers) and, finally, the creation of adequate medical manual and medical chest. Defining those learning outcomes will enable each country to design its own training programmes or textbooks that will have the same training outcomes as IMO model courses. Similarly medical guides and medical chests will be for the first time designed based on globally agreed elements.

MATERIALS AND METHODS

The aim of this project was to develop learning outcomes based on agreed competences and achieved through a tuning process that will include all stakeholders. IMHF EP created a medical working group/expert panel on learning outcomes/competences and from 18–19 March 2022, in Bergen, Norway, held the 2nd IMHF Workshop on Maritime Health on Board – Medical Training of Seafarers. Academic experts, with experience in establishing teaching policies for maritime students and maritime authorities' representatives, were also invited to this meeting.

2ND IMHF EP WORKSHOP ON MARITIME HEALTH ON BOARD – MEDICAL TRAINING OF SEAFARERS

The 2nd IMHF EP Workshop on Maritime Health on Board – Medical Training of Seafarers was held from 18–19 March 2022, in Bergen, Norway in cooperation with The Norwegian Centre for Maritime Medicine and Diving Medicine. In total, ten expert participants from international maritime medicine institutes, universities, legislative bodies and industry, actively participated in the workshop, namely: Dr. Haga Jon Magnus (NCMDM), Dr. Tülsner Jens (MMS), Capt. Årland Per Otto (NMA), Dr. Lund-Kordahl Inger (NCMDM), Dr. Simolin Pernilla Cecilia (NCMDM), Dr. Horneland Alf Magne (NCMDM), Capt. Kavanagh Bill (NMCI), Dr. Seidenstucker Klaus (IMHF), Dr. Briggs Spike (NHS/MSOS), and Dr. Nebojša Nikolić (MCOHR).

The aim of the workshop was to evaluate the Learning Outcomes/Competences for Undergraduate Medical Education in Europe in the context of medical training for the designated medical personnel on board of merchant ships. In the light of this evaluation, the next aim was to reach consensus on the learning outcomes/competences for medical training of designated officers and crew on-board merchant ships [47].

Altogether ten expert participants from international maritime medicine institutes, universities, legislative bodies and industry actively participated in the workshop. Eight participants were allocated to four task-teams (TT in further text); each TT discussed, evaluated and tuned four groups

of 12 major “Level 1” learning outcomes/competences as defined by the Tuning (Medicine) Project – MEDINE Thematic Network for Medical Education in Europe, and validated by an Expert Panel of the European Commission. Two participants participated in the workshop with the presentations on previously determined topics and actively participated in the work of the TTs and tuning sessions.

The first part of the workshop (Day One: 0930-1115): was dedicated to introductions and six presentations on previously planned topics. The second part of the workshop (Day One: 1145-1445) comprised four TT presentation sessions. All four TT simultaneously worked on the same allocated topic and one team then presented allocated topic to other teams. Each session comprised 10 minutes of working on the topic, 10 minutes of discussion among the team members and finally 10 minutes for presentation on the TT allocated topic – one presenter discussing the allocated learning outcomes from their TT point of view. Each of the sessions were closed with brief comments on the topic by the other workshop participants.

After all four TT presentations were complete, each TT had 1.5 hour to design their position paper. The rest of the non-allocated participants cooperated as required with each TT, whether by invitation or by their free interest and expertise in the topic.

Fourth part of the workshop (Day One: 1600-1900) comprised six parallel workshop sessions where each TT presented their position paper to other task teams. After each TT presented their position paper, all teams tuned their position papers in combined sessions.

The fifth part of the workshop (Day Two) was organized in the format of a plenary session where all task group position papers were included in the final position paper, and subsequently discussed and tuned. There were several topics considered of essential importance to medical care on board, that were considered to require a more detailed outcome than could be achieved in the timeframe of the workshop. Several participants undertook to prepare a paper on each of these areas for evaluation by all participants subsequent to closure of the workshop. One team was committed to draft a supplement to the agreed list of learning outcomes referring to experiential learning and explaining the reasoning of the Level 5 in the Likert scale (Does in real practice) not used in the agreed list of competences.

