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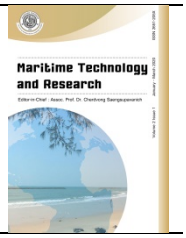

Review Article

Maritime doctors' skills and competencies: A review for policy analysis

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Abstract

Maritime medicine deals with the health of seafarers, fishermen, and offshore employees and, more specifically, with their employment, working and living conditions, and their health and safety at sea. Maritime doctors should have the appropriate training and competencies to provide the equivalent service as would be found on land. This review discusses a) the required skills and competencies of maritime doctors and b) explores the associated ongoing discussions for the establishment of a global accredited Masters programme in maritime health. A literature review was conducted using 2 databases: PubMed and Google scholar. Search terms included: maritime doctors, maritime medicine, occupational health, and skills and competencies. Literature published between 1990 and 2018 was prioritised. Thirty-five articles that discussed the skills, competencies, and education of maritime doctors and health professionals were retrieved, reviewed, and discussed, plus 8 reports and documents from relevant International Organisations webpages. We explored policies in relation to training using i) the health triangle and ii) the Kingdon model. Doctors who serve in the sector should have extensive knowledge about medical practice, but also about the environment of seafaring. The complexity of their roles, coupled with the provision of a high quality of services in global shipping, call for high quality accredited training and harmonisation of maritime health practices. The analysis of policy, using 2 policy models, showed that a window of opportunity appears to be in favour of a policy regarding the recognition of maritime medicine as a medical specialisation. International stakeholders, together with the International Maritime Health Association, should actively advocate such a perspective which will be in favour of seafarers, who will enjoy better health and wellbeing, with higher income while avoiding ill-health, as well as the shipping industry, which will employ satisfied and loyal employees, and will enjoy a higher reputation.

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1. Introduction

The International Maritime Health Association (IMHA) defines maritime health as "a wide range of disciplines that are committed to improving the health of seafarers by developing better approaches to health protection, health promotion, and health treatment both locally and internationally". Maritime medicine is conceptualized as "any medical activity related to employment, working conditions, living conditions, health, and safety of workers at sea" (Jensen et al., 2018). This stream of medicine deals with medical care for the people working in the merchant marines, the Navy, commercial fishing, offshore industry, the cruise ship industry, and for the students of maritime schools. It is developed with a base of 'occupational medicine' to respond to crew occupational health needs while, in addition, the health needs of passengers onboard cruise vessels are covered (Carter, 2011).

The Maritime Labour Convention (MLC 2006) provides the framework and guidelines for health and safety at sea (Piniela, 2013). Furthermore, it states that ships carrying more than 99 persons on board in international waters must have a doctor on board, but there is no reference about the necessary qualifications, skills, and competencies for that physician (Adăscăliţei, 2014).

According to the International Labour Organisation (ILO), a maritime doctor or sea doctor is a medical practitioner authorized to perform pre-employment medical examinations and make decisions in accordance with the provisions of the regulations concerning the health of seagoing employees (fishermen, seafarers, offshore workers, maritime students) (McCallum & Cox, 2012). They should have a clear understanding of working and living conditions onboard. Practitioners should be experienced in general and occupational or in maritime occupational medicine, and should receive clear guidance on the procedures for fit-to-work examinations (Carter & Stannard, 2014), as well as public health, tropical medicine, and emergency medicine (Carter, 2011).

There are 4 types of maritime medical practices: i) assessment of work fitness (PEME); ii) training of seafarers to provide first aid onboard; iii) management of medical emergencies (TMAS), and iv) healthcare on board and port/shore for crews and passengers (Jensen et al., 2010).

Seafaring is a truly global profession in the global shipping industry. Seeking timely and effective health care around the globe is not always simple. Seafaring is an occupation with dangers. Recent studies show that there is a higher fatality rate among seafarers compared to other occupations (Bloor et al., 2000). Due to limited access to medical care services and support at sea, seafaring is regarded as among the most isolated professions (Borch et al., 2012). Seafarers are expected to have the same level and quality of healthcare at sea as that of on land, with settings organized accordingly and staffed with competent health professionals who can provide equivalent services as on land (Jerončić et al., 2014). Core maritime documents, including the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) (Yabuki, 2011), deal with medical complications and health problems that maritime doctors have to deal with but, on high seas, health problems might be more severe, due to limited access to advanced medical services (Saarni, 2005; Walters & Bailey, 2013).

To better respond to these needs, the maritime health system is organised in a continuum of care, as in **Figure 1**.

