University of Southern Denmark
Department of Public Health
Centre of Maritime Health and Society

A Gap analysis of the Maritime doctors service profile compared to General practitioners

Danish Maritime Fund: Grant number SDU2016-124

FINAL REPORT DEC 2017

Research team:

Despena Andrioti, Olaf Jensen, Mads Faurby, Susanne Frank, Jette Videbæk Le

Danish Maritime Fund: Grant number SDU2016-124

A Gap analysis of the Maritime doctors' service profile compared to General practitioners

FINAL REPORT DEC 2017

CMSS-SDU

Research team:

Despena Andrioti[1], Olaf Jensen[1], Mads Faurby[1], Susanne Frank[1], Jette Videbæk Le[2]

[1]Centre of Maritime Health and Society, Department of Public Health, University of Southern Denmark

[2]Research Unit of General Practice, Department of Public Health, University of Southern Denmark

Table of Contents

Acknowledgements

The researchers wish to thank the Danish Maritime Fond for co-financing this project, and especially Mr Carsten Melchiors, Head of Secretariat, and the Project Leaders Mr Peter Karlshøj and Ms Marianne Lindahl.

The Danish Maritime Authority, and special thanks to Ms Maria Casparij, Head of Section, Seafarers, Certification and Social Affairs, and Ms Kristina Ravn, Special Adviser, Maritime Regulations and Legal Affairs for their valuable help with the questionnaire and maritime doctors contact details.

Special thanks to Dr Mette Gabriel, Chief Medical Director of the Medical Office for her precious contribution to the several revisions of the questionnaire.

Furthermore, the team wants to cordially thank Dr Henrik L. Hansen, former Head of Department, Danish Patient Authority and medical adviser on pre-employment health examinations of seafarers and fishermen for his treasured comments to the pre-final draft of the questionnaire.

The contribution of maritime doctors Jørn Brix and Mads Søndergaard to earlier drafts of the questionnaire as well as their support to this study is extremely appreciated.

We are grateful to all the maritime doctors and the general practitioners who participated in this survey.

Executive summary

Travel medicine deals with the prevention and management of health problems of international travellers. Maritime medicine extends practices to notions of occupational medicine, tropical medicine, and travel medicine and may be defined as "any medical activity related to questions concerning the employment, working conditions, living conditions, health and safety of workers at sea." This includes workers in the commercial fleet, the navy, the fishing fleet, sea piloting, offshore installations, maritime academy students and leisure boats.

Maritime medicine in not a recognised specialization in terms of mutual recognition of medical certificates in the European Union (Directive 2005/36/EC).

In the context of Maritime Labour Convention (MLC) 2006 that came into force in Denmark in 2013, (BEK999/13, last update in 2016), the respective authorities have an interest in providing comprehensive good quality of health services to the seagoing professionals as the rest of the population enjoys. A fundamental aspect of these are the pre-employment medical certificates as well as the periodic medical fitness examinations for seafarers, fishermen, offshore employees and students as described by the respective ILO/IMO guidelines on the medical examinations of seafarers. These are provided by maritime doctors who should have a clear understanding of living and working conditions aboard. However, because seagoing professionals may consult general practitioners for their health concerns, authorities should have in place relevant guidance for this medical specialty to better cope with seafarers.

There have been long discussions between government agencies and medical associations on the content of training, licence of the professionals and accreditation of Institutions to provide this training, with limited success so far. However, training is a fundamental part of medical practice, due to the advancement of biological sciences, medical doctors and health professionals in general put a lot of efforts in lifelong learning activities to update their knowledge and stay current to better serve the population in need. A number of training programmes on maritime medicine are offered at certificate, diploma and master level, in different countries, including Spain, and Norway. All programmes are flexible as to their organisation, and they are provided as a combination of distance learning and face-to-face teaching. In Denmark, such training on maritime medicine is lacking and doctors who want to know more about maritime medicine have to travel to other neighbouring countries and mainly to Norway.

The continuous professional development of medical doctors is an important milestone, for high quality of services, but so far very little is known on how maritime doctors respond to seagoing professionals health needs. The aim of this survey was to gain insight on a) breadth of services offered, b) follow-up practices and c) perceived training needs on aspects of maritime medicine.

In the survey, all the maritime doctors in the country were contacted electronically in May-June 2017. In parallel a respective sample of general practitioners was searched with similar questions to investigate their own professional needs, in regards to maritime employees, but with a more complicated approach (combination of electronic and manual) due to reasons described in the methods section.

The tool was based on aspects of medical practice on fit-to-work certificates, health promotion, prevention diagnosis and communication with patient and authorities.

As expected maritime doctors, deal more with prevention, diagnosis and communication with authorities, while GPs deal more with promotion, follow-up and patient education.

The results of this survey showed that maritime doctors were mainly males, of Danish nationality, around 60 years old, with more than 10 years of experience, educated from Aarhus University, specialized in general practice. What is the picture for the maritime professional? The seagoing professionals usually return to the maritime doctor for health concerns, but they may also consult GPs to a lesser extent. This might be the reason that only few GPs (about 1 out of 4) pointed out having very small numbers of seafarers on their list. Both medical practitioners are involved in education of their patients during consultation, and provide follow-up consultations to those in risk of chronic diseases. Furthermore, maritime doctors are mainly involved in the provision of vaccinations too. However, both specialties don't usually report occupational diseases. When they do so, they mainly identify musculoskeletal problems in the seagoing population, followed by hearing and skin problems. Maybe the administration process is time consuming and should be revised.
Both medical groups have knowledge about national guidelines on seafarers' medical examinations, with maritime doctors scoring higher in their knowledge about living and working conditions aboard.
In terms of medical doctors self-rated training needs, this study found areas of knowledge that need to be updated to enable maritime doctors optimize their services according to the needs of their seagoing population. As expected the majority of maritime doctors highlighted the need for targeted training in the areas in "Fitness Evaluation and Medical Examination Guidelines" followed by "Rules and regulations within Maritime Medicine" and "Working conditions and health risks on board".
The maritime doctors showed their interest in professional development by making suggestions about the form of training organization to comply with their high work burden. In line of this, they pointed out the need for a flexible, licensed course, the establishment of a website as one stop-shop with relevant guidelines and information for the medical professionals, with regular updates. Furthermore, the establishment of an Advisory Board for consultation in grey cases and the cooperation with all relevant stakeholders were defined as priorities.
GPs were younger, below 45 years old, had an equal distribution between male and female, and graduated mainly from Copenhagen University. Most GPs (63%) reported to have less than five maritime workers and none had above 20. The three training areas reported important were: i) working conditions and health risks on board a ship ii) occupational diseases diagnostics, prevention and follow-up and iii) health and safety on board.
The survey results of the GPs showed that maritime workers were not regarded as an especially risky occupational group. However, GPs, were interested in learning more about risks exposures and ways of handling these risks. Due to small numbers, it seems ambitious to set up continuing medical education activities aimed at only this particular group. Nevertheless, a course in occupational risks, diseases and follow-up targeting high-risk professions could be relevant and of interest to GPs.

This research was a pilot one done for the first time in the country with objectives to improve the quality of health advice and other services provided to the seafarers by helping the respective authorities to provide relevant training.

The questions this survey addressed were the following:

- How are maritime doctors recruited? – They are appointed by the Danish Maritime Authority and no specific training is required
- What are the maritime doctors practice characteristics? They are all specialised GPs
- What are the maritime experiences of the maritime doctors? Almost all of them are to some extent familiar with the working and living conditions on board
- Are they familiar with international regulations guidelines about work fitness? They are familiar to some extend but the majority of maritime doctors perceived it important to receive professional training and update their knowledge in the "Fitness evaluation and medical examinations guidelines" (76,47%) followed by "Rules and regulations within maritime medicine" (68,63%) and "Working conditions and health risks on board" (62,75%).
- Are they familiar with national regulations and guidelines about work fitness? Most of them are familiar with the national regulations, however they considered that training on national and international regulations would improve their knowledge
- How confident do they feel with doing the administrative processes? Half of them expressed needs for training in communication with patients and authorities
- Are they familiar with seafarers' working conditions and service demands? 63% expressed needs for training about working conditions on board
- How competent do they feel about disease management and occupational diseases notification? 27% expressed needs for occupational disease diagnostics, prevention and reporting
- How do they follow-up with prevention and control of seafarers with emerging chronic diseases (hypertension, obesity, diabetes)? 60% expressed needs for training in follow up for seafarers with chronic diseases

Analyse the differences in needs between the maritime doctors and the general practitioners:

- Working conditions on board is seen very important for 63 % maritime doctors and 44% for GPs
- Training in health and safety at work is seen very important for 63% of the maritime doctors and 44% of the GPs
- Training in rules and regulations related to maritime medicine is very important for 69% of the maritime doctors compared with only 35% of the GPs
- Training in reporting occupational diseases is seen as very important for 41% of the GPs and 28% of the maritime doctors
- Training in gender issues is seen as very important for 22% of the maritime doctors and 9% of the GPs

In general, maritime doctors with more than 10 years of experience and more than 20 annual visits of seagoing employees, were more likely to have a knowledge about the new demands for a brush-up course in smoke diving, be involved in seafarers' vaccinations, as well as patient education.

It is also worth mentioning that especially the maritime doctors expressed their needs for information and training related to gender issues. Actually, Danske Rederier has for a long time been focusing on dealing with bullying and harassment in shipping.

Dissemination and Impact

The team published two articles in open access international journals based on this survey, in 2017. One more is under way. The first article "Maritime Doctors and General Practitioners Service Profiles: A Research Protocol" was published in the Health Science Journal DOI: 10.21767/1791-809X.1000500 (Annex 2). It described the survey, methods and expected results in details, highlighting the importance of the topic for the international shipping community. The second article "Do Danish Maritime Doctors Value Continuous Education Initiatives?" was published in the journal, Health Economics & Outcomes Research: Open Access DOI: 10.4172/2471-268X/1000137 (Annex 2). The aim was to present the findings of the maritime doctors perceived training needs as part of a planned comprehensive maritime occupational health prevention programme. It concluded that maritime doctors are in favour of continuous education and training and could help the respective Authorities to organise such short courses on targeted topics in the country. The third article describes the findings of the GAP analysis presenting similarities and differences between the two groups of the medical practitioners, highlighting the need for putting on the agenda the issue of training in maritime medicine.

Besides these publications, the team actively communicated the results of the survey. More specifically, in 2017, there were presentations in national and international conferences and symposia emanating from the survey and two more in 2018, including as follows (for a detailed list please see Annex 3):

a) Maritime doctors' competencies, methods and issues, 14th International Symposium on Maritime Health, IMHA Research Seminar, Manila 22-24 March 2017
b) Maritime doctors' competencies, methods and issues. CMSS, Advisory Board Meeting, Esbjerg 13 June 2017
c) Compliance with MLC2006: the maritime doctors are ready to embrace innovative training. XI Congreso Internacional Hispano-Francófono de Medicina Marítima, IMHA and SEMM, Panama 21-22 September 2017
d) Survey on Maritime doctors' service characteristics. DSMM annual meeting. Helsingør, 17 November 2017
e) How General Practitioners Respond to Health Needs of Marginalized Groups: The Case of Maritime Employees in Denmark. Poster, 13rd Conference in Management, Economics and Policies in Health. National School of Public Health, Athens 12-14 December 2017
f) Maritime doctors self-rated training needs. SOME 2018, Technical University of Athens, School of Naval Architecture. Athens, 20-21 March 2018.
g) Maritime doctors' services profiles in Denmark. Barcelona Spain 31/5-3/6 2018

Impact

The team discussed the project in various occasions with our international partners and networks. It is worth noting that the European Medical Association (EMA) expressed their interest to initiate a similar European project for comparisons on maritime doctors training needs between member states. Furthermore, they consider to revitalise the discussions about training in maritime medicine as a medical specialty, in cooperation with all relevant stakeholders including the International Maritime Health Association (IMHA).

Policy implications

The prospects emanating from the study is that it puts Denmark in the front line as a pioneer country conducting research in the field of maritime doctors training needs in line with the ILO/IMO guidelines on the medical examinations of seafarers, providing the opportunity to benchmark the situation in Denmark and allow for international comparison on doctors' perceived training needs in other countries.

The results of this survey showed that there is a clear need for establishing adequate training in specific subjects, like for example the MLC 2006 convention and that the training should be tailored to doctors' needs and high work burden.

As a further step this survey could support the planning of targeted training on maritime medicine. Such training should be offered in cooperation with all the stakeholders and the medical associations. It should be flexible, accredited and linked to continuous professional development of medical doctors.

Recommendations

Maritime doctors highly welcome a flexible, accredited training programme in maritime medicine. The establishment of an Advisory Board for consultation and a web page as one-stop-shop are extremely important for these practitioners, who wish a closer cooperation with the respective national authority.

The reporting of occupational diseases, showed a very low percentage. This might be due to the administrative process, which takes a lot of time and should be revised. In line of this both groups of medical doctors expressed a need to have training in occupational diseases, prevention, diagnosis and reporting.

Concerning a follow up of expressed needs for training, like notification of occupational diseases and gender issues a qualitative study should be established. As a further step, this could be done by inviting a group of maritime doctors, GPs, representatives from ship owners, unions and the Danish Maritime Authority.

1. Introduction

There are about 1.5 million seafarers who sail around the globe, for long periods of time, transporting more than 90 per cent of goods (1,2). The maritime employees are a hard to reach population group since their work imposes difficulties to seek timely health services (3,4). Seafarers, fishermen and off-shore workers are prone to mandatory health examinations every second year in order to reduce risks to other crew members and for the safe operation of the ship as well as to protect their personal health and safety. The aim of regular health examinations are to decide if the seafarer is medically fit to perform his or her routine and emergency duties at sea and is not suffering from a medical condition likely to deteriorate at sea (5). The fitness for work examinations must be conducted by a maritime doctor, who should be familiar with the health risks of seafarers and working environment on board merchant vessels (5,6). In addition to the maritime doctor seagoing employees may consult their regular general practitioner (GP) with regards to health concerns.

The International Labour Organisation (ILO) in the Maritime Labour Convention (MLC) 2006, which entered into force internationally and in Denmark 20 August 2013, stated that countries should have specific guidelines on the medical examination of seafarers and fishermen (6). ILO issued guidelines on the medical examination of seafarers that all member countries should apply to (5). The current Danish executive order on the medical examination of seafarers and fishermen no. 999 enter into force in 2013, with last update in 2016 (7). The executive order takes into account the guidelines issued by ILO and MLC 2006, the amendments, as well as the requirements of the Standards of Training Certification and Watchkeeping (STCW) Convention, 1978 (5,6).

In Denmark maritime doctors are GPs, appointed by the Danish Maritime Authority (DMA) to provide pre-employment health examinations to seagoing personnel (8). Further training in maritime medicine, is not provided in the country. Denmark lacks a specific training programme in maritime medicine for medical doctors.
Maritime doctors who wish to pursue such courses have to travel abroad and more likely to neighbouring countries. It can be argued that regular GPs may need more detailed guidance in dealing with professionals who work at sea and should receive training in maritime medicine too, as the seagoing professionals might consult their regular GP with health concerns (5).
Education and training of health professionals is an essential factor in the development of health systems (9). Education and training contribute to better responsiveness and performance of the health professionals and lead to optimization of the services (10,11).