CONSENSUS PROCESS

The resulting draft position paper results from the workshop was submitted for wider evaluation in the format of the online survey among stakeholders who assessed it online (Qualtrics) for validity, feasibility and clarity, using a 1–9 Likert scale. The on-line questionnaire was structured with 14 questions according to the main Level 1 learning

outcomes from the questionnaire used in the workshop. A higher score indicated a recommendation being more valid, feasible or clear. Recommendations with an average score < 4 were discarded, recommendations with a score ≥ 7 were retained, and recommendations with a score in-between were revised in the second round of tuning among the members of the workgroup. In addition, the online assessment offered participants the opportunity to provide open comments about each recommendation, which were considered during the revision process. Results of the survey revealed an overall mean score of 7.12 for validity, 6.75 for feasibility and 7.31 for clarity. Five questions had the mean score ≥ 7, none had the score < 4 and 9 questions had a score between 4 and 6. Of those 9 questions, 3 had that score in all three assessment categories, 3 had that score in two categories and 3 had that score in one category. Following the survey, after two rounds of tuning, 12 recommendations that received a score between 4 and 6 in at least one of the assessment categories, were amended and validated. These revisions of the workshop's results were finally approved by all the authors.

After completion of the survey, final tuning of the results has been made by panellists of the IMHF EP who formally adopted it as a consensus paper.

RESULTS

The result of the workshop and further tuning process is a set of learning outcomes/competences in medical training for merchant seafarers, presented below.

QUESTIONNAIRE DESIGN AND LEARNING OUTCOMES/COMPETENCES AS AGREED AT THE 2ND IMHF EP WORKSHOP

For each of the learning outcomes/competences arising from the Tuning (Medicine) Project, participants of the workshop were asked: “to rate the following learning outcomes/competences on the extent to which they think they should have been achieved by a designated provider/crew on board who has successfully completed the training in medical help on board” on the following Likert scale, which is based on “Miller’s triangle” [48, 49]:

- Not learned – allocated “1” on Likert scale;
- Knows (about it) – allocated “2” on Likert scale;
- Knows how (to do it) – allocated “3” on Likert scale;
- Shows how (in simulation) – allocated “4” on Likert scale;
- Does (in real practice) – allocated “5” on Likert scale.

After the training in medical help on board, designated provider on board/crew who has successfully completed the training will have the ability to:

Outcomes	Designated provider	All personnel
Carry out a consultation with a patient		
Take a history	4	2
Carry out physical examination	4	2
Make judgements and decisions	2	1
Provide explanation and advice	3	1
Provide reassurance and support	3	3
Assess the patient’s mental state	3	2
Assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan		
Recognise and assess the severity of clinical presentations (concept of triage – presentations that can be handled independently and those requiring outside assistance, e.g., TMAS)	4	2
Order appropriate investigations and interpret the results	2	1
Make differential diagnoses	2	1
Negotiate an appropriate management plan with patients and TMAS (use of ATMIST, AVPU or similar form of reporting)	4	1
Provide care of the dying and their families	2	2
Manage chronic illness	2	1
Provide immediate care of medical emergencies, including first aid and resuscitation		
Recognise and assess acute medical emergencies (prioritising actions)	4	4
Treat acute medical emergencies (burns, choking, bleeding management, drowning and near drowning)	4	2
Provide basic first aid	4	4

Provide basic life support and cardio-pulmonary resuscitation according to current guidelines	4	4
Use of automatic defibrillator (D-CPR)	4	4
Provide trauma care according to current guidelines	4	2
Prescribe drugs		
Prescribe clearly and accurately to selected medical emergencies	3	1
Match appropriate drugs and other therapies to the clinical context	2	1
Review the appropriateness of drug and other therapies and evaluate potential benefits and risks	2	1
Treat pain and distress	2	2
Carry out practical procedures		
Measure blood pressure (automatic BP machine) and temperature	4	2
Cannulation of veins and intraosseous cannulation	4	1
Administer IV therapy and use infusion devices	4	1
Intramuscular injection/Use of local anaesthetic agents	4	1
Administer oxygen	4	4
Move and handle patients (evacuation stretchers, log-roll)	4	4
Wound management/suturing (stapling, skin glue, skin adhesive strips)	4	1
Bladder catheterisation	4	1
Point of care testing (urine, glucose, pregnancy testing)	4	1
Splints/bandages including cervical and spinal immobilisation	4	2
Otoscopy	4	1
Pulse oximetry	4	1
Communicate effectively in a medical context	4	2
Ability to apply ethical and legal principles in medical practice		
Maintain confidentiality	3	4
Concept of "Acting in the patients' best interest"	3	4
Obtain and record informed consent	4	2
Assess psychological and social aspects of a patient's illness		
Assess psychological factors in presentations and impact of illness	3	2
Assess social factors in presentations and impact of illness	3	2
Detect stress in relation to illness	3	2
Detect alcohol and substance abuse, dependency	4	4
Apply the principles, skills and knowledge of evidence-based medicine		
Keep accurate and complete clinical records	4	2
Use information and information technology effectively in a medical context (medical guide, electronic databases, drug formularies)	4	1
Promote health, engage with population health issues and work effectively in a health care system		
Provide patient care which minimises the risk of harm to patients	3	1
Apply measures to prevent the spread of infection (hygiene, sterility, disinfection, procedures of illness prevention and prophylaxis)	4	4
Recognise own health needs and ensure own health does not interfere with professional responsibilities	3	4
Conform with professional regulation and certification to practise	3	1
Engage in health promotion	3	2