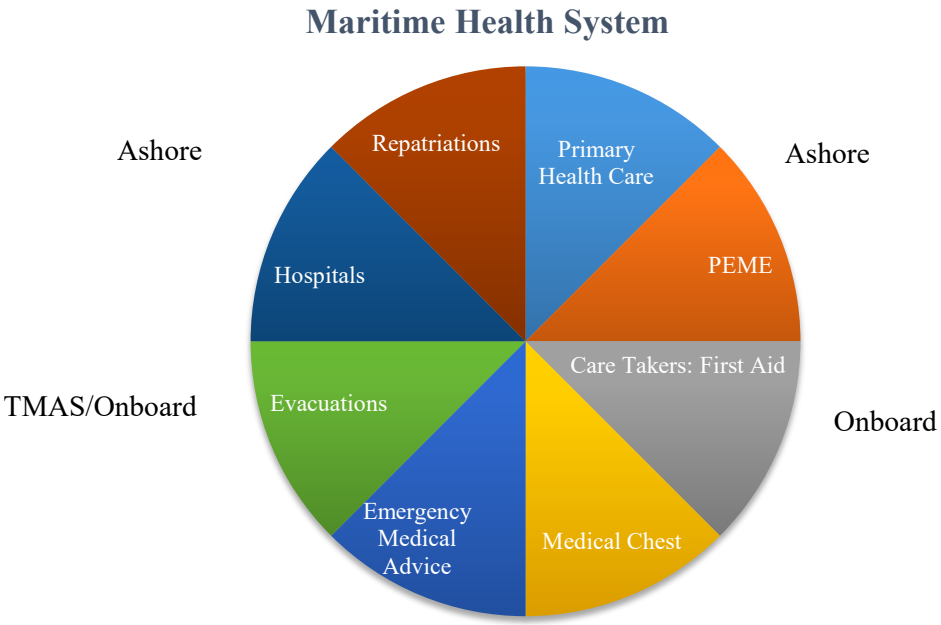

Figure 1 The organization of the maritime health system
PEME: Pre-employment medical examinations
TMAS: Tele-Medical Assistance Services

Such systems are in different states of development in maritime countries. Patient/client journals connect all the different dots of the system and facilitate the exchange of health information among health professionals. Shipping is highly regulated, and the same applies to the health and wellbeing of seafarers. Guidelines for the provision of health services in each quadrat aim to offer the same quality of health services to seafarers as to individuals on shore (Carter, 2016) and came into force in national legislation to harmonise and facilitate the provision of services.

However, there is a fragmentation, maybe due to the involvement of the large number of stakeholders/service providers, whose tasks may overlap, highlighting the extremely important contribution of maritime doctors to crew and passenger health.

Maritime medicine is growing as a stream of specialization in medicine, with increasing scope and an increasing market. The required skills and competencies for maritime doctors are often discussed in terms of quality care and standards (Seidenstuecker & Neidhardt, 2014). For a comprehensive maritime health system, with effective and quality services, we need to redesign the provision of services in terms of roles, ensuring that the skills and competencies of all stakeholders involved are in line with harmonized international standards, and that the education and training of health professionals comply with these (Dahl & Stannard, 2015).

Maritime doctors play an important role in the health outcomes of seagoing personnel but, due to the complexity of their roles and scientific advancements, there is a need for continuous training so that they stay current and can better respond to this population group's specific needs and expectations (Andrioti et al., 2017b).

The World Health Organization (WHO) proposed in 2003 to introduce training and quality teams to help lift quality in all medical specialities, while the European Medical Organisation in 2015 emphasized the need for greater visibility in national programmes, in terms of quality, to create a focus on quality health care outcomes. National and international initiatives to improve the patient health outcome have been established in recent years (World Federation of Medical Education, 2003).

In line with this, the International Maritime Health Association (IMHA) tried some years ago to establish a global programme, with quality teams for maritime health clinics around the globe, but this was never realised. However, the results from a survey in 2014 in the Philippines concluded that Filipino maritime doctors want to comply well with shipping industry demands for high quality health examinations (Alcaraz et al., 2019). Similarly, the research results in Denmark highlight the strong will of maritime doctors towards continuous professional development to better serve their reference population (Andrioti et al., 2017c). Furthermore, a recent cross sectional survey, conducted to assess the training needs of maritime health professionals on a global scale, revealed onboard medicine, maritime medical emergencies, training in fitness guidelines, and working conditions as the top most perceived training needs (Shah et al., 2018).

So far, maritime medicine is not a recognised specialization in terms of the mutual recognition of medical certificates in the European Union (Directive 2005/36/EC) (Peeters, 2005); currently, cruise ship medicine is considered a subsection of emergency medicine by the American College of Emergency Physicians. Even though postgraduate medical training courses in maritime occupational health exist in some countries, including Spain, France, and Norway, spanning from stand-alone courses to Masters degrees, the requirements and curricula for this training vary (Andrioti et al., 2017a).