In Denmark, the policy on patient-centred care is in place for some years now. It requires a different approach in doctor–patient relation and builds on the principal that the patients are equipped to make informed decisions about their health. Health systems should give attention to the needs of marginalized groups (16). Seafarers are a hard to reach population group far from hospitals and with a great range of health needs due to their specific working environment and long working hours (17). Research findings showed that their perceived health is very poor with limited access to health information (18,19). They face difficulties in communications with health professionals who should be trained to understand and respond to their needs (20).

Effective care should be organised in an integrated manner and this applies particularly to the seagoing employees (21). Better management of care will be of benefit to "Blue Denmark" contribute to decreasing cost of unexpected provision of health services to seafarers by identifying those clients who may develop a chronic disease. The seagoing personnel will enjoy better quality of health services in terms of follow-up of employees with chronic diseases or those at risk while they will be able to make informed decisions about their health. The provision of prevention and health education services will increase seafarers' competencies to keep up with good health conditions and well-being on board (2).

More specifically with regards to the maritime doctors, they play a fundamental role including the performance of health examinations, communication with authorities and the follow-up practices (12,13). Furthermore, they should empower their patients in self-disease management through their engagement in necessary behavioural changes and promote patient satisfaction (14).

However, so far very little is known about the range of services offered to the seagoing personnel and their training needs in order to stay current and better serve their population. The aim of this survey was to gain insight on a) breadth of services offered, b) follow-up practices and c) perceived training needs on aspects of maritime medicine. The results could be used in the helping the relevant authorities to establish a training in maritime medicine. A comprehensive maritime medicine programme could be planned including occupational diseases diagnosis and prevention based on the WHO and the respective Medical Associations recommendations tailor made for the shipping industry.

2. Maritime Doctors

2.1 Material

All participants were designated maritime doctors by the Danish Maritime Authority to provide the mandatory medical examinations of seafarers, fishermen, offshore workers and maritime students.

The survey took place electronically on 31 May to 28 June 2017. The survey was distributed electronically and anonymously via the Google Forms Analyse software. An e-mail was sent out to 84 e-mail addresses provided by DMA containing an invitation letter, explaining the scope of the survey and a link to the online version. The 84 e-mail addresses from DMA were to the maritime doctor clinics and some clinics had more than one maritime doctor affiliated. In total, there were 111 DMA approved maritime doctors, who were designated to provide the mandatory medical examinations of seafarers, fishermen, offshore workers and maritime students in 2017. Clinics with more than one affiliated maritime doctor were contacted by phone to make sure that all recognised maritime doctors received the invitation e-mail. Further one e-mail address was still missing. In the telephone contact, the secretary of the clinic stated that the clinic did not have an e-mail for outside contact with other than patients. This clinic was not able to participate. In total 110 approved maritime doctors were invited to participate. Three e-mail reminders were sent one week apart with the first one a week after the invitation letter to remind the doctors to participate in the survey. 51 (46.4%) maritime doctors completed the survey.

The questionnaire was created in close cooperation with DMA, national medical experts and the Research Unit for General Practice, University of Southern Denmark, based on international experience (22) and

adapted to Danish Standards. The questionnaire was initially developed in English for use in international comparisons and then translated in Danish following the standard forward-backward method. A different researcher performed the forward and backward translation of both questionnaires, while a Danish linguistic professional was involved in the final editing of the tool. It was pilot-tested in a small sample of maritime doctors to investigate content validity.

The instrument was developed with drop down menus to facilitate quick responses. It was self-administered. It contained 40 questions, with three of them open ended, with questions covering four aspects of maritime medicine performance a) demographic characteristics, b) attributes of physicians in seafarers pre-service practice (fit-for-work certificate) c) continuity of care with questions on disease management, prevention, follow up practices and notifications of occupational diseases d) competencies and training needs. Completion time of the questions was around 7-10 minutes.

2.2 Method

A literature search was conducted in order to gather knowledge regarding the research question: *'What are the maritime doctors perceived training needs?'*

The study followed the Meta-Analysis for Observational Studies in Epidemiology guidelines (MOOSE) and the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement (23,24) .

Search strategy and selection criteria

The literature search was conducted utilizing the database Ovid Journals in the period January-March 2017 searching the databases of Medline, Embase, PsychInfo and Google scholar. The literature search was structured as a block search which is recognized as a proper technique to conduct literature searches (25). A full table of the search string can be seen in Annex 4

The search consisted of three blocks – columns – divided by the Boolean operator 'AND'. The words in the same block was divided with the Boolean operator 'OR'. The star (*) indicates that the search word was truncated, which indicates that the search included words extended beyond the star with unspecified search terms just containing the truncated word (26,27).

Inclusion and exclusion criteria

In order for a study to be included it had to be an observational study or expert opinion assessing the health professional attitude or advice given towards maritime medicine, travel medicine or travel vaccination. Studies reporting on the prevalence and magnitude of travel advice, travel vaccination and prophylactic treatment were also included. Very little research was done on this topic and any relevant articles were included. Studies were excluded if they were from before 1st January 2000 and not peer reviewed. Studies included were written in English, German, Danish, Swedish or Norwegian.

The results of all included studies were assessed qualitatively. The quality of all included studies was assessed and assessment of possible biases were discussed.

Duplicates were initially removed using Ovid Journals own software and then further screened by title screening in which nine duplicates were found and removed. The journals were through title and abstract

screening rated as excluded, low/moderate probability of inclusion and high probability of inclusion. All articles except for the excluded were retrieved in full-text for further analysis and screening.

The studies were during abstract and title screening given number 0, 1 or 2 to potentially indicate inclusiona or exclusion. 0 indicated that it should be excluded. 1 was given if the title or abstract contained a search term from one of the columns/blocks and indicated that the record was likely to be excluded and 2 was given if the record contained at least a search term from two columns/blocks and indicated that it was likely to be included. Studies rated 1 or 2 were included for full text review.

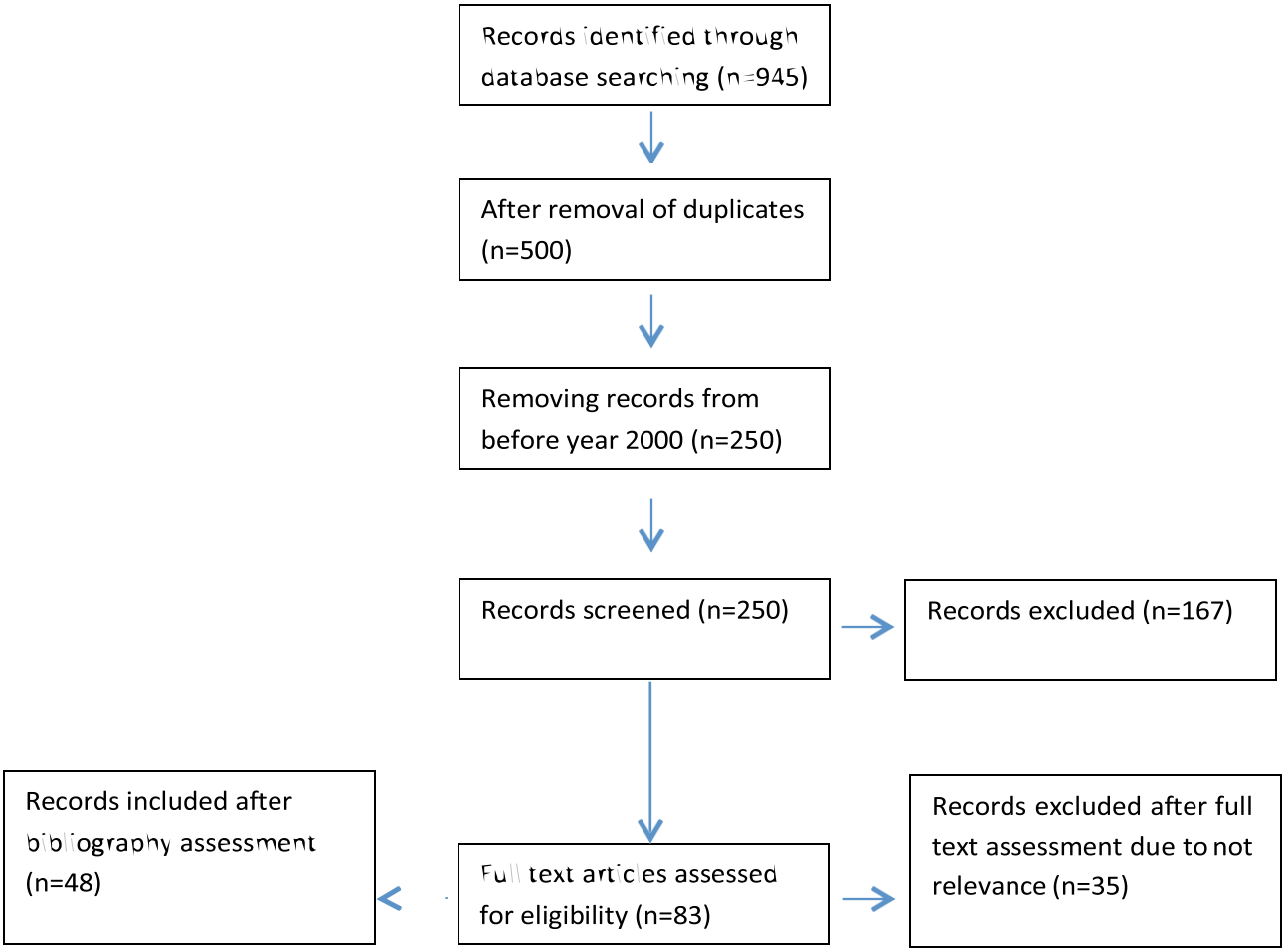
Studies were excluded if they were from before 2000. The exclusion process is illustrated in the figure below showing a flowchart. The first step in the process was to remove any duplicates and exclude studies from before 2000. Records were screened based on title and abstract and rated according to the above mentioned. The flowchart below illustrates the records included for full text review (28–42).

A snowball technique was applied searching the bibliographies of the included studies and further 3 more studies were included.

Assessment of bias

The risk of bias in studies included for full text review was assessed using a checklist of essential items based on the STROBE statement (43).

Flowchart 1: Process of literature review



Statistical analysis

Initial descriptive statistics were made directly in the Google Forms Analyse software. STATA® 14 statistical software was applied to further analyse the data. Demographics were displayed with frequency tables and by subgroups chi-2 tests to examine differences between groups. Follow-up practices, breadth of services offered and doctors' training needs analyzed by subgroups and displayed in frequency tables, chi2 tests to test for between group difference.

We further analyzed the responses to identify statistically significant influences between personal characteristics, breadth of services offered and self-rated training needs with logistic regression. Services offered were the dependent variables while doctors' characteristics the independent i.e. gender, age, region, years in practice and number of seafarers, fishermen, offshore employees and students.

Similarly, differences in the rating of knowledge, satisfaction and perceived importance of training needs were analysed according to personal characteristics of the maritime doctors such as; gender, years as a maritime doctor, annual number of seafarers exams, fishermen, offshore employees and students, region of clinical practice and age and differences were tested with Fishers exact test.

The importance of training needs was answered by the doctors on a five point Likert scale where 1 equalled 'not important' and 5 equalled 'very important'. The analysis of the results provided insights on issues and draw conclusions of the attitudes of maritime doctors and their perceived training needs. To increase the robustness of the answers, in the analysis this question was recoded into three categories; 1 and 2 equalled 'not important, 3 equalled 'moderate important' and 4 and 5 'very important'. Fisher exact test, with significance level at α=0.05% confidence level was considered to indicate statistical significance.

2.3 Results

Table 1 illustrates the demographics of the maritime doctors that participated in the survey. 43.11% of the maritime doctors were 60 years of age or older and the majority were men (n=38, 74.51%). 50 doctors (98.04%) graduated from a university within Denmark and all doctors had Danish nationality. Two thirds of the population had more than 20 medical examinations of seafarers in 2016 and two doctors had none.

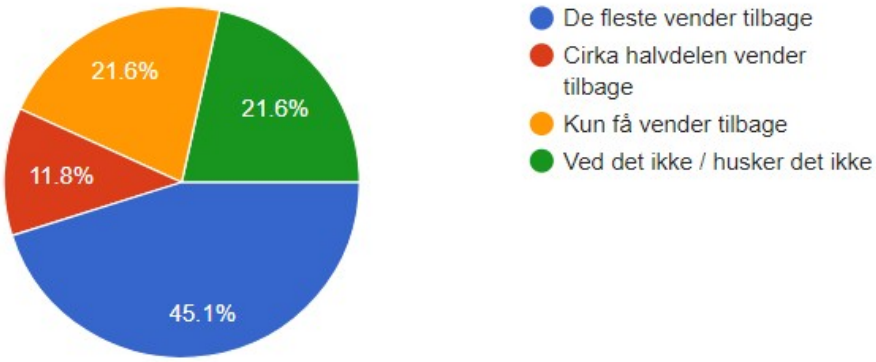
Table 1 Maritime doctors' characteristics (N=51)

	N	%
Age		
- 40-49	13	25.49%
- 50-59	16	31.37%
- 60-69	18	35.29%
- 70+	4	7.84%
Danish nationality (yes)	51	100.00%
Specialized in general medicine (yes)	50	98.04%
Gender (male)	38	74.51%
University		
- Aarhus	21	41.18%
- Copenhagen	16	31.37%
- Southern Denmark	13	25.49%
- Outside of Denmark	1	1.96%

Years as a maritime doctor		
- <5	13	25.49%
- 5-9	10	19.61%
- 10-20	18	35.29%
- >20	10	19.61%
Medical examinations for other countries than Denmark (yes n=15)	15	29.41%
- Norway	9	60.00
- United Kingdom	7	46.67
- The Netherlands	2	13.33
- Sweden	2	13.33
- Other	7	46.67
Region		
- Capital	9	17.65%
- Zealand	4	7.84%
- Southern Denmark	20	39.22%
- Central Denmark	11	21.57%
- North Denmark	7	13.73%
Annual number of exams 2016:Seafarers		
- 0	2	3.92%
- 1-20	8	15.69%
- >20	34	66.67%
- Don't know/don'trecall	7	13.73%
Number of seafarers found not-fit-for duty in 2016		
- 0	15	29.41%
- 1-10	29	56.86%
- Don't know/don'trecall	7	13.73%
Annual number of exams 2016: Fishermen		
- 0	7	13.73%
- 1-20	27	52.94%
- >20	9	17.65%
- Don't know/don'trecall	8	15.69%
Number of fishermen found not-fit-for duty in 2016		
- 0	34	66.67%
- 1-10	12	23.53%
- Don't know/don'trecall	5	9.80%
Annual number of exams 2016: Offshore workers		
- 0-5	20	39.22%
- 6-20	15	29.41%
- >20	12	23.53%
- Don't know/don'trecall	4	7.84%
Annual number of exams 2016: Maritime students		
- 0-5	20	39.22%
- 6-20	16	31.37%
- >20	13	25.49%
- Don't know/don'trecall	2	3.92%
Electronic patient journals (yes)	42	82.35

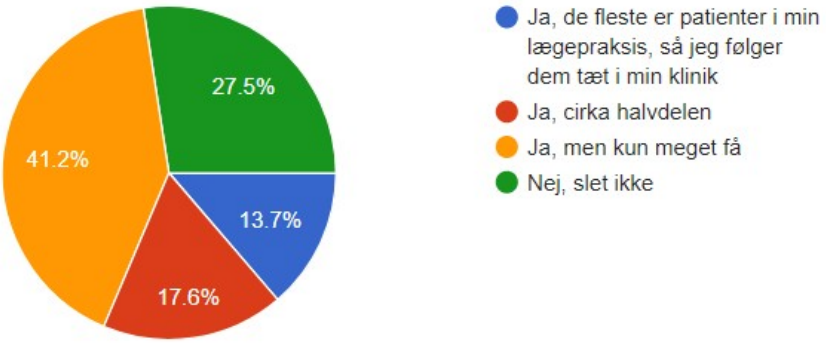
In continuation, the maritime doctors answer questions about the range of services offered to seafarers, fishermen and off-shore employees:

Figur 1. Hvor ofte vender den samme maritime person tilbage til almindelige lægebesøg?