Outcomes in medical professionalism	Designated provider	All personnel
Professional working		
Ability to recognise limits and ask for help	4	4
Communicate port health authorities regarding IHR-requirements	4	1
Ability to communicate with shore-based TMAS and SAR services	4	1
Capacity and ability to organize and plan medical support and rescue (in water, helicopter, lifeboat)	4	1
The medical provider as expert		
Capacity to learn (including lifelong self-directed learning)	4	1
Capacity for applying knowledge in practice	4	4
Ability to lead and teach others	4	1
Dealing with multiculturality – global medical provider		
Appreciation of diversity and multiculturality in perception of disease	3	3
Knowledge of medical terminology in English	4	4
Commitment to maintain skill competency and knowledge	4	4

After the training in medical help on board, designated medical provider on board/crew who has successful-

ly completed the training should be able to demonstrate knowledge of:

Knowledge outcomes	Designated provider	All personnel
Basic sciences		
Normal function (physiology)	3	2
Normal structure (anatomy)	3	2
Clinical sciences		
Abnormal structure and mechanisms of disease (pathology)	2	1
Infection (microbiology)	3	2
Drugs and prescribing		
Use of antibiotics and antibiotic resistance	3	1
Principles of prescribing	3	1
Drug side-effects	3	2
Drug interactions	2	1
Individual drugs	3	1
Public health		
Disease prevention (esp. infectious diseases)	4	3
Lifestyle, diet and nutrition	2	2
Health promotion	2	1
Screening for disease and disease surveillance	2	1
Gender issues relevant to health care	2	2
Cultural and ethnic influences on health care	2	1
Ethical and legal principles in medical practice		
Rights of patients	2	2
Role of the designated medical person on board in health care systems		
Laws relevant to medicine on ships	3	1
Systems for health care delivery on ships	3	1

After the training in medical help on board, designated provider on board/crew who has successfully completed the training should be able to:

General care	Designated provider	Crew
Care of acutely medically ill patients including mental first aid	4	1
Care of trauma patients	4	1
Care for the dying	3	1
Care for mentally ill patients	3	1

EXPERIENTIAL LEARNING

Training according to STCW competence requirements usually includes experiential learning to reach a certain level of competence and get a maritime certificate.

In the area of medical care it is difficult to organize such training, as:

- relevant medical care situations on board a merchant ship do not happen more than 2–4 times a year
 - too infrequent to assess whether Likert scale level 5 is reached;
- there is no medical superior on board to carry out an appraisal;
- it may prove difficult for seafarers to get such training and appraisal in hospitals.

The highest level on the Likert scale that can be achieved during a course is Likert scale level 4. The students are, however, on completion of the course, supposed to carry out the procedures in real life, corresponding to Likert level 5. This emphasizes the importance of combining traditional coursework with continuous education and training in medical care on board ships and that there is a low threshold for the designated person on board to seek assistance from TMAS services ashore.

Infrequency of real medical situations on board and corresponding lack of experience may be mitigated through a mandatory system of continuous learning.

We recommend the following:

- a mandatory basic course covering identified learning outcomes;
- a mandatory refresher course every 5 years;
- a mandatory system of continuous learning, consisting of exercises and drills to be carried out on a regular basis, at least 4 times a year:
 - drills under the supervision of the master;
 - exercises in connection with a TMAS training centre ashore;
 - a log of completed drills/exercises should be provided together with a refresher course diploma to get an extension of their competence, alternatively

the person should attend the basic course once more, instead of a refresher course.

LIMITATIONS OF THE STUDY

Learning outcomes used in this study are the core learning outcomes Level 1/2 used by Tuning (Medicine) to gain consensus on core learning outcomes for primary medical degrees (Master of Medicine) across Europe [43, 44]. Although recognizing that there are additional areas of the study of interest for seafarers onboard, authors agreed to keep the consistency of the paper by not adding the new learning outcomes, foreseeing that further changes will be necessary, based on gathered experience of course developers and feedback from the users. In updating the list, the same method should be used.

CONCLUSIONS

The result of the project is a set of learning outcomes/competences in medical training for merchant seafarers that will be submitted to the relevant bodies of IMO in the process of the review of model courses 1.13, 1.14 and 1.15 [13].

Conflict of interest: None declared

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