Different dominant maritime states, including Greece, Japan, China, the USA, Germany, Singapore, Norway, and Denmark, are actively discussing and coordinating the standardisation of maritime medicine being led by the International Maritime Organisation (Dahl, 2009).

In this review, we deal with the role of medical doctors in the right half of the circle of **Figure 1**. This involves the first quadrat primary/onshore level, with the performance of Pre-Employment Medical Examinations (PEME), prevention, treatment, follow-up practices, and communication with authorities. Patient empowerment in disease self-management, through their engagement in necessary behavioral changes, and promotion of patient satisfaction are also considered (World Health Organization, 2006).

This review discusses a) the required skills and competencies of maritime doctors and b) explores the potential for establishing an accredited Masters programme which will lead to a specialisation in maritime medicine using 2 policy frameworks, in the hope of contributing in a constructive way to scientific discussions about the establishment of specialisation in the field.

2. Materials and methods

Literature review

To analyse the required skills and competencies of maritime doctors, a literature review was done using 2 databases, PubMed and Google scholar, using the search terms: maritime doctors, sea doctors, maritime medicine, skills and competencies, and guidelines. This review covers the literature published between 1990 and 2018. Only articles published in the English language were considered for review. 31 articles were extracted, and their abstracts were screened. Those articles that discuss the skills, competencies, and education of maritime doctors and health professionals were retrieved and discussed. Furthermore, using the snowball technique, 4 more articles were found. In addition, the websites of the respective International Organisations for reports and relevant material gave 8 more references, included in this review.

Policy tools

Analysis for a policy on the establishment of an accredited Masters programme, which will lead to specialization in maritime medicine, can better be understood with the use of techniques which present and analyze the different aspects of this policy. Such models help to better describe the related building blocks for a new policy formation, and they refer to the background, the parties, the content of the policy, and the process for generating the policy, as well as its implementation and evaluation (Buse et al., 2012). In the current analysis, 2 policy models were used: the Health

Policy Triangle (HPT) and the Kingdon model. The HPT is a theoretical framework which is built on *context*, *content*, and *process*, while the role of *actors/parties* should be identified and acknowledged in the policy. The *context* of a policy refers to the structure of the system, the situations around its main elements, and the impact of international factors, as well as how the cultures of the involved populations could influence the policy. *Content* refers to the actual content of the policy, while *actors/parties* refers to individuals or organizations who are either involved in the policy-making or are affected by the policy. The role of possible actors should be clarified, along with their power and interests. Finally, the *process* describes how the policy is initiated, developed, implemented, and evaluated. The latter is beyond the scope of the current article. Instead, potential agenda setting was analyzed using the Kingdon model.

According to this, for a policy to reach the agenda, a policy window should be created. This requires that 3 streams run together. The *problem stream* describes how the population perceives the importance of the problem with which politicians should deal. The *policy stream* covers the existence of a feasible solution, while the *politics stream* describes the debate among politicians and whether they are in favour of or against the policy. Media and other *parties/actors* could influence the decisions lobbying in favour of or against the policy.

3. Results

Maritime medicine covers many issues, from the environment of seafaring to the conditions of work and life on merchant, passenger, and fishing vessels and on wind and oilrigs. It encompasses the occupational health of the employees onboard, infectious diseases, the personal hygiene of seafarers, vaccinations, and other preventive interventions, as well as crew health counselling (Peltz & Warger, 2002). This stream of medicine also includes the training of seafarers in providing first aid and basic medical services onboard during voyages, health standards for work at sea, medical examinations of seafarers, and radio medical advice for ships (Carter, 2011; Oldenburg et al., 2014).

An indication of the required skills, competencies, and education for maritime doctors was published in the guidelines of the American College of Emergency Physicians (ACEP). They recommend maritime doctors to have at least a 3 years post-graduate degree in general and emergency medicine and appropriate life-saving courses, including Advanced Cardiac Life Support (ALS/ACLS). Advanced Pediatric Life Support (APLS/PALS), and Advanced Trauma Life Support (ATLS). These guidelines are followed to a large extent in cruise line requirements for hiring medical doctors onboard and are supported by the literature (DiGiovanna et al., 1992; Bansal et al., 2007; Dahl, 2010; Ottomann, 2015).