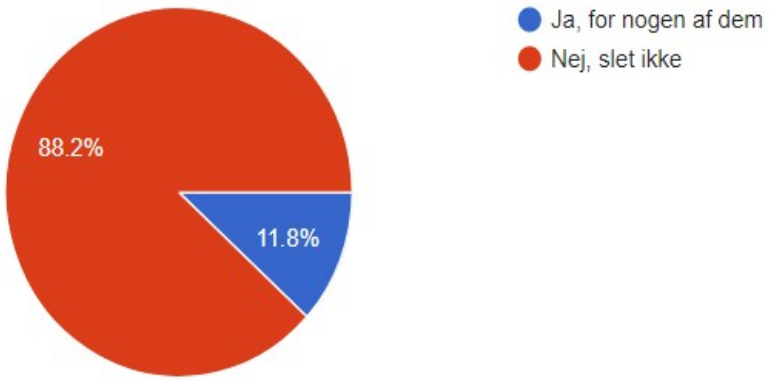
45% of the maritime doctors answered that most maritime employees come back for regular exams. In general 4/5 of the seagoing employees visit the maritime doctors for their routine health concerns.

Figur 2. Foretager du opfølgning af sømænd med eksisterende eller præstadier til kroniske sygdomme som diabetes og hypertension?



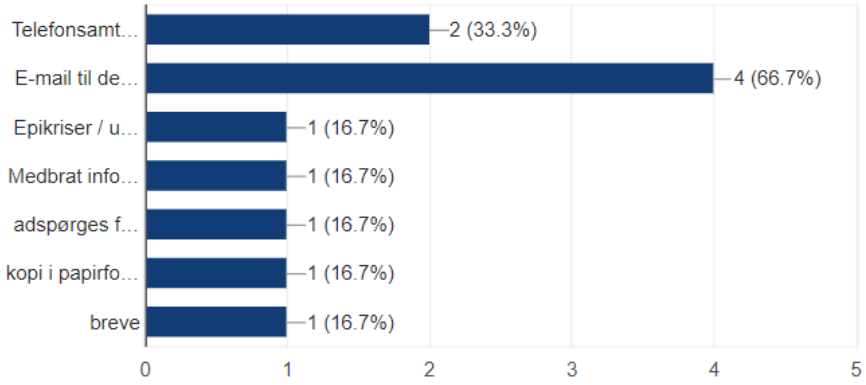
41.2% of the maritime doctors answered that they follow-up at least a few maritime employees with chronic diseases and only 3 out of ten stated that they never provide follow-up services to their seagoing personnel.

Figur 3. Har du adgang til journaler med behandlinger, sygdomme og symptomer på sømænd fra andre nationaliteter?



The vast majority of maritime doctors (88.2%) do not have access to the medical journals of seafarers from other countries.

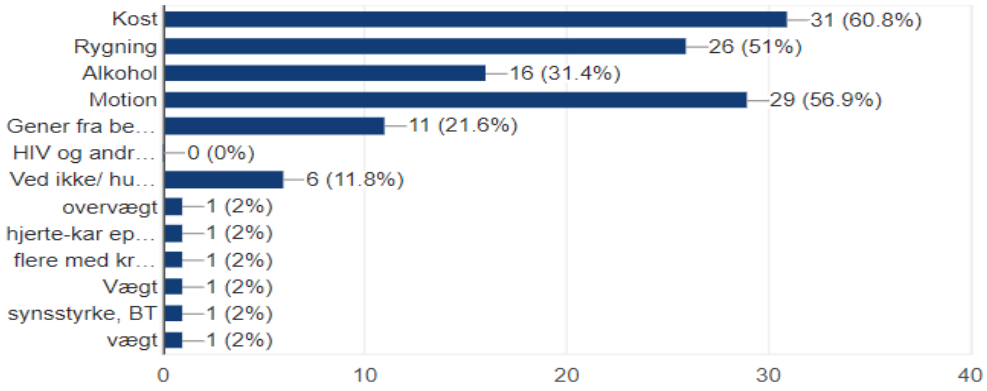
Figur 4. Hvis ja, hvordan får du informationen?



Only 6 maritime doctors answered this question about access to journals of foreigner seafarers and they pointed out emails exchange as the main way of communication.

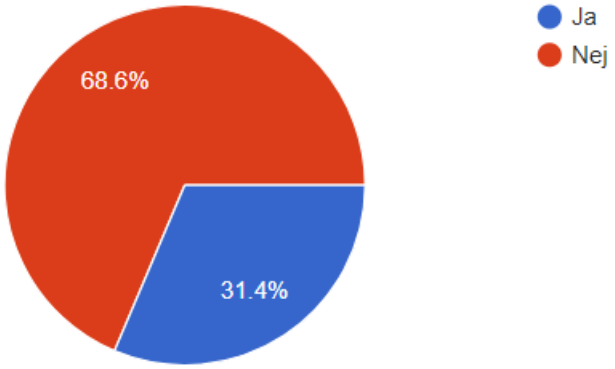
The next question was about the major issues in relation to seafarers' health, based on their personal views.

Figur 5. Baseret på din erfaring, hvor ser du de største udfordringer i forhold til søfarende, fiskeres og/eller offshore medarbejderes helbred? Sæt gerne flere krydser.



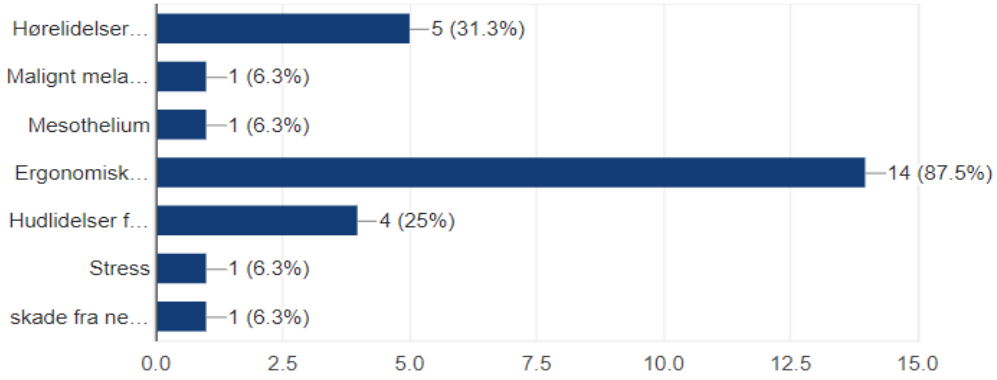
This was a multiple answer question. They considered nutrition on board (60.8%) and motion with 56.9% as the major problems aboard.

Figur 6. Har du nogensinde anmeldt en arbejdsbetinget lidelse hos en sømand, fisker eller offshore medarbejder?



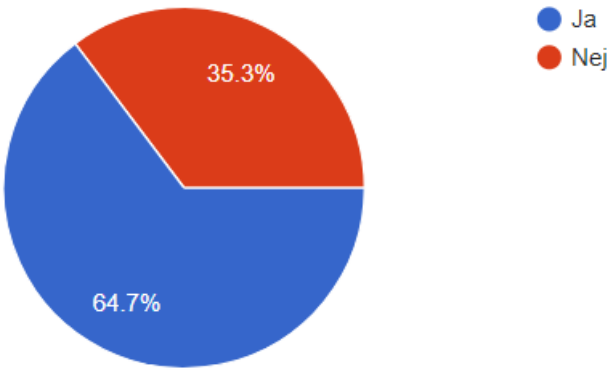
The maritime doctors pointed out that they have not reported any occupational disease for a seafarer, fishermen or off-shore employee (68.6%).

Figur 7. Hvis ja, hvilke arbejdsbetingede lidelser har du anmeldt? Sæt gerne flere krydser



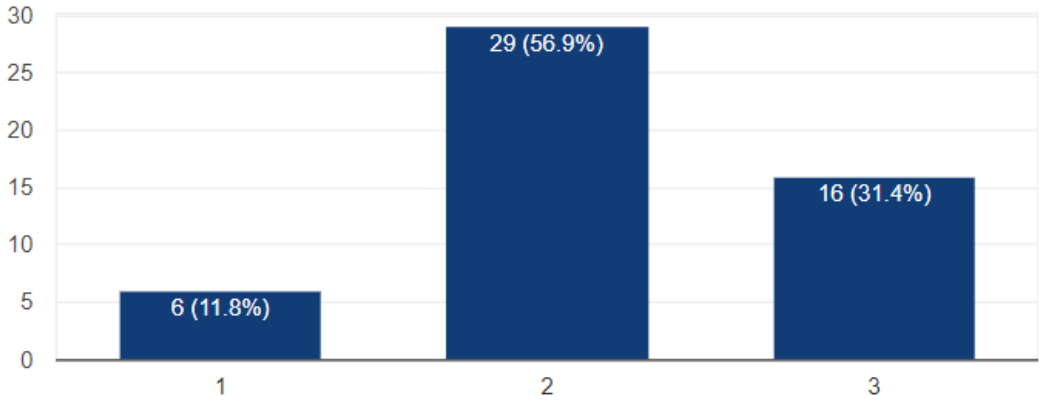
This was a multiple answer question. Those who answered yes (16 responses), in the previous question, mentioned mainly ergonomic and hearing problems (87.5% and 31.3% respectively).

Figur 8. Er du også involveret i vaccinationen af sømænd?



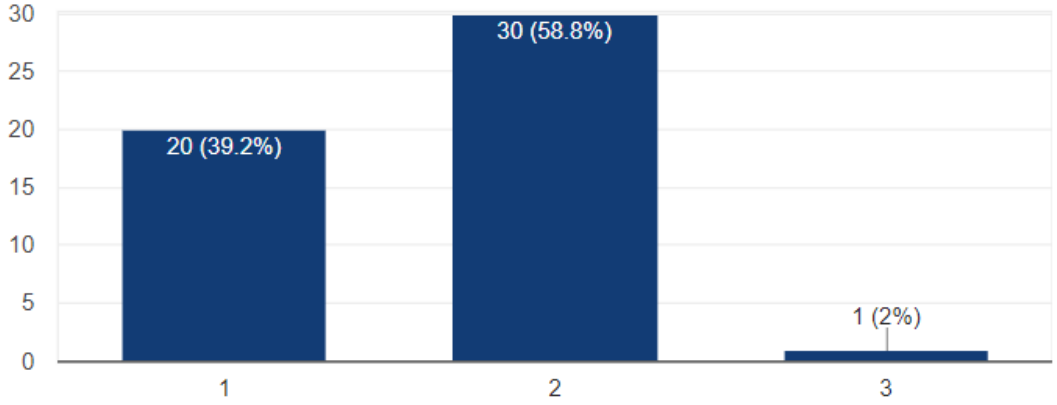
Almost 7 out of 10 maritime doctors answered that they vaccinate their patients.

Figur 9. Underviser du dine patienter vedrørende deres helbred under konsultationerne? Angiv venligst i forhold til følgende skala, hvor "1=Aldrig" og "3=Altid"



More than half of the maritime doctors (56.9%) answered that they sometimes educate their patients while 31.4% always educate their patients during consultations.

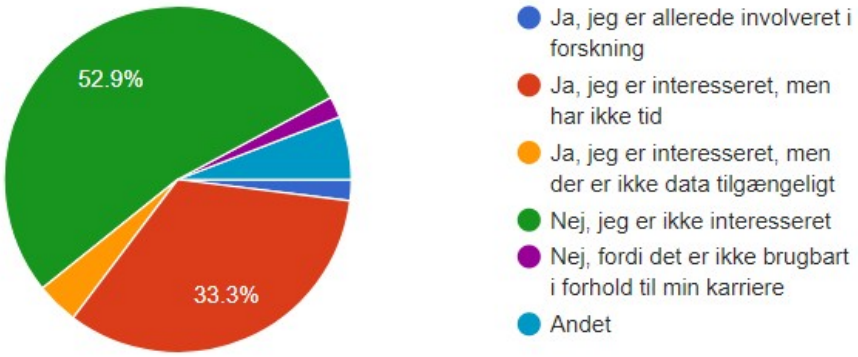
Figur 10. Beder du søfarende om at lave fysiske tests, f.eks trappegang, som en del af vurderingen? Angiv venligst i forhold til følgende skala, hvor "1=Aldrig" og "3=Altid"



More than half of maritime doctors (58.8%) answered that they sometimes ask seafarers and fishermen to do physical tests such as stairs climbing while 39.2% never ask.

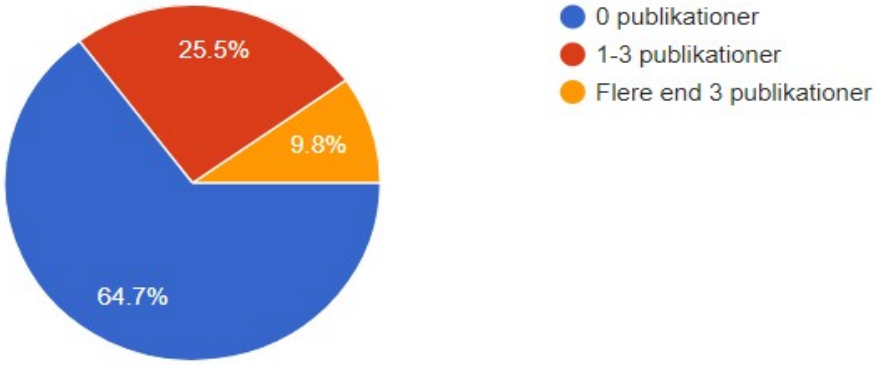
The following questions tried to survey specific job related characteristics and research interests. It is well documented that doctors have very limited time due to high workloads. This can be seen also in this study based on their answers.

Figur 11. Er du interesseret i at forske i maritim medicin?