4. Discussion

Epidemiology of seafarers

Maritime epidemiology provides core knowledge and is among the required skills and competencies of sea doctors. Seagoing employees originate from all over the world. Their health profile mirrors their country of origin. Due to their profession, they are exposed to different kinds of environment and climate during voyages. Although health problems and disease conditions vary, depending on the type of ships and voyages, there are some general health issues. Mostly, the seafarers are exposed to extremes of weather, operational and mechanical hazards, and toxic cargoes and substances. Seafarers are swept away by heavy seas; they may die as a result of vessel casualties (foundering, capsizing, explosions, fires) (Carter, 2011). Seafarer health is affected by, among others, noise, vibration, smoke inhalation and fatigue due to overwork. There remains the threat of exposure to infectious diseases such as malaria (Borch et al., 2012). There are also other specific health problems and medical conditions in the maritime industry, including hypothermia and heat stroke, risks in ports, and different types of ill health that may affect sailors after returning home (Jerončić et al., 2014).

Accident and injury rates for seafarers are generally higher on older, rather than on newly constructed, ships; on smaller than on large ships, and on general cargo than on tanker ships. This reflects the differences in the nature of the work and the quality of safety management required on different kind of vessels (Nielsen & Panayides, 2005).

Mainly, the skills and competencies required for a maritime doctor can be classified broadly into medical and non-medical skills.

Medical skills

Looking at the diverse health problems and issues, maritime doctors should have thorough knowledge, based on general practice, of occupational and environmental medicine. Maritime doctors should have knowledge about the risks that may arise on board a ship due to noise, vibrations, and toxic substances, and they need to understand ergonomic constraints and be able to assess occupational safety on board (Dahl, 2009). Competencies on travel and tropical medicine are important requirements for a maritime doctor, along with skills in occupational maritime medicine (Jezewska et al., 2007).

In addition, they should go through additional training to have a better understanding of the maritime environment and the skills and competencies essential to practising medicine in isolation at maritime settings (Seidenstuecker & Neidhardt, 2014).

A recent study conducted by the authors in Denmark among the maritime doctors of the country showed that seafarers visit maritime doctors not only for the issuance of pre-employment medical certificates but for other health concerns as well. Since maritime physicians in Denmark are specialised general practitioners, they might be their family doctors as well. This facilitates follow-up practices and disease management and puts the patient at the centre of care, making the system more efficient because it increases access to care. Additional findings pointed out that maritime doctors are in favour of training in "fitness evaluation and medical examinations guidelines", followed by "rules and regulations within maritime medicine", and "working conditions and health risks on board" (76.5, 68.6, and 62.7 % respectively). When it comes to ways of training, they underscored preference for flexible ways, including e-learning and distance learning courses, to comply with their busy daily schedules, while they expect that these courses be accredited. In addition, they highlighted that the respective authority should create a "one-stop-shop" as an official site on the web, for communication of scientific information to maritime health professionals (Andrioti et al., 2017c).

Doctors who serve on passenger ships are requested to have a broader knowledge of emergency medicine (Jerončić et al., 2014), as well as of public health, including sanitary internal audits, nutrition, and food hygiene (Sritharan, 2006). These basic requirements are important to cover most potentially critical issues that could occur during a voyage (Seidenstuecker & Neidhardt, 2015).

Additionally, a maritime doctor should be trained in preventive medicine, being aware of required vaccinations and prophylaxis on board. A study showed that infectious disease rates were higher among crew in comparison with passengers, highlighting the need for targeted training of both physicians and seafarers in relation to vaccine-preventable diseases (Mouchtouri et al., 2019).

There is increased attention on issues related to mental and ill-health (Mayhew & Grewal, 2003). Further requirements involve the use of innovative technology in telemedicine. Telemedicine has become a significant component of maritime medicine. It is crucial in the transmission of electrocardiogram (ECG) recordings, and can be used in a broader way than emergencies; digital pictures and videos are of great help in the diagnosis of diseases and in the care and follow-up of patients. Most importantly, it helps to get assistance from onshore medical experts. The maritime physician should be familiar with the continuing development

of telemedicine and be able to take advantage of it (Hall, 1993; Lucas & Snoots, 1997; McCallum & Cox, 2012; Dahl & Stannard 2015).

Non-medical skills

Maritime doctors are expected to have additional non-medical knowledge along with their medical competencies. The globalization of shipping requests knowledge of international maritime laws, ship safety codes, and security plans and roles (Tortell et al., 2009). Furthermore, mandatory training for seafarers, as specified in international rules (International Convention for the Safety of Life at Sea (SOLAS) and International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention)) consist of safety familiarization knowledge, safety training, and crisis management training, and should also apply to the medical professionals onboard.

Some authors argue that knowledge of insurance systems and insurance claims could be an advantage in making informed decisions, especially in regards to ship deviations Furthermore, knowledge of international rules and regulations help doctors to get an idea about the roles of flag states, port states, and classification societies (Dahl & Stannard, 2015; Faurby et al., 2017).

For communication, not only on board but also with radio medical advice or follow up medical services ashore, it is recommended that maritime doctors should be certified in nautical and medical English on an advanced level. Soft skills, commonly known as diplomacy and empathy, are also important additional knowledge (Dahl, 2009).

Hereafter, we discuss the different challenges and debates about setting up a global programme in maritime medicine. The analysis will use the Health Policy triangle and the Kingdon model.

The Health Policy triangle

Context

Context means systemic factors- political, economic, social or cultural, both national and international- which may affect policy formulation. In regards to harmonising the skills and competencies of maritime doctors, the current systematic factors look more supportive for creating a standardised and common training and education programme and, thus, well-accepted assessment methods for certification. In this era of globalization, in world politics, economy, and culture, the international operational setting of the maritime industry connecting nations and continents demands internationally accepted policies in the area of human resources and, hence, there is an active request for skilful maritime doctors. The global call for "health as human rights" of individuals disregards its location, context, place, ethnicity, and occupation, and it expects individuals to have acceptable, affordable, and accessible healthcare (Asher & Hunt, 2010). This applies to people at sea, who should have the same standards of health care as those that can access health care on land (Jerončić et al., 2014).

In addition, the economic headway has introduced a business market in the maritime industry, with flourishing cruises on the seas. This is a more luxurious area, seeking good standards and quality of service, as more older passengers travel around the globe, requiring more qualified maritime doctors aboard.

Actors/Parties

Actors/parties are all those involved and/or who can affect the decision making of the policy. These can reside at the local, regional, national, or international level (Buse et al., 2012).

Actors refer to individuals, organizations, or the state, and their actions that affect health policy. The major actors in this context are industry, flag states, seafarers unions, Protection & Indemnity Clubs (P & I Clubs), maritime doctors and medical associations, universities, the

media, the EU, the International Labour Organisation (ILO), the International Maritime Health Association (IMHA), and the International Maritime Organization (IMO). These actors have a vested interest in providing good quality of care in the maritime area, both for seagoing employees and for passengers, while industry scales up their good reputation. International Organisations, including the IMO and IMHA, could lead the development of, as well as the coordination of, harmonized training courses for maritime health professionals which will be accredited with international standards (Peck et al., 2000). To move ahead with standard education of maritime doctors, they should be more proactive in new business models, encouraging training institutes to work together with all the stakeholders to design and offer a high quality of curricula. More importantly, they should facilitate discussions and debates among different nations and stakeholders on skills and competencies of maritime doctors. Health professionals are mostly found to be supportive of well-organised and comprehensive training courses which will equip them to work in challenging and remote situations at sea (Lucero-Prisno et al., 2005).

Content

Content is the substance of a policy, and details the subjects and topics covered. The content of policy reflects a resilient maritime health system with effective high-quality health services onboard. The ongoing discussion extends to ship construction, ship operation, and ship organization, international regulations, multicultural crew issues, dangerous goods, waste disposal and environmental issues, substance abuse, and harassment being included in the curricula. When discussing the creation of a new specialization, it is implied that maritime medicine will clearly describe core competency statements (essential requirements) which will define the respective competencies for the workforce serving in the field (Chodnik et al., 2013).

The Kingdon model

This model concerns the agenda setting for policy analysis in the establishment of a global Masters of Science training programme in maritime medicine, to enhance the skills and competencies of maritime doctors and harmonize practices at the global level. *The problem stream* concerns the perceived importance of the issue to be placed higher on the agenda for policy decisions. So far, all the stakeholders, including shipowners, manning agencies, P&I Clubs, and seafarer professional organisations, have consolidated their interest in offering high quality of services to seafarers. ILO 2013 requested competent maritime doctors to be able to understand not only the specific international epidemiological profiles of seafarers who come from all over the world to serve global shipping, but also the living and working environments onboard, and to have competencies in remote and travel medicine.

An accredited training programme in maritime medicine is the obvious *policy stream*, which will harmonize doctors' knowledge and practices globally and could promote maritime medicine as a recognised specialisation. There is a great deal of experience in the area of training programme development, and Medical Associations, together with the IMHA and respective universities, could help enormously in this direction. Flexibility in the organisation and provision of training as blended learning could lift attendance barriers (Schwarz & Wojtczak, 2002).