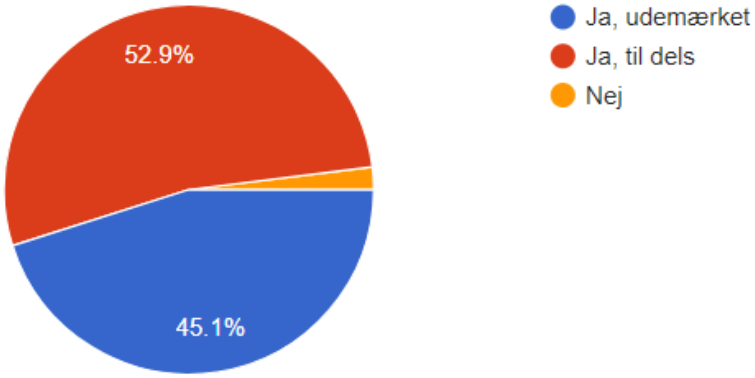
52.9% answered that they were not interested while 33.3% were interested but have no time

Figur 12. Hvor mange fagfællebedømte (peer reviewede) videnskabelige publikationer har du publiceret som første forfatter eller som medforfatter?



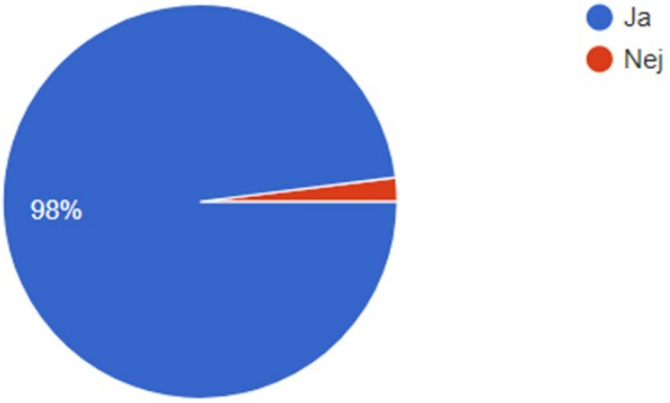
64.7% of the maritime doctors answered that they haven't published any article in scientific journals, and only 1 out of ten doctors had more than 3 publications

Figur 13. Er du bekendt med leve- og arbejdsvilkår om bord på et skib?



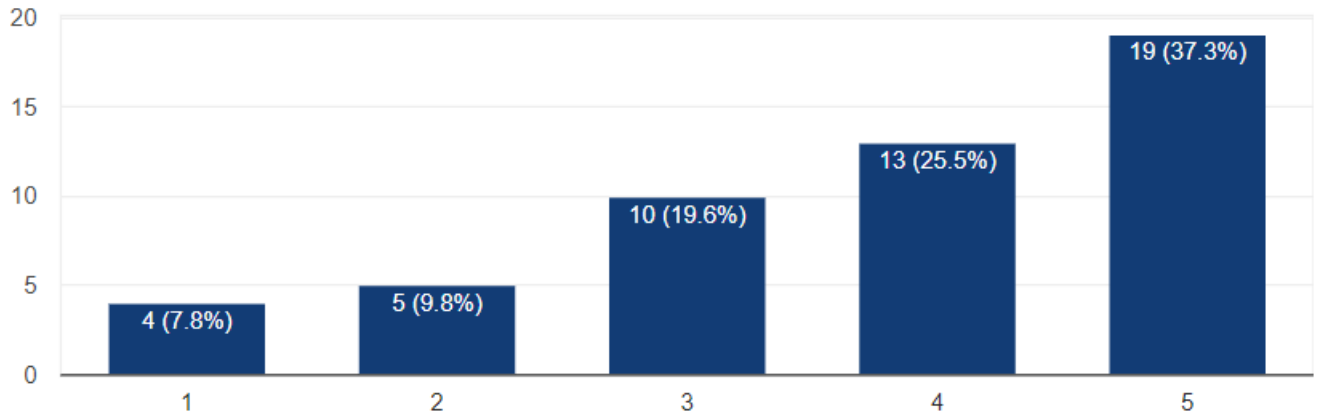
52.9% answered that they have a reasonable awareness of living and working conditions on board a ship, while 45.1% have a great awareness.

Figur 14. Er du bekendt med, "Bekendtgørelse om lægeundersøgelse af søfarende og fiskere"? (BEK nr. 999/2013



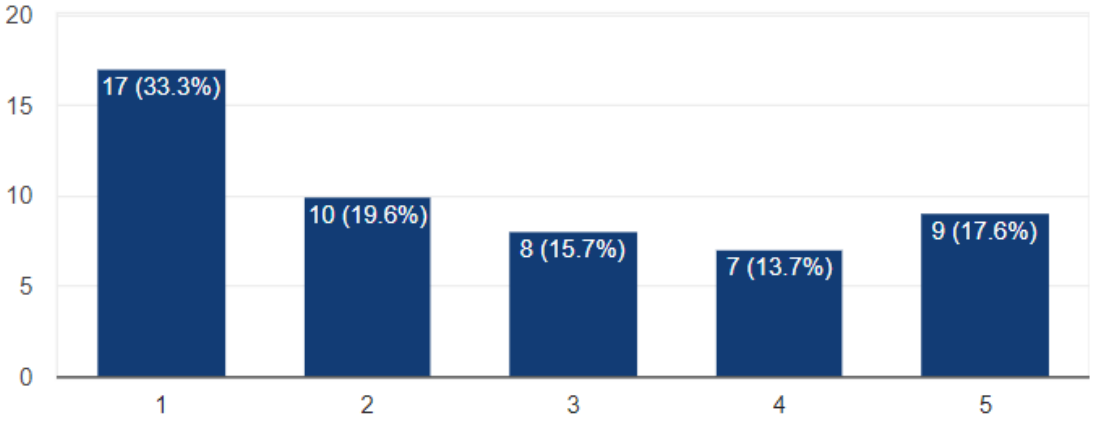
Almost all answered that they are aware of the national guidelines

Figur 15. Er du bekendt med de seneste ILO/IMO 2013, 'Retningslinjer for lægeundersøgelse af sømænd'? Angiv venligst i forhold til følgende skala, hvor "1=Nej, det ved jeg ikke" og "5=Ja, det er jeg velinformeret om"



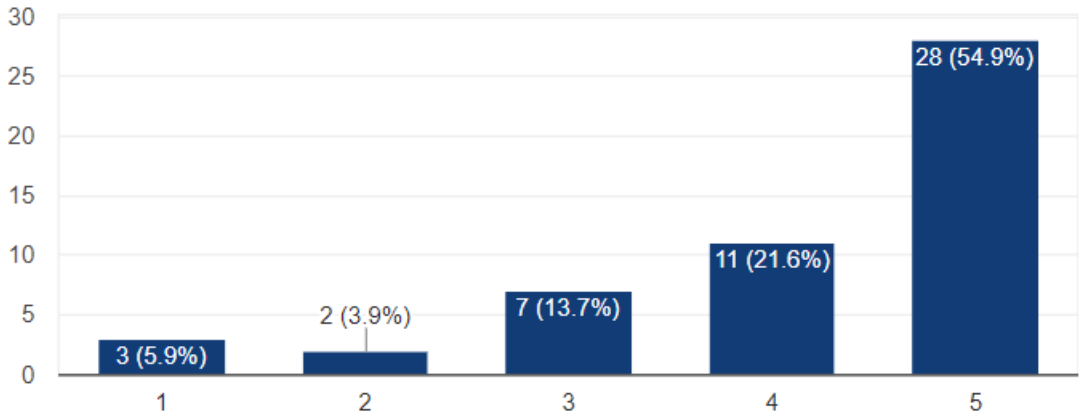
The majority of the maritime doctors (62.8%) answered that they are aware and well aware of the ILO/IMO 2013 guidelines on the medical examinations of seafarers

Figur 16. Er du bekendt med de nye krav til gennemførelse af et genopfriskningskursus i røgdykning?" Angiv venligst i forhold til følgende skala, hvor "1=Nej, det ved jeg ikke" og "5=Ja, det er jeg velinformeret om"



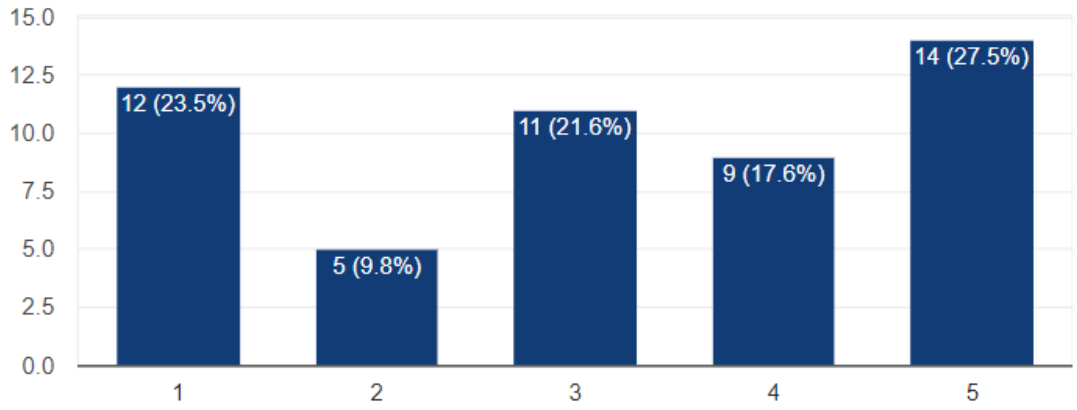
Almost 7 out of 10 pointed out that they were not aware of the new requirements, while only 3 out of 10 answer that they were aware and well aware.

Figur 17. Er du bekendt med muligheden for at give søfarende eller fiskere begrænset ret til at arbejde f.eks. må ikke deltage i røgdykning og kun arbejde i visse fartsområder? Angiv venligst i forhold til følgende skala, hvor "1=Nej, det ved jeg ikke" og "5=Ja, det er jeg velinformeretom



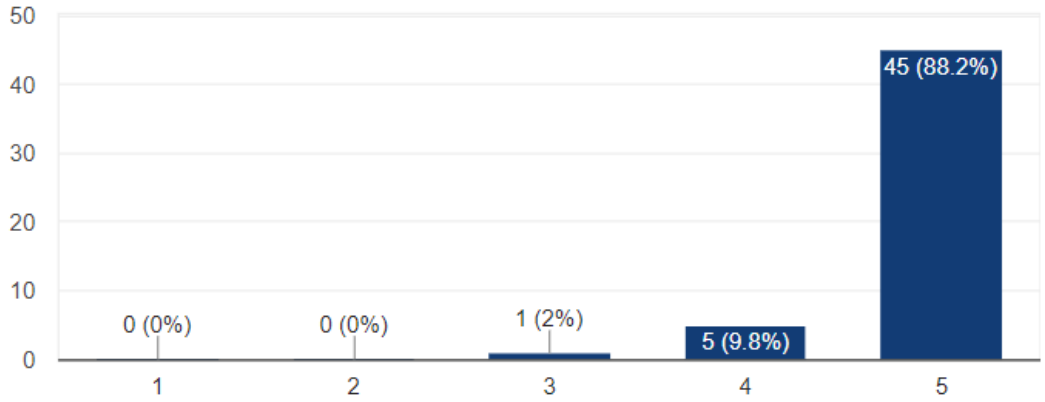
The majority 76.5% answered that they are aware and well aware (21.6% and 54.9% respectively).

Figur 18. Er du bekendt med skibes medicinkiste og indhold heraf? Angiv venligsti forhold til følgende skala, hvor "1=Nej, det ved jeg ikke" og "5=Ja, det er jeg velinformeret om"



The majority of the medical doctors (66.7%) are familiar with the ship's medical chest but still 3 out of 10 answered that they are not acquainted.

Figur 19. Er du bekendt med undersøgelse af søfarende og fiskernes synsevne og farveblindhed? Angiv venligst i forhold til følgende skala, hvor "1=Nej, det ved jeg ikke" og "5=Ja, det har jeg erfaring med"



Almost all of them (88.2%) were familiar with the examination guidelines for colour blindness

The table below illustrates the results of the above mentioned questions in summary. The questions were related to the services provided by the maritime doctors and their current knowledge about the living and working conditions aboard. The answers indicated that according to maritime doctors' views, seafarers' greatest health challenges are in regards to nutrition, lack of exercise and smoking. Less than a third (31.37%) of the maritime doctors had ever reported an occupational disease and the most common occupational disease was ergonomic disorders followed by hearing disorders. More than half of the doctors (52.94%) answered that they had no interest in conducting research within maritime medicine and only one doctor (1.96%) were already involved in maritime medicine research. It is not common among maritime doctors to conduct physical tests like stair walking during examination and only one doctor stated that this was always a part of the routing examination and 20 (39.22%) stated that it was never a part of the routine while 30 (58.82%) stated that they sometimes perform physical tests during examination. It is worth noting that the majority of the seafarers visit maritime doctors for health concerns, and that 7 out of 10 maritime doctors follow-up the seafarers on their list. Furthermore, the survey revealed that 20% of maritime doctors are not familiar with the new demands for completion a brush-up course in smoke diving, nor with ILO/IMO 2013 guidelines on the medical examinations of seafarers, even though they are well aware of the national ones. These clearly point out to a need for a more active communication of such frameworks. The survey highlighted a high work burden of maritime doctors, who would like to do research in maritime medicine but have not time.

Table 2. Results of survey to questions on maritime doctors service characteristics

		N=51	%
Q16: How often are the same maritime persons returning to you for regular health examinations?			
-	Most of them return	23	45.10
-	Approximately half of them return	6	11.76
-	Only few are returning	11	21.57
-	Don't know/Don't recall	11	21.57

Q17: Do you follow-up the seafarers with existing and emerging chronic conditions, like diabetes and hypertension?			
-	Yes, as most of them are my own GP patients, so I include and follow them closely in my GP clinic	7	13.73
-	Yes, about half of them	9	17.65
-	Yes, but only very few	21	41.18
-	No, not at all	14	27.45
Q18: Do you have access to the seafarers of other nationalities' medical records with treatments, diseases and symptoms?			
-	Yes, for some of them	6	11.76
-	No, not at all	45	88.24
Q20: Based on your experience, where do you see the greatest challenges in regards to the health of seafarers, fishermen and/or offshore workers? (multiple answers allowed)			
-	Nutrition	31	60.78
-	Smoking	26	50.98
-	Alcohol	16	31.37
-	Exercise	29	56.86
-	Discomfort from the musculoskeletal system	11	21.57
-	HIV and other sexually transmitted diseases	0	0.00
-	Other	6	11.76
-	Don't know/Don't recall	6	11.76
Q21: Have you ever reported an occupational disease for a seafarer, fishermen or offshore worker?			
-	Yes	16	31.37
-	No	35	68.63
Q22: If yes, what work related diseases have you reported? (multiple answers allowed) (n=16)			
-	Hearing disorder (tinnitus, hearing loss)	5	31.25
-	Malignant melanoma	1	6.25
-	Mesothelium	1	6.25
-	Ergonomic disorder	14	87.50
-	Skin disease caused by chemical substances	4	25.00
-	Other	2	12.50
Q23: Are you interested in doing research in Maritime Medicine?			
-	Yes, I am already involved in research	1	1.96
-	I am interested, but I don't have the time	17	33.33
-	I am interested, but there is no available data	2	3.92
-	No, I am not interested	27	52.94
-	No, because this is not useful for my career advancement	1	1.96
-	Other	3	5.88
Q24: How many peer reviewed scientific publications have you published as the first author or co-author?			
-	0 publications	33	64.71
-	1-3 publications	13	25.49
-	More than 3 publications	5	9.80
Q25: Are you familiar with the living and working conditions on board a ship?			
-	Yes, quite well	23	45.10
-	Yes, to some extent	27	52.94
-	No	1	1.96
Q26: Are you familiar with, Bekendtgørelse om lægeundersøgelse af søfarende og fiskere "(Guidelines on the Medical Examination of Seafarers BEK nr. 999/2013)"?			
-	Yes	50	98.04
-	No	1	1.96
Q27: Are you familiar with the latest ILO/IMO 2013, Guidelines on the Medical Examination of Seafarers?			
-	No, I don't know	9	17.65
-	Knows about it	10	19.61
-	Yes, I am well informed	32	62.75
Q28: Are you familiar with the new demands for completion of a brush-up course in smoke diving?			
-	No, I don't know	27	52.94
-	Knows about it	8	15.69
-	Yes, I am well informed	16	31.37
Q29: Are you familiar with the possibility of providing seafarers and fishermen with restrictions in their work certificate e.g. must not participate in smoke diving and must only sail in certain areas			
-	No, I don't know	5	9.80
-	Knows about it	7	13.73
-	Yes, I am well informed	39	76.47
Q30: Do you educate your patients regarding their health during their consultation?			
-	Never	6	11.76
-	Sometimes	29	56.86

- Always	16	31.37
Q31: Are you involved in the vaccination of seafarers?		
- Yes	33	64.71
- No	18	35.29
Q32: Are you familiar with the ship's medical chest, and its contents?		
- No, I don't know	17	33.33
- Knows about it	11	21.57
- Yes, I am well informed	23	45.10
Q33: Are you familiar with examination of seafarers and fishermen's visual acuity and colour blindness?		
- No, I don't know	0	0.00
- Knows about it	1	1.96
- Yes, I am well informed	50	98.04
Q34: Do you conduct physical tests on seafarers e.g. stair walking as a part of the examination?		
- Never	20	39.22
- Sometimes	30	58.82
- Always	1	1.96

We then analyzed the responses to identify statistically significant influences between personal characteristics, services offered and familiarity with living and working conditions aboard, applying logistic regression. Services offered were the dependent variables while doctors' characteristics the independent i.e. gender, age, region, years in practice and number of seafarers, fishermen, offshore employees and students.