There is not any explicit international standard describing the required skills and competencies. The major actors in the area should be actively involved in determining the content and topics for an accredited programme in maritime medicine, based on the requirements and level of maritime health services, including guidelines for occupational and environmental health and remote and travel medicine. This could serve as the basis for a specialisation in maritime medicine worldwide. The current scenarios should encompass a common goal in setting internationally-accepted training curricula for maritime doctors

accredited with standard measures. The IMO should lead, bringing all the concerned stakeholders together. The IMHA and medical associations could provide evidence and principles for setting common standards for maritime health services and the required minimum standards of skills and competencies. In addition, the IMHA could provide technical support in the organisation of international training courses for medical doctors and other health professionals in maritime medicine and in seafarer fitness evaluations (Regnier et al., 2005).

The politics stream: When discussing the politics stream, one should refer to the different actors and their roles and positions in favour of or against suggested policy. Analysing the role of the shipping industry and the parties, it becomes clear that only benefits derive from such a policy in establishing a maritime medicine specialisation. Harmonized medical knowledge implies that seafarers get the same efficient health services whenever needed globally and could help them stay healthy and enjoy longer working lives. Similarly, the industry avoids, or minimizes, costly evacuations and repatriations. The media and the authorities are expected to support the policy, and there is already a market for physicians who are employed in the maritime field.

In conclusion, there is a good chance for the establishment of a global training programme which will create a recognised specialisation in maritime medicine. As the analysis shows, there is a window of opportunity, and the 3 streams potentially run together.

Following the report of the study in Denmark, the European Medical Association expressed their interest in running a similar study in EU member states to identify relevant support of an accredited training programme in maritime medicine.

5. Conclusions

The current state of the art shows that different countries have developed and adopted training programmes for maritime doctors, ranging from short training to diplomas or full post graduate MSc programmes in Maritime Health (Canals et al., 2013). The globalized nature of the maritime industry and its intercontinental and extraterritorial operational area suggests that maritime doctors should be well trained to accommodate international employees in a global working environment, as well as international passengers on cruise vessels. It is expected that all the courses should provide trainee doctors with the same knowledge base and skills, regardless of the country of origin, and be accredited through the standard way of assessment (Lucero-Prisno et al., 2005).

The knowledge base, skills, and competence necessary for maritime doctors should be defined, based on globally accepted criteria (Chodnik et al., 2013). A basis for consideration could be the "Guidelines on the medical examinations of seafarers", published by the ILO/IMO in 2013 to harmonize relevant practices globally. These could be modified to incorporate current knowledge in the field.

Maritime doctors should be skilful and competent, with an in-depth understanding of the maritime environment and its laws and regulations. They should understand well about the sailors' living and working conditions on board, the special psychological conditions sailors are exposed to, and all the other risks at sea. In addition, they should have skills and competence in occupational medicine, primary health care, emergency medicine, public health, tropical medicine, and travel medicine. Furthermore, they should be trained and competent in national and international rules and regulations; ethical aspects of maritime medicine; work and life on ships, and the health, risk evaluation, and fitness demand of work onboard ships. It should not be limited to medical care; the current context suggests a demand for competencies in public health, prevention, forensics, and other soft skills, addressing the needs of modernization and globalization of the maritime industry. The globalization trend stresses some common standards for successful work with international maritime medicine. The International

Maritime Health Association is a convenient platform to initiate an international discussion among specialists about the challenges and opportunities of maritime medicine. The IMHA should also call and coordinate for an international, common Master of Science training programme for medical doctors in maritime medicine, as the training organized in different countries faces challenges in effectively addressing the existing wide variations in medical examinations, fitness criteria, and the medical care of seafarers. Medical adversity at sea attracts attention and unfailingly cripples the whole maritime industry; therefore, a global standard for qualifications and training for competent maritime doctors on ships focuses on international cooperation and coordination within the global community of maritime medicine.

References

Adăscăliţei, O. (2014). The maritime labour convention 2006: A long-awaited change in the maritime sector. *Procedia-Social and Behavioral Sciences, 149*, 8-13. doi:10.1016/j.sbspro.2014.08.163

Alcaraz, M., Solomon, E., Ching, S., Paul, M., & Teves, P. (2019). Current profile of filipino physicians doing medical examination of seafarers in the Philippines: Need for maritime medicine training. *International Maritime Health* (in press).

Andrioti, D., Faurby, M. D., Le, J. V., & Jensen, O. C. (2017a). Do danish maritime doctors value continuous education initiatives? *Health Economics, 3*(3), 1000137. doi:10.4172/2471-268X/1000137

Andrioti, D., Jensen, O., Faurby, M., Frank, S., & Le, J. V. (2017b). A gap analysis of the maritime doctors' service profile compared to general practitioners. Retrieved from: https://docs.google.com/viewer?url=https%3A%2F%2Fwww.dendanskemaritimefond.dk%2Fwp-content%2Fuploads%2F2017%2F01%2Ffinal-report_Maritime-doctors-profile_SDU2016-124.pdf

Andrioti, D., & Jensen, O.C. (2017c) Maritime doctors and general practitioners service profiles: A research protocol. *Health Science Journal, 11*(2), 1. doi:10.21767/1791-809X.1000500

Asher, J. P., & Hunt, P. (2010). *The right to health: A resource manual for NGOs*. Martinus Nijhoff Publishers.

Bansal, V., Fortlage, D., Lee, J. G., Hill, L. L., Potenza, B., & Coimbra, R. (2007). Significant injury in cruise ship passengers: A case series. *American Journal of Preventive Medicine, 33*(3), 219-221.

Bloor, M., Thomas, M., & Lane, T. (2000). Health risks in the global shipping industry: An overview. *Health, Risk & Society, 2*(3), 329-340. doi:10.1080/713670163

Borch, D. F., Hansen, H. L., Burr, H., & Jepsen, J. R. (2012). Surveillance of maritime deaths on board Danish merchant ships, 1986-2009. *International Maritime Health, 63*(1), 7-16.

Buse, K., Mays, N., & Walt, G. (2012). *Making health policy*. Maidenhead: Open University Press. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.474.6452&rep=rep1&type=pdf

Carter, T. (2011). Mapping the knowledge base for maritime health: 3 illness and injury in seafarers. *International Maritime Health, 62*(4), 224-235.

Carter, T. (2016). Seafarer medicals: Population health or private gain? *International Maritime Health, 67*(1), 1-2. doi:10.5603/IMH.2016.0001

Carter, T., & Stannard, S. (2014). Healthcare at sea: Are regulations a guarantee of minimum standards or a barrier to improved practice? *International Maritime Health, 65*(4), 177-180. doi:10.5603/IMH.2014.0034

Chodnik, T., Jeżewska, M., Jaremin, B., Kotłowski, A., Leszczyńska, I., & Grubman-Nowak, M. (2013). Polish system of education in maritime health care and medical assistance for seafarers. *International Maritime Health, 64*(1), 24-29.

Dahl, E. (2009). Cruise ship doctor: Demands and challenges versus qualifications and training. *International Maritime Health, 60*(1-2), 33-35.

Dahl, E. (2010). Passenger accidents and injuries reported during 3 years on a cruise ship. *International Maritime Health, 61*(1), 1-8.

Dahl, E., & Stannard, S. (2015). Ship's doctor qualifications: A response to the German recommendations. *International Maritime Health, 66*(1), 1-3. doi:10.5603/IMH.2015.0001

DiGiovanna, T., Rosen, T., Forsett, R., Sivertson, K., & Kelen, G. D. (1992). Shipboard medicine: A new niche for emergency medicine. *Annals of Emergency Medicine, 21*(12), 1476-1479.

Faurby, M. D., Jensen, O. C., Hjarnoe, L., & Andrioti, D. (2017). The costs of repatriating an ill seafarer: A micro-costing approach. *Health Economics Review, 7*(1), 46. doi:10.1186/s13561-017-0184-0

Hall, T. (1993). Basic elements of maritime health care. *Journal of Occupational and Environmental Medicine, 25*(4), 325.

Jensen, O. C., Charalambous, G., & Andrioti, D. (2018). Perceived training needs of maritime doctors and general practitioners. *International Journal of Travel Medicine and Global Health, 6*(4), 154-160. doi:10.15171/IJTMGH.2018.28

Jensen, O. C., Lucero-Prisno III, D. E., & Canals, M. L. (2010). Integrated occupational health care for seafarers across the continuum of primary, secondary and tertiary prevention. *International Journal of Integrated Care, 10*(1), e035. doi:10.5334/ijic.512

Jerončić, I., Nikolić, J., & Mulić, R. (2014). *Maritime Medicine and Medicine for Seafarers.* In Proceedings of the 6th International Maritime Science Conference. Solin, Croatia, pp. 412-416.

Jezewska, M., Jaremin, B., & Leszczyńska, I. (2007). Health promotion in the maritime work environment: Training of leaders. *International Maritime Health, 58*(1-4), 129-137. doi:10.1.1.537.1454

Lucero-Prisno, D., Muramatsu, S., Hisamune, S., & Ehara, M. (2005). Mainstreaming health in maritime education and training. *International Maritime Health, 2005*, 300-302.