Gender had an influence on the knowledge about the demands for a brush-up course in smoke diving, where a statistical significant difference was seen between men and women (p=0.009). 42.11% of the male doctors stated that they were well informed vs. no women. The same applies to regions in terms of knowledge about the demands for a brush-up course in smoke diving, difference occurred across regions (p=0.039). Differences in the knowledge about the demands for a brush-up course in smoke diving were seen in years as a maritime doctor. Where 65.22% of doctors with less than 10 years of experience did not know about it compared to 42.86% of doctors with 10 or more years of experience (p=0.012).

Region did have an influence on the doctors' knowledge related to the living conditions aboard, where statistical significant difference was seen between regions (p=0.003).

Involvement in vaccination of seafarers was significantly influenced by the years of experience of the maritime doctor, where the maritime doctors with experience of 10 years or more were less likely not to be involved in the vaccination of seafarers (OR=0.25, p=0.026).

The annual number of seafarer exams had a statistical significant influence on the behaviour of the doctor related to patient education (p=0.009). It also had a significant influence on the odds of being involved in the vaccination of seafarer, where doctors with more than 20 annual seafarer health exams were less likely not to be involved in the vaccination of seafarers compared to their colleagues with less than 20 health

exams (OR=0.13, p=0.011). Age did not have an influence on the maritime doctors' knowledge or follow-up practice (p >0.005).

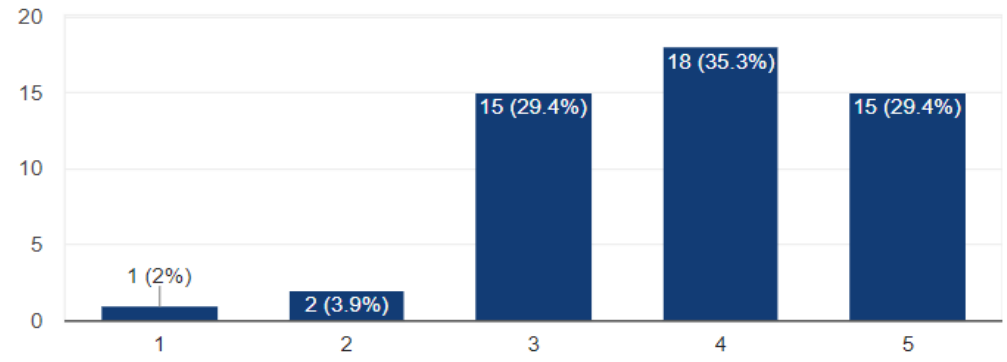
In general, maritime doctors with more than 10 years of experience and more than 20 annual visits of seagoing employees, were more likely to have a knowledge about the new demands for a brush-up course in smoke diving, be involved in seafarers vaccinations, as well as patient education.

2.3.1 Communication with Danish Maritime Authority and job satisfaction

The aim of these questions was to assess their satisfaction with the respective Authority and present their confidence in handling seafarers' pre-employment examinations. The Question 36 was a qualitative one (open ended) so they could give their views with regards to their communication with the Authority.

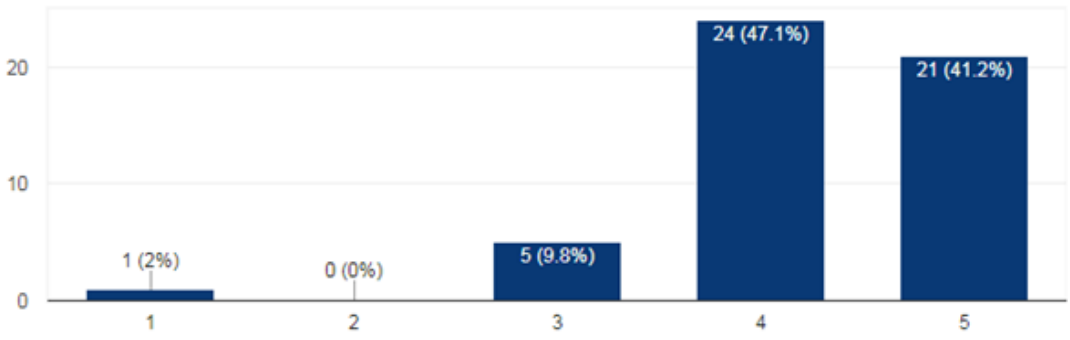
The results are presented below:

Figur 20. Jeg er tilfreds med min kommunikation med Søfartsstyrelsen.



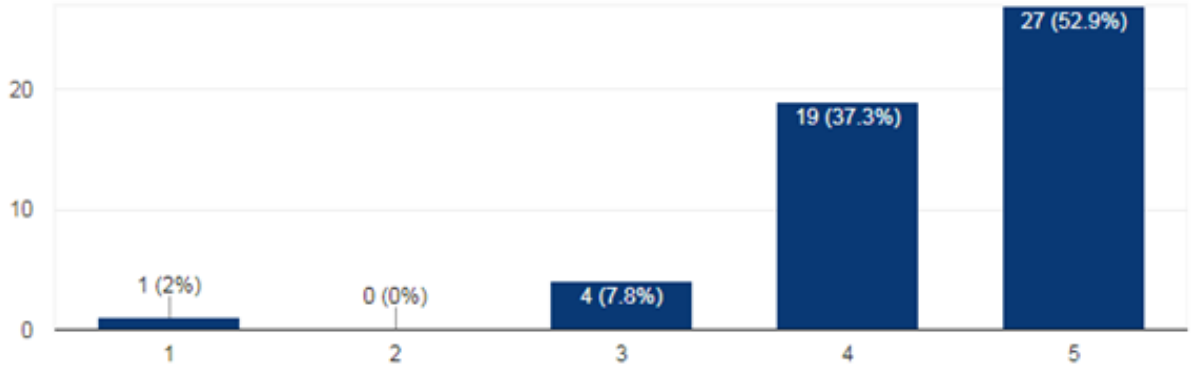
In their answers, 64.7% of the maritime doctors pointed out that they are satisfied and very satisfied with their communication with Søfartsstyrelsen. 29.4% were moderately satisfied while 7.9% were slightly and not at all satisfied.

Figur 21. Med min nuværende viden om lægeundersøgelser af sømænd er jeg egnet til at håndtere alle tilfælde sikkert.



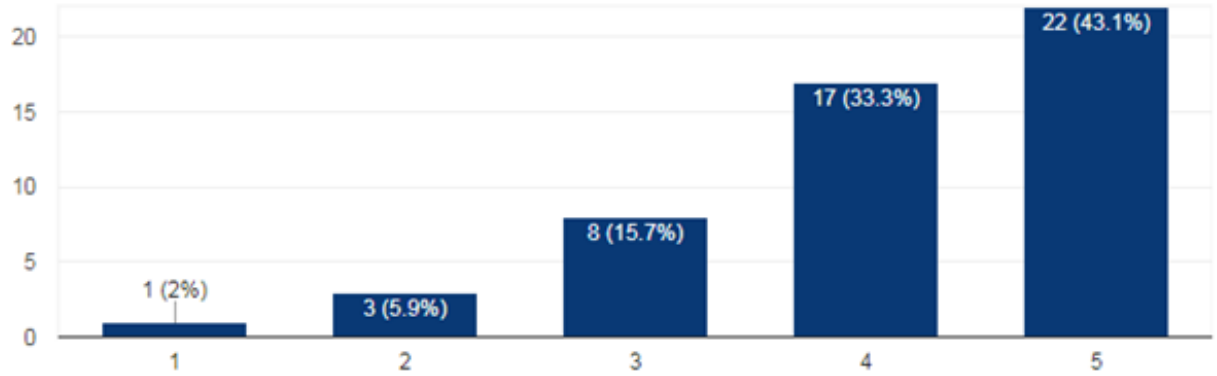
Of the 51 doctors who answered this question 88.3% agreed and strongly agreed that with their current knowledge were able to handle all cases effectively. 9.8% neither agreed or disagreed while 2% strongly disagreed

Figur 22. Jeg er tilfreds med mit nuværende job som søfartslæge.



With regards to the question 38 the vast majority 90.2% highlighted that they were satisfied with their job as maritime doctors. 9.8% answered that they were moderately satisfied and 2% were not at all satisfied.

Figur 23. Kurser i maritim medicin kan forbedre min viden.



In relation to this question the majority of maritime doctors 8 out of ten (76.4%) agreed and strongly agreed that courses in maritime medicine could improve their knowledge. 15.7% neither agreed or disagreed while 7.9% disagreed and strongly disagreed.

Table 3 presents the responses of maritime doctors around communication with DMA and job satisfaction in summary. It illustrates the maritime doctors' answers to items no. 35 to 39 in the survey. The four items were handling the topics of job satisfaction and knowledge. The two items related to satisfaction were in regards to the maritime doctors' job satisfaction and satisfaction with the communication with DMA, which most of the doctors agreed or strongly agreed with (90.2% and 64.7% respectively). The two items related to knowledge were items no. 37 and no. 39. The vast majority of the maritime doctors, 88.2%, agreed or strongly agreed to the statement that they were able to handle all cases efficiently and the majority 76.4% agreed that courses in maritime medicine could improve their knowledge, showing a strong pro-training attitude of the medical doctors.

Table 3. The maritime doctors' satisfaction and knowledge

	N=51	%
Q35: I am satisfied with my communication with the Danish Maritime Authority		
- Disagree or strongly disagree	3	5.9
- Neither disagree or agree	15	29.4
- Agree or strongly agree	33	64.7
Q37: With my current knowledge in the medical examination of seafarers am I able to handle all cases confidently		
- Disagree or strongly disagree	1	2.0
- Neither disagree or agree	5	9.8
- Agree or strongly agree	45	88.2
Q38: I am satisfied with my current position as a Maritime Health Physician		
- Disagree or strongly disagree	1	2.0
- Neither disagree or agree	4	7.8
- Agree or strongly agree	27	90.2
Q39: Training in maritime medicine could increase my knowledge		
- Disagree or strongly disagree	4	7.9
- Neither disagree or agree	8	15.7
- Agree or strongly agree	39	76.4

We then performed logistic regression to highlight statistical influence between doctors' job satisfaction and personal characteristics. Age, gender, region and years in practice as a maritime doctor did not have an influence on their knowledge or satisfaction. The number of seafarer exams in 2016 did have a statistical significant influence on their perception to handle all cases efficiently, where 40% of maritime doctors with 20 or less annual exams disagreed or strongly disagreed compared to 5.88% of the doctors with more than 20 annual exams (p=0.031), clearly showing that skills are better developed along with practice.

2.3.2 Open-ended questions

The questionnaire included three open-ended questions. Answer to these was optional. The maritime doctors had i) the possibility to provide feedback for the communication with DMA ii) suggest training topics iii) make final overall suggestions on the survey. Suggestions around a website for maritime doctors, a one-day brush up course and regular updates and newsletters like the Norwegian approach came up. More specifically:

In line of i) communication and suggestions with DMA, they pointed out:

- The establishment of a website as one stop-shop with relevant regularly updated guidelines and information for maritime doctors

- The establishment of an Advisory Board for communication and advice
- The maintenance and upgrade of the current electronic system which is sometimes unstable
- The need of access to seafarers' medical journals, routinely
- The establishment of a one-day brush up course

With regards to ii) suggest training topics for professional development:

- They expressed their interest to attend an "informative course" in maritime, off shore and diving medicine, provided by experienced instructors in the field
- Topics including legal aspects, rejected case studies, and drug testing would be highly relevant
- The training should be accredited and linked to the maritime doctors' license, as it is the case with the respective Norwegian one
- The organization of training to comply with their high work burden should be flexible

In relation to iii) make final overall suggestions on the survey:

- They wish more space in the maritime certificate to elaborate on diagnosis, follow-up diseases and medicines
- They point out the importance of better cooperation among all stakeholders, including TMAS, the authorities and the respective professional associations
- They welcome access to seafarers' medical journals to avoid repetition of exams

2.3.3 Self-rated training needs

The final part of the questionnaire was around their perceived training needs regarding the care for seafarers, fishermen and offshore employees.

The maritime doctors were asked in the final question number 40, to rate their training needs from a list of 16 topics (one open ended presented above) answering in a five points Likert scale where 1= not important to 5= very important.

Table 4 presents the ranking of the doctors perceived training needs according to the perception of the importance of the topic. The topic 40.12 "Fitness evaluation and medical examination guidelines" was the topic which most of the maritime doctors perceived to be very important (76.7%) making this topic the highest ranking among the 15 topics. Further, more than half of the maritime doctors perceived training in 40.1 "Rules and regulations within maritime medicine", 40.7 "Working conditions and health risks on board", 40.10 "Maritime medicine emergencies" and 40.11 "Shipboard medicine to be very important".

40.9 "Gender issues" was the topic that was perceived by least maritime doctors to be very important (21.6%), followed by 40.8 "Medical communication with patients and authorities" and 40.4 "Occupational disease diagnostics, prevention" which less than 30% of the maritime doctors perceived to be very important.