Mayhew, C., & Grewal, D. (2003). Occupational violence/bullying in the maritime industry: A pilot study. *Journal of Occupational Health and Safety, Australia and New Zealand, 19*(5), 457.

McCallum, I., & Cox, R. A. (2012). *Offshore medicine: Medical care of employees in the offshore oil industry*. Springer Science & Business Media.

Nielsen, D., & Panayides, P. M. (2005). Causes of casualties and the regulation of occupational health and safety in the shipping industry. *WMU Journal of Maritime Affairs, 4*(2), 147-167.

Oldenburg, M., Rieger, J., Sevenich, C., & Harth, V. (2014). Nautical officers at sea: Emergency experience and need for medical training. *Journal of Occupational Medicine and Toxicology, 9*(1), 19. doi:10.1186/1745-6673-9-19

Ottomann, C. (2015). Ship's doctors qualifications required for cruise ships: Recruiter's comments on the German: Norwegian debate. *International Maritime Health, 66*(3), 160-163. doi:10.5603/IMH.2015.0031

Peck, C., McCall, M., McLaren, B., & Rotem, T. (2000) Continuing medical education and continuing proffesional development: International comparisons. *BMJ, 320*(7232), 432-435. doi:10.1136/bmj.320.7232.432

Peeters, M. (2005). Free movement of medical doctors: The new Directive 2005/36/EC on the recognition of professional qualifications. *European Journal of Health Law, 12*(4), 373-396.

Peltz, R. D., & Warger, V. J. (2002). Medicine on the seas. *Tulane Maritime Law Journal, 27*(2), 425-466.

Piniela, F., Silos, J., & Bernal, F. (2013). Who will give effect to the ILO's Maritime Labour Convention, 2006? *International Labour Review, 152*(1), 59-83. doi:10.1111/j.1564-913X.2013.00169.x

Regnier, K., Kopelow, M., Lane, D., & Alden, E. (2005). Accreditation for learning and change: Quality and improvement as the outcome. *Journal of Continuing Education in the Health Professions, 25*(3), 174-182. doi:10.1002/chp.26

Saarni, H. (2005). Medical examinations of seafarers and training for medical doctors in maritime health. *Actual Problems of Transport Medicine, 2005*(1), 124-129.

Schwarz, M. R., & Wojtczak, A. (2002). Global minimum essential requirements: A road towards competence-oriented medical education. *Medical Teacher, 24*(2), 125-129.

Scott, J., Lucas, R., & Snoots, R. (1997). Maritime medicine. *Emergency Medicine Clinics of North America, 15*(1), 241-249.

Seidenstuecker, K. H., & Neidhardt, S. (2014). Qualification of ship doctors: A German approach. *Int Marit Health, 65*(4), 181-186.

Seidenstuecker, K. H., & Neidhardt, S. (2015). Ship doctor's qualification: The fast track? *International Maritime Health, 66*(2), 118-119. doi:10.5603/IMH.2015.0025

Shah, B., Andrioti, D., & Jensen, O. C. (2018). Training needs among maritime professionals: A cross sectional study. *International Maritime Health, 69*(2), 129-136. doi:10.5603/IMH.2018.0019

Sritharan, K. (2006). Maritime medicine. *BMJ, 332*(7546), s146-s147. doi:10.1136/bmj.332.7546.s146

Tortell, L., Delarue, R., & Kenner, J. (2009). The EU and the ILO maritime labour convention: In our common interest and in the interest of the world. In The European Union and the Social Dimension of Globalization. Routledge, pp. 127-144.

Varvara A. Mouchtouri, V. A., Lewis, H. C., & Hadjichristodoulou, C. (2019). A systematic review for vaccine-preventable diseases on ships: Evidence for cross-border transmission and for pre-employment immunization need. *International Journal of Environmental Research and Public Health, 16*(15), 2713. doi:10.3390/ijerph16152713

Walters, D., & Bailey, N. (2013). *Lives in peril: Profit or safety in the global maritime industry?* London: Palgrave Macmillan. doi:10.1057/9781137357298

World Health Organization (WHO). (2006). *The World Health Report 2006: Working together for health*. Retrieved from https://www.who.int/whr/2006/en

World Federation of Medical Education. (2003). *Continuing Professional Development (CPD) of Medical Doctors: WFME Global Standards for Quality Improvement*. Retrieved from https://docs.google.com/viewer?url=http%3A%2F%2Fwww.whogis.com%2Fentity%2Fworkforcealliance%2Fknowledge%2Ftoolkit%2F46.pdf

Yabuki, H. (2011). The 2010 Manila amendments to the STCW convention and code and changes in maritime education and training. *Journal of Maritime Researches, 1*(1), 11-17.