Table 4. Maritime doctors training needs ranked according perceived importance

Topic	N	%
40.12. Fitness evaluation and Medical Examination Guidelines	39	76.7%
40.1. Rules and regulations within maritime medicine	35	68.7%
40.7. Working conditions and health risks on board	32	62.8%
40.10. Maritime medicine emergencies	29	56.9%
40.11. On board/Shipboard medicine	29	56.9%
40.5. Health and safety at work	25	49.0%
40.15. Methods for professional update	22	43.5%
40.2. Organisation of Maritime Health Services and Resources in Denmark and abroad	19	37.3%
40.3. Telemedicine/radio medical advice	17	33.3%
40.14. WHO/International Health Regulations (IHR)	16	31.4%
40.6. How to do early diagnosis. prevention and follow-up of common chronic conditions (e.g. diabetes. overweight/obesity and hypertension) at seafarers	16	31.4%
40.13. Clinical registers for follow-up and research of seafarers	15	29.4%
40.4. Occupational disease diagnostics. prevention and reporting	14	27.5%
40.8. Medical communication with patients and authorities	13	25.6%
40.9. Gender issues	11	21.6%

We further analysed the responses to identify statistically significant influences between personal characteristics and self-rated training needs. In the analysis this question was recoded into three categories; 1 and 2 equalled 'not important, 3 equalled 'moderate important' and 4 and 5 'very important'. More specifically, differences in the rating of perceived importance of training needs were analysed according to personal characteristics of the maritime doctors such as; gender, years as a maritime doctor, annual number of seafarer exams, region of clinical practice and age and differences were tested with Fisher exact test.

In general, the importance of the maritime doctors perceived training needs did not differentiate according to gender. In addition, region did not influence the perception of the importance of training needs except for topic three, where a statistically significant difference was observed at the 95% significance level. For telemedicine/radio medical advice differences in the frequencies on the perception of the topic to be very important for the region Capital (p=0.005).

Age had some influence on the perception of the importance of the different topics, where statistically significant differences were observed for topics 40.11 "On board/ Shipboard medicine" and 40.12 "Fitness evaluation and Medical Examination Guidelines".
More specifically, 84.6% of maritime doctors in the 40-49 age group, rated the topic "On board/ Shipboard medicine" as very important, followed by 66.7% in the age group 60-69 years old (p=0.001). With regards to the topic 40.12 "Fitness evaluation and Medical Examination Guidelines" all doctors aged 40-49 years old perceived the topic to be very important followed by 75% in the age group 50-59 years old (p=0.040).

The perception of the importance of the training needs did not depend on the years practised as a maritime doctor (p>0.05 in all cases).

According to the annual number of seafarer exams there were statistically significant differences towards topic 15. Maritime doctors conducting more than 20 seafarers health exams in 2016 perceived "Methods for professional update" to be more important (55.8%) than doctors conducting 20 or less health exams, (p=0.017). These findings are consistent with the previous ones.
With regards to the topic 40.9 "gender issues", there was a statistically significant difference (p=0.017) towards the maritime doctors perceived importance of the topic, where 44.44% of the 60 to 69 year olds, perceived it very important.

2.4 Discussion

The majority of the maritime doctors in Denmark were men (n=38, 74.5%) and almost half (43.1%) were 60 years or older showing the greying of this workforce and the difficulties to attract new candidates in the medical profession, which is similar in the other European countries. 50 doctors (98.04%) graduated from a University within Denmark and all doctors had Danish nationality. Two thirds of the population had more than 20 medical examinations of seafarers in 2016. Most of the doctors (90%) educate their patients and 7 out of 10 vaccinate them during consultation. The annual number of seafarer exams had a statistical significant influence on the behaviour of the doctor related to patient education (p=0.009). Involvement in vaccination of seafarers was significantly influenced by the years of experience. Maritime doctors with experience of 10 years or more were more likely to be involved in the vaccination of seafarers (OR=0.25, p=0.026). Furthermore, 58.8% ask sometimes seafarers for physical exams, while less than 1/3 of maritime doctors reported occupational diseases of seafarers and when they did, it was mainly ergonomic disorders followed by hearing disorders.
More than half of the doctors (52.94%) answered that they had no interest in conducting research within maritime medicine while the other half pointed out that they are interested but have no time showing a high workload of medical professionals.

This study found areas of knowledge that need to be updated to enable maritime doctors optimize their services according to their seagoing population (6). The majority of maritime doctors perceived important to receive professional training in the "Fitness evaluation and medical examinations guidelines" (76.7%) followed by "Rules and regulations within maritime medicine" (68.7%) and "Working conditions and health risks on board" (62.8%). Age influenced their preferences, with those in the age group 40-49 considered important training in shipboard medicine and fitness evaluation and medical examination guidelines, showing the need for younger doctors to know more about working conditions of seafarers.
The number of annual examinations influenced their preferences too. Those with more than 20 patients expressed a more pressing need for training, while age, gender and years of practice did not have any influence in their self-rated needs. Region capital highlighted a need for training in TMAS. It may be due to organisation and their responsibility of this service.

The results of this study can be used as guidelines for continuing professional development of medical doctors and could help the establishment of a comprehensive maritime occupational health prevention programme. The programme could be based on the WHO and the respective medical associations recommended design for a public health prevention plan to be applied for the shipping industry.

3. General practitioners

3.1 Material

The Department of Research in General Practice run the survey on general practitioners about the same time interval as the one on maritime doctors. Due to factors beyond the power of the Department this survey was done in combination (manual and electronic). Thus, the invitation letters were sent out by post and the questionnaire uploaded on the electronic platform "SurveyXact".

Based on the maritime doctor survey, the electronic questionnaire targeted the GPs was developed with input from the project team and collaborating partners. The questionnaire contained questions on four domains: demographic characteristics, breadth of services offered to seafarers, fishermen and off-shore employees, follow-up practices as well as GPs perceived training needs, included topics meaningful to GPs only. It was prepared in English for use in international surveys and translated in Danish following the same process as the one for the maritime doctors. It contained 29 questions, one open-ended.

It took an estimated time of 5-10 minutes to fill in. A pilot-test aimed at assessing comprehensibility and comprehensiveness as well as acceptability was performed in a small sample (five persons) belonging to the target population. Based on this test, minor revisions were made and finally, research colleagues, without previous acquaintance with the survey, tested layout and functionality.

Letter invitations to participate in the survey were sent out to a random sample of 100 GPs from all over the country excluding those appointed as maritime doctors with DMA. The respondents had to log on to the website of the electronic platform using a personal, unique 16-digit code, that was provided in the invitation. Respondents were offered a fee for participating corresponding to approximately 18 Euro. Two reminders were sent out I two week intervals.

GPs were recommended to participate in the study by the "Committee of Multipractice Studies in General Practice".

3.2 Methods

Initial descriptive statistics were made directly in the Survey Xact programme. GPs indicated their perceived training needs on aspects of maritime medicine on a five point Likert scale, where 1 equalled "not important" and 5 equalled "very important". In the analysis, the answers were pooled into three categories: "not important = answers 1 and 2", "neither important, nor unimportant = answer 3" and "important = answers 4 and 5".

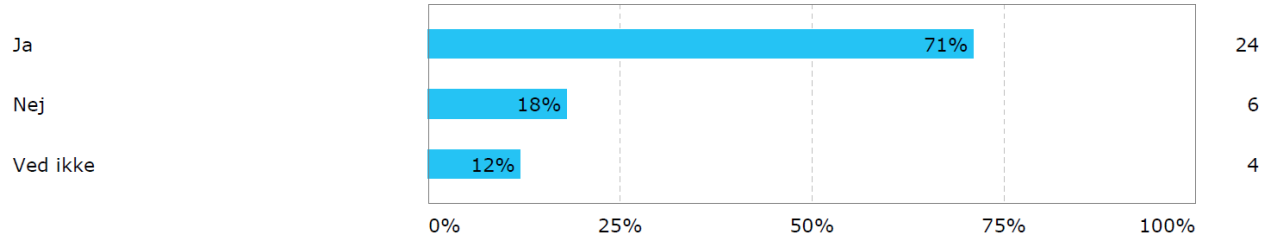
3.3 Results

The survey reached a response rate of 34% with an equal distribution between male and female GPs, and a representative distribution between single-handed and group practices. An overview of GP characteristics is provided in Table 1.

Table 5. GP characteristics, in 2017

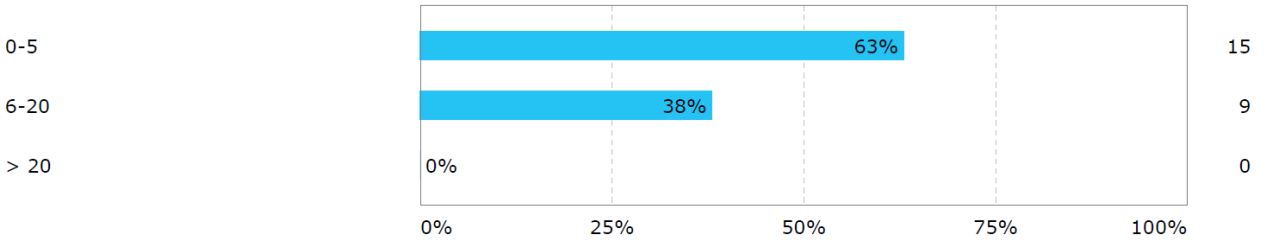
	N	%
Gender		
Male	16	47.1%
Female	18	52.9%
Age-group		
< 45	14	41.2%
45 – 54	8	23.5%
55 – 64	11	32.4%
> 64	1	2.9%
University		
Aarhus	12	35.3
Copenhagen	15	44.1%
Odense	7	20.6%
Other	0	0%
Practice form		
Single-handed	11	32.4%
Group practice	23	67.6%

Figur 24. Har du patienter, der arbejder som søfarende, fiskere, eller offshore medarbejdere tilmeldt din praksis?



24 doctors (71%) answered that they have maritime employees in their clientele

Figur 25. Hvis ja, angiv venligst det omtrentlige antal



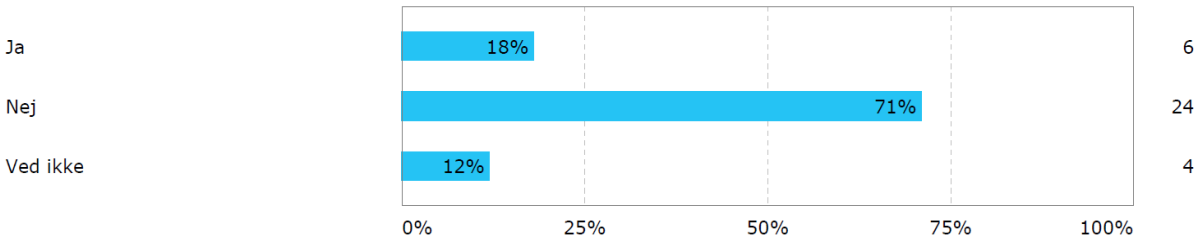
Of those who answered 63% have up to 5 maritime employees on their list.
Not all GPs reported having patients with a maritime occupation and for those who did, most stated to have less than five in their entire patient population and none had more than 20, see Table below.

Table 6. Reported number of patients with a maritime occupation

	N	%
Patients with a maritime occupation		
Yes	24	70.6%
No	6	17.6%
Don't know	4	11.8%
Approximate number of patients with a maritime occupation		
≤ 5	15	62.5%
6 – 20	9	37.5%
> 20	0	0%

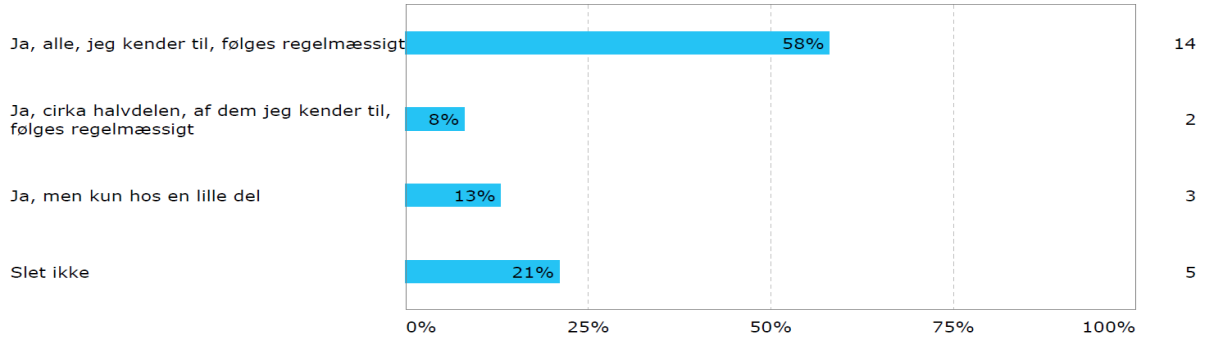
The breadth of services and as well as the follow-up practices were investigated in the following questions:

Figur 26. Er du involveret i vaccinationer af søfarende, fiskere eller offshoremedarbejdere?



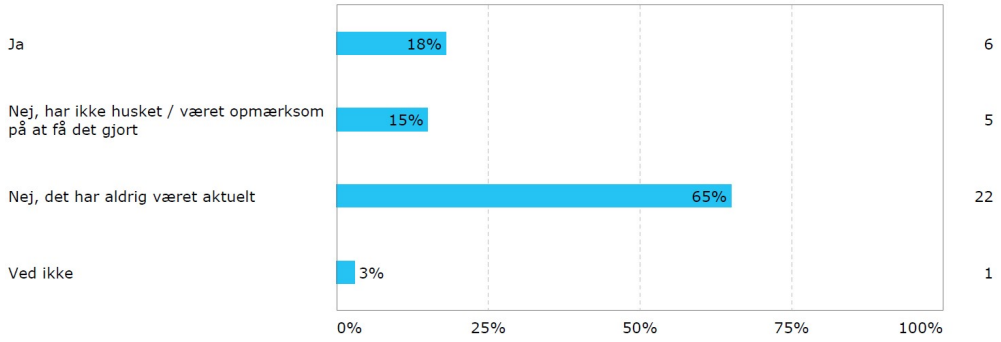
The majority of GPs (71%) are not involved in vaccinations of maritime employees, probably because this is considered part of the fit-to-work exams, laying with maritime doctors.

Figur 27. Foretager du kontroller af søfarende, fiskere og/eller offshore medarbejdere med kroniske sygdomme som fx diabetes og hypertension? Sæt kryds ved den svarmulighed, der passer bedst.



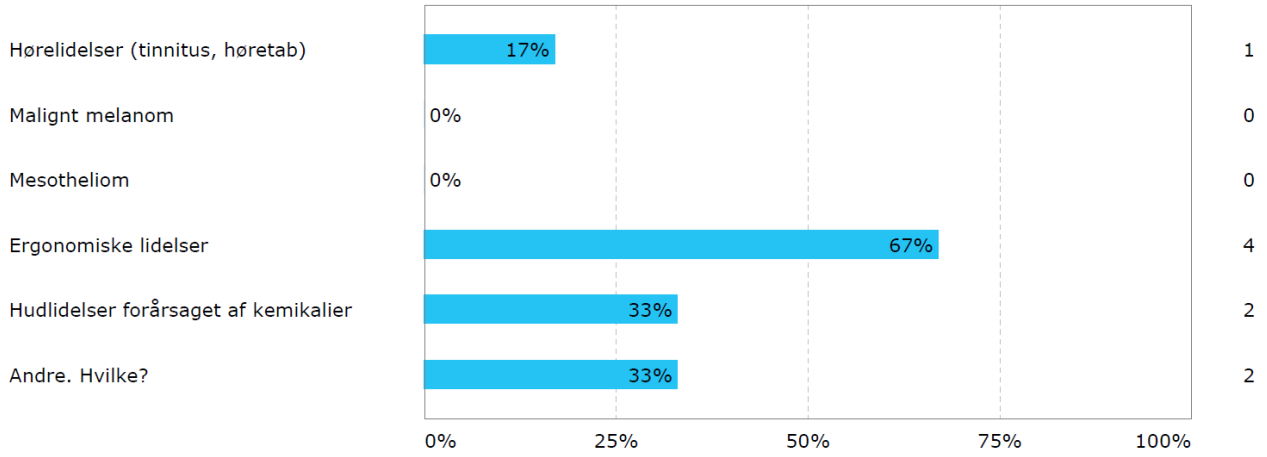
6 out of 10 GPs stated that they make follow-up consultations of all their maritime patients with a known chronic disease.

Figur 28. Har du nogensinde anmeldt en arbejdsbetinget lidelse hos en søfarende, fisker eller offshore medarbejder? Sæt kryds ved den svarmulighed, der passer bedst.



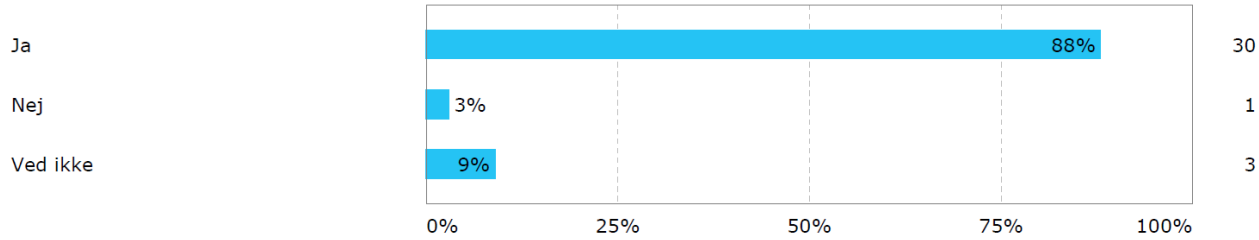
Around only one fifth of the participants, reported an occupational disease for a maritime employee

Figur 29. Hvis ja, hvilke arbejdsbetingede lidelser har du anmeldt? Sæt gerne flere krydser.



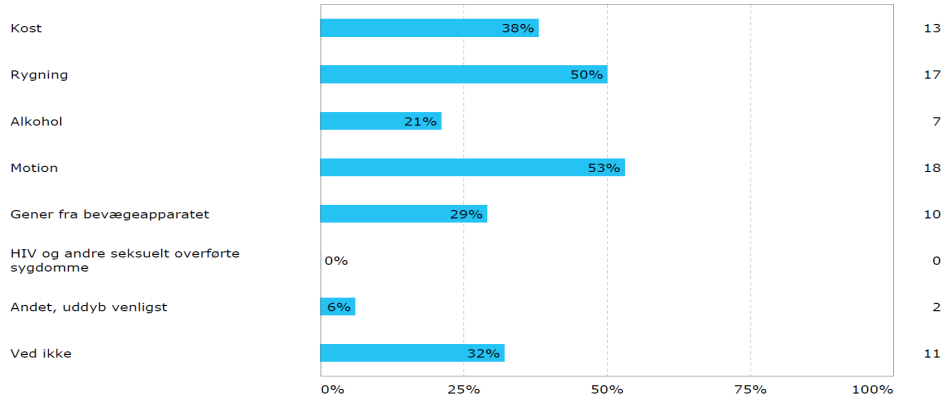
Of those GPs who answered that they have maritime employees in their list, almost 70% reported ergonomic issues as the most common diagnosis of occupational diseases followed by skin diseases caused by chemicals 33%

Figur 30. Underviser du dine patienter vedrørende deres helbred under konsultationerne?



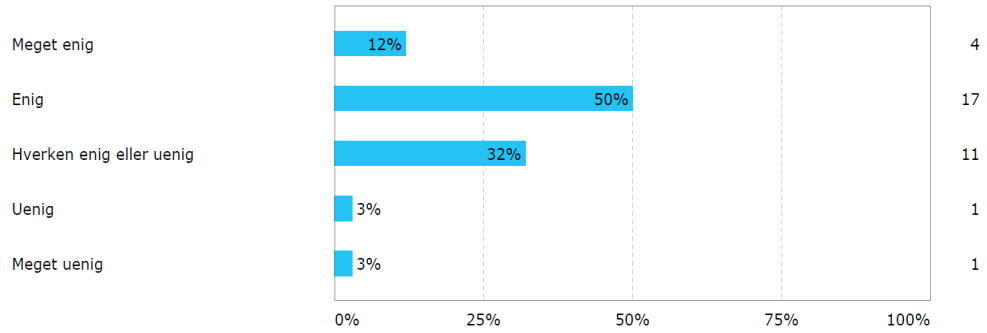
Almost all the GPs 88% educate their patients during consultation.

Figur 31. Baseret på din erfaring, hvor ser du de største udfordringer i forhold til søfarende, fiskeres og/eller offshore medarbejderes helbred?



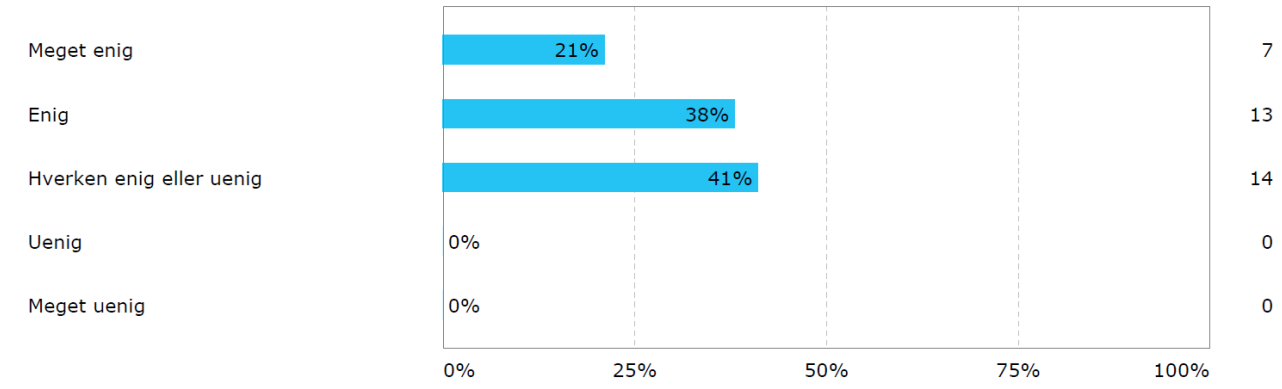
The GPs considered the lack of exercise as a major problem on board, followed by smoking and diet (53%, 50% and 38% respectively)

Figur 32. Med min nuværende viden føler jeg mig i stand til at varetage behandlingen af søfarende, fiskere og offshore medarbejdere på lige fod med mine andre patienter.



They feel confident in handling the treatment of seafarers, fishermen and offshore employees on the same level as with their other patients (62%).

Figur 33. **Kurser i søfartsmedicin kan forbedre min viden**



More than half of the GPs (59%) agreed that training in maritime medicine could improve their knowledge, and this is also in accordance with the existing pro-training culture among health professions

Then the GPs were asked to self-rate their training needs. The results are presented in the table 7 below.

Table 7. GPs perceived training needs in different areas of maritime medicine.

Topics	Not important N (%)	Neither nor N (%)	Important N (%)
1.Rules and regulations related to maritime medicine	10 (30%)	12 (35%)	12 (35%)
2.Organization of maritime health services and resources in Denmark and abroad	15 (45%)	14 (41%)	5 (14%)
3.Telemedicine medical advice	12 (35%)	11 (32%)	11 (33%)
4.Occupational disease diagnostics, prevention and reporting	9 (27%)	11 (32%)	14 (41%)
5.Health and safety at work	9 (27%)	12 (35%)	13 (38%)
6.Early diagnosis, prevention and follow-up of diabetes, obesity and hypertension	13 (38%)	11 (32%)	10 (30%)
7.Working conditions and health risks on board a ship	9 (27%)	10 (29%)	15 (44%)
8.Communication skills with patients	14 (41%)	11 (32%)	9 (27%)
9.Gender issues	20 (59%)	11 (32%)	3 (9%)
10.Methods for professional update	15 (45%)	11 (32%)	8 (24%)
Other	24 (71%)	7 (21%)	3 (8%)

The answers showed that GPs were interested to get training in “working conditions and health risks on board, 44%”, followed by “occupational disease diagnostics, prevention and reporting, 41%” and “health and safety at work, 38%”.

3.4 Discussion

This study was a small scale cross-sectional survey. From the invited 100 GPs, 34% answered the survey. The ones who did had knowledge of a few maritime workers in their patient population.

Regarding follow-up practices, a large majority of the GPs, who reported having patients with a maritime occupation, stated to make follow-up consultations of all of their maritime patients with a known chronic disease. Around half of the GPs found it harder to maintain these patients in their follow-up practices compared to their other patients with chronic diseases.

Only 17.6% of the GPs recalled to have ever reported an occupational disease, and most of the reported diseases (66.7%) was marked as ergonomic conditions. Accordingly, GPs regarded a lack of physical exercise as one of the greatest challenges to the health of maritime workers, followed by smoking and unhealthy diet.

The majority of GPs (61.8%) perceived themselves to be able to deliver a quality of care to maritime workers equal to the ones they deliver to all of their other patients. Only 2% disagreed to this.

None of the GPs disagreed that training in maritime medicine could improve their knowledge, 41% though, answered, “neither agree nor disagree”.

The response rates and the results from the survey indicate that maritime workers are not regarded as an especially risky occupational group, and that these patients are of no strong presence in Danish general practice. However, regarding perceived training needs, the three areas considered important by most were “working conditions and health risks on board a ship (44%), “occupational disease diagnostics, prevention and follow-up” (41%) and “health and safety on board” (38%). Together with the other findings, this could suggest that GPs have not been especially aware of the occupational risks in these seagoing groups, but are

interested in learning more about which risks, maritime workers are exposed to, and how to handle it in the consultation.

Since maritime workers account for such a small part of the entire patient population in regular general practice, it seems ambitious to set up continuing medical education activities aimed at only these particular groups. Nevertheless, a course in occupational risks, diseases and follow-up including not only maritime workers but also other professions at a high risk of chronic and occupational diseases could be relevant and of interest to GPs.

4. Gap Analysis of doctors perceived training needs

Based on both Maritime Doctors' and General Practitioners' surveys, common questions were selected for the gap analysis. The total number of respondents in survey of General Practitioners were 34 and in survey of Maritime doctors were 51. Variable for the analysis were categorized as:

4.1 Common training topics

Responses on perceived training needs of both General Practitioners' and Maritime Doctors' were selected:

- Laws and regulations related to maritime medicine
- The organization of the maritime health services in Denmark and abroad
- Tele Medical Advice (TMAS)
- Diagnosis, prevention and report of occupational diseases
- Health and safety at work
- Early diagnosis, follow up and prevention of diabetes, obesity and hypertension on seafarers
- Working conditions and health risks on board
- Communication skills with patients
- Gender issues
- Methods for professional update

4.2 Methods

The statistical analysis was performed using STATA 15. Both univariate and multivariate analysis were performed. The importance of training needs for personal continuous professional development answered by health professionals on a five point Likert scale where 1 equalled "very low" and 5 equalled "very high" was categorized into low, neutral and high. The age groups of maritime doctors were recoded to <45, 45-54, 55-64 >64 to allow for comparisons with GPs.

The p value 0.05 was considered statistically significant at 95% confidence interval (CI) level. Univariate analysis was done by calculating the frequency of personal characteristic of the respondents. Chi square test was used for the statistical comparison of personal characteristics.

4.3 Results

Most of the participants in the GPs sample (41.2%) were below the age of 45 years whereas in maritime doctors' sample, most of the participants (39%) were in the 55-64 age group. More than half (52.95%) were female GPs but only one forth (26%) of maritime doctors were female.

Most of the General Practitioners (44%) had completed their medical degree from Copenhagen University and most of the Maritime doctors (42%) graduated from Aarhus University. In comparison to maritime doctors, more than half of the GPs had < 6 years working experience.

Table 8. General Practitioners' (n=34) and Maritime Doctors' (n=51) Demographic Characteristics

		General Practitioners		Maritime Doctors	
Variables	**Categories**	**N**		**N**	**%**
Age	< 45	14	41.2	5	9.8
	45-54	8	23.5	18	35.4
	55-64	11	32.4	20	39.2
	>64	1	2.9	8	15.6
Gender	Male	16	47.1	37	74.5
	Female	18	52.9	13	25.5
Region	Capital	7	20.6	9	17.6
	Zealand	6	17.6	4	7.9
	Southern Denmark	7	20.6	20	39.2
	Central Denmark	8	23.5	11	21.6
	North Denmark	6	17.6	6	13.7
University	Aarhus	12	35.3	21	41.2
	Copenhagen	15	44.1	16	31.4
	Odense	7	20.6	14	25.5
	Other	0	0	1	1.9
Years as doctor	0-5 Years	15	62.5	13	25.5
	6-20 Years	9	37.5	38	74.5

According to, maritime doctors, nutrition (60.8%), exercise (56.9%) and smoking (50.9%) were the biggest challenges regarding the health of seafarers, followed by alcohol (31.37%) and discomfort from the musculoskeletal system (21.57%). Most of the GPs thought that lack of exercise (52.9%) and smoking (50%) were the biggest challenges regarding the health of seafarers, followed by nutrition (38.2%) and discomfort from the musculoskeletal system (29.4%).

More than half of the maritime doctors (68.63%) did not ever reported an occupational disease for a seafarer, fishermen or an offshore employee and only 31.37% of the maritime doctors ever reported an occupational disease, while only 18% of the General Practitioners' reported an occupational disease. Among the total reported occupational disease, ergonomic disorder and skin diseases caused by chemical substances were the major challenges found by General Practitioners whereas Maritime doctors found biggest challenges as ergonomic disorder (87.5%) followed by hearing disorder (31.25%)

Table 9: Range of services and maritime knowledge of GPs (n=34) and maritime doctors (n=51)

Variables	Categories	General Practitioners		Maritime Doctors	
		N	%	N	%
Familiar with the living and working conditions on a board ship	Yes, quite well	2	5.9	23	45.10
	Yes, to some extent	17	50.0	27	52.94
	No	15	**44.1**	1	1.96
Familiar with the ministerial order (BEK999/13)	Yes	16	47.0	50	98.04
	No	18	**52.9**	1	1.96
Educate patients about their health	Yes	30	88.2	16	**88.23**
	No	4	11.8	6	11.76
Perform vaccinations	Yes	6	17.6	33	**64.71**
	No	28	**82.4**	18	35.29
Follow-up consultations	Yes	19	**89.0**	37	**72.50**
	No	5	21.0	14	27.50
With present knowledge, confident to handle all cases efficiently	Agree or strongly agree	21	61.8	45	88.30
	Neither agree or disagree	11	32.4	5	9.80
	Disagree or highly disagree	2	5.8	1	1.20
Improve knowledge by taking courses in maritime medicine	Agree or strongly agree	20	58.8	39	76.47
	Neither agree or disagree	14	41.2	8	15.69
	Disagree or highly disagree	0	0.0	7	7.84

Almost all the maritime doctors (98%) have quite good knowledge regarding living and working conditions on board a ship while the percentage among GPs was 55,9%

Regarding familiarity with the ministerial order BEK999/13 on medical examinations of seafarers and fishermen, almost all the maritime doctors (98.04%) were familiar with it and about half of the General Practitioners (47,0%), which shows the needs of communicating knowledge on ministerial order among General Practitioners but also indicating GPs extensive range of knowledge.

Among the maritime doctors, during consultations, almost 9 out of 10 educate their patients about health issues. The same applies in the pool of GPs. With regards to vaccinations, the majority of the maritime doctors (64.7%) performed vaccinations to seafarers. On the contrary, most of the General Practitioners (82.4%) did not perform vaccinations to the seagoing personnel. 72.5% of maritime doctors, provided follow-up consultations to seafarers. This percentage was higher among GPs with 89% them stating that they did so. The vast majority of the maritime doctors (88.3%) pointed out that with their current knowledge could handle all cases safely. This percentage was lower among GPs (61.8%). The next question dealt with training wishes, 39 (76.4%) of the maritime doctors agreed or strongly agreed that taking courses in maritime medicine could improve their knowledge, and (15.7%) neither agreed nor disagreed and only 4 (7.9%) disagreed and strongly disagreed. Likewise, more than half of the General Practitioners (58.8%) agreed or strongly agreed and nearly half of them (41.2%) neither agreed or disagreed on that they could improve their knowledge by taking courses in maritime medicine, showing doctors pro training attitudes

The two professional groups were then asked to rank the topics in which they want to get training, in a Likert scale where 1 equalled ‘not important’ and 5 equalled ‘very important.’ The responses were recoded

into three categories; 1 and 2 equalled 'not important, 3 equalled 'neither important nor unimportant' and 4 and 5 'very important'. The results for only the common topics are presented in the Table 10 below.

Table 10: Common topics and perceived training needs of General Practitioners' (n=34) and Maritime doctors (n=51)

Variables	Categories	General Practitioners		Maritime Doctors	
		N	%	N	%
Rules & Regulations related to maritime medicine	Very important	12	**35.3**	35	**68.7**
	Neither nor	12	35.3	12	23.5
	Not important	10	30.4	4	7.8
Organization of maritime health services & resources in Denmark & abroad	Very important	5	14.7	19	37.3
	Neither nor	14	41.2	19	37.3
	Not important	15	44.1	13	25.4
Telemedicine medical advice	Very important	11	32.4	17	33.2
	Neither nor	11	32.4	19	37.4
	Not important	12	35.2	15	29.4
Occupational disease diagnostics, prevention & reporting	Very important	14	**41.1**	14	27.5
	Neither nor	11	32.4	23	45.1
	Not important	9	26.5	14	27.4
Health & safety at work	Very important	13	**38.2**	25	**49.1**
	Neither nor	12	35.3	18	35.2
	Not important	9	27.5	8	15.7
Early diagnosis, follow up & prevention of diabetes, obesity & hypertension on seafarers	Very important	10	29.4	16	31.5
	Neither nor	11	32.4	15	29.4
	Not important	13	38.2	20	39.1
Working conditions & health risks on board	Very important	15	**44.1**	32	**62.8**
	Neither nor	10	29.4	14	27.4
	Not important	9	26.5	5	9.8
Communication between doctor and patient	Very important	9	26.4	13	25.5
	Neither nor	11	32.4	20	39.2
	Not important	14	41.2	18	35.3
Gender issues	Very important	3	8.8	11	21.6
	Neither nor	11	32.4	23	45.1
	Not important	20	58.8	17	33.3
Management of information for professional update	Very important	8	23.5	22	43.2
	Neither nor	11	32.4	19	37.2
	Not important	15	44.1	10	19.6

GPs self-rated training priorities laying within "working conditions & health risks aboard" followed by "occupational disease diagnostics, prevention and follow-up" and "health & safety at work". In the pool of maritime doctors, priorities laying within "rules & regulations related to maritime medicine" followed by "working conditions" and "health risks aboard". The results showed when it comes to topics of mutual interest both practitioners expressed common needs.

5. Discussion

Continuing education programmes enable physicians to better respond to their populations needs and expectations and improve patient centred care by educating patients on health prevention related to chronic diseases, including hypertension, diabetes and cardio-vascular diseases (44). So far despite the relevant guidelines issued by the responsible International Organisations including the International Labour

Organisation and the International Maritime Organization, there is a lack of an internationally accepted continuous professional training programme on maritime medicine. As maritime doctors perform the pre-engagement examinations for the seagoing professionals, their performance is of crucial importance for the shipping industry and the employees in particular. Seafarers sail the high seas, they are requested to be in good health to perform their duties. Sickness far away from shore can be not only dangerous for the infected employee but also for the fellow colleagues while evacuations are proved very expensive for the industry. It is important to update maritime doctors' knowledge and increase their awareness with the living and working conditions on board as well as in the specific laws and regulations with regards to seafaring. The National Health Systems will benefit from lower hospitalization and evacuation costs by offering higher quality of services with reduced costs.

The results of this survey showed that seagoing professionals usually return to the maritime doctor for health concerns, but they also may consult GPs to a lesser extent. This might be the reason that only few GPs (about 1out of 4) pointed out having very small numbers of seafarers on their list. Both practitioners are involved in education of their patients during consultation, and provide follow-up consultations to those in risk of chronic diseases. Furthermore, maritime doctors are mainly involved in the provision of vaccinations too. However, both specialities don't usually report occupational diseases. When they do so, they mainly identify musculoskeletal problems in the seagoing population, followed by hearing and skin problems. Maybe the administration process is time consuming and should be revised.

In terms of medical doctors self-rated training needs, this study found areas of knowledge that need to be updated to enable maritime doctors optimize their services according to the needs of their seagoing population (6). As expected the majority of maritime doctors highlighted the need for targeted training in the areas in "Fitness Evaluation and Medical Examination Guidelines" followed by "Rules and regulations within Maritime Medicine" and "Working conditions and health risks on board".

The maritime doctors showed their interest in professional development by making suggestions about the form of training organization to comply with their high work burden. In line of this, they pointed out the establishment of a website as one stop-shop with relevant guidelines and information for the medical professionals, regular updates, publication of newsletters and a one-day brush up course. Furthermore, the establishment of an Advisory Board for consultation in grey cases and the cooperation with all relevant stakeholders were defined as priorities.

GPs had a response rate of 34% with an equal distribution between male and female. Most GPs (63%) reported to have less than five maritime workers and none had above 20. The three training areas reported important were: i) working conditions and health risks on board a ship ii) Occupational diseases diagnostics, prevention and follow-up and iii) Health and safety on board.

The survey results of the GPs showed that maritime workers were not regarded as an especially risky occupational group. However, GPs, were interested in learning more about risks exposures and ways of handling these risks. Due to small numbers, it seems ambitious to set up continuing medical education activities aimed at only this particular group. Nevertheless, a course in occupational risks, diseases and follow-up targeting high-risk professions could be relevant and of interest to GPs.

5.1 Dissemination and impact

5.1.1 Dissemination

The team published two articles in open access international journals based on this survey, in 2017. One more is under way. The first article "Maritime Doctors and General Practitioners Service Profiles: A Research Protocol" was published in the Health Science Journal DOI: 10.21767/1791-809X.1000500 (Annex 2). It described the survey, methods and expected results in details, highlighting the importance of the topic for the international shipping community. The second article "Do Danish Maritime Doctors Value Continuous Education Initiatives?" was published in the journal, Health Economics & Outcomes Research: Open Access DOI: 10.4172/2471-268X/1000137 (Annex 2). The aim was to present the findings of the maritime doctors perceived training needs as part of a planned comprehensive maritime occupational health prevention programme. It concluded that maritime doctors are in favour of continuous education and training and could help the respective Authorities to organise such short courses on targeted topics in the country. The third article describes the findings of the GAP analysis presenting similarities and differences between the two groups of the medical practitioners, highlighting the need for putting on the agenda the issue of training in maritime medicine.

Besides these publications, the team actively communicated the results of the survey. More specifically, in 2017, there were several presentations in national and international conferences and symposia emanating from the survey and two more in 2018. Moreover, there was several communications including CMSS newsletters, the celebration of the 25 years Jubileum, and SDU webpage. Detailed list in Annex 3.

a. Maritime doctors' competencies, methods and issues, 14th International Symposium on Maritime Health, IMHA Research Seminar, Manila 22-24 March 2017
b. Maritime doctors' competencies, methods and issues Advisory Board Meeting. 13 June 2017 CMSS, Esbjerg
c. Compliance with MLC2006: the maritime doctors are ready to embrace innovative training. XI Congreso Internacional Hispano-Francófono de Medicina Marítima, IMHA and SEMM, Panama 21-22 September 2017
d. Survey on Maritime doctors' service characteristics. DSMM annual meeting. Helsingør, 17 November 2017
e. How General Practitioners Respond to Health Needs of Marginalized Groups: The Case of Maritime Employees in Denmark. Poster, 13rd Conference in Management, Economics and Policies in Health. National School of Public Health, Athens 12-14 December
f. Maritime doctors self-rated training needs. SOME 2018, Technical University of Athens, School of Naval Architecture. Athens, 20-21 March 2018.
g. Maritime doctors' services profiles in Denmark. Siga2 2018, Barcelona Spain 31/5-3/6 2018

5.1.2. Impact

The team discussed the project in various occasions with our international partners and networks. It is worth noting that European Medical Association (EMA) expressed their interest to initiate a similar European project for comparisons on maritime doctors training needs between member states. Furthermore, they consider to revitalise the discussions about training in maritime medicine as a medical specialisation, in cooperation with all relevant stakeholders including the International Maritime Health Association (IMHA).

5.2 Policy implications

The prospects emanating from the study is that it puts Denmark in the front line as a pioneer country conducting research in the field of maritime doctors training needs in line with the ILO/IMO guidelines on the medical examinations of seafarers, providing the opportunity to benchmark the situation in Denmark and allow for international comparison on doctors' perceived training needs in other countries.

The results of this survey showed that there is a clear need for establishing adequate training in specific subjects, like for example the MLC 2006 convention and that the training should be tailored to doctors needs and high work burden.

As a further step this survey could support the planning of targeted training in maritime medicine. Such training should be offered in cooperation with all the stakeholders and the medical associations. It should be flexible, licenced and linked to continuous professional development of medical doctors.

5.3 Study limitations

In this survey 51 (46.4%) maritime doctors completed the questionnaire. It is well known that medical doctors (MDs) show fairly low response rates. Highlighted possible reasons may be that they receive too many requests for research participation and/or have very limited time to participate in various studies. For this survey the completion time of the questionnaires was around 5-10 minutes and this is within accepted survey time standards.

The expected response rate for maritime doctors was 50 per cent, which was well estimated with the actual response rate. It was challenging to get access to all maritime doctors' e-mails. E-mails of 84 clinics or persons working on the clinics were provided. However, there is no guarantee that all 110 maritime doctors had access to the e-mail, which could result in a lower response rate. The sample size was limited to equal number of GPs and maritime doctors. This gave some statistical limitations of the study in the GPs group to detect statistical meaningful differences in their characteristics, though it was still possible to obtain useful results. A possible reason for lower response rate might be, that the part of the survey to GPs was implemented in a challenging period. More specifically, due to reasons beyond the power of the survey team, invitations with the unique access code were sent by regular post and the doctors had to log on to the electronic questionnaire and type this 16 digits' code to answer the survey. Even though, the "Committee of Multipractice Studies in General Practice" supported this survey, the response rate was 34%, lower than this of the maritime doctors but close to the expected one, based on the international literature about medical doctors' response rates.

6. References

1. Henny C, Hartington K, Scott S, Tveiten A, Canals L. The business case for telemedicine. Int Marit Health. 2013;64(3):129–35.

2. Lefkowitz RY, Slade MD, Redlich CA. Risk factors for merchant seafarer repatriation due to injury or illness at sea. Int Marit Health. 2015 Jun 18;66(2):61–6.

3. Poulsen TR, Burr H, Hansen HL, Jepsen JR. Health of Danish seafarers and fishermen 1970-2010: What have register-based studies found? Scand J Public Health. 2014 Aug;42(6):534–45.

4. Andrioti D, Jensen O. Maritime Doctors and General Practitioners Service Profiles: A Research Protocol. Health Sci J 2017;11(2). Available from: http://www.hsj.gr/medicine/maritime-doctors-and-general-partitioners-service-profiles-a-research-protocol.pdf

5. International Maritime Organization, editor. Guidelines on the medical examinations of seafarers. Geneva: ILO; 2013. 65 p.

6. International Labour Organization. Maritime Labour Convention, 2006 [Internet]. Geneva; 2006 [cited 2017 Mar 30] p. 1–110. Available from: http://www.itfseafarers.org/files/seealsodocs/27667/MLC%20English.pdf

7. Retsinformation. Bekendtgørelse om lægeundersøgelse af søfarende og fiskere [Internet]. Erhvervs- og vækstministeriet; 2013 Aug. Available from: https://www.retsinformation.dk/forms/R0710.aspx?id=158016

8. Danish Maritime Authority. Ansøgning om at blive søfartslæge [Internet]. [cited 2017 Jul 7]. Available from: http://www.soefartsstyrelsen.dk/SoefarendeBemanding/LaegeHelbred/Laegeundersoegelse/Sider/HvordanBliverJegSoefartslaege.aspx

9. World Health Organization, editor. Working together for health. Geneva: World Health Organisation; 2006. 209 p. (The world health report).

10. Regnier K, Kopelow M, Lane D, Alden E. Accreditation for learning and change: quality and improvement as the outcome. J Contin Educ Health Prof. 2005;25(3):174–82.

11. Overstreet K, Eidsvoog K, Orsetti R. Educational interventions and outcomes - a literature review of CME regarding institute of medicine (IOM) competencies. CE Meas. 2006;1:17–26.

12. OECD, editor. Value for money in health spending. Paris: OECD; 2010. 200 p. (OECD health policy studies).

13. Kickbusch I, Pelikan JM, Apfel F, Tsouros AD, World Health Organization, editors. Health literacy: the solid facts. Copenhagen: World Health Organization Regional Office for Europe; 2013. 73 p. (The solid

facts).

14. Carter T, Stannard S. Healthcare at sea: are regulations a guarantee of minimum standards or a barrier to improved practice? Int Marit Health. 2014 Dec 17;65(4):177–80.

15. Schwarz MR, Wojtczak A. Global minimum essential requirements: a road towards competence-oriented medical education. Med Teach. 2002 Jan;24(2):125–9.

16. European Comission. On effective, accessible and resilient health systems [Internet]. Brussels; 2014 [cited 2017 Jul 17]. Available from: http://ec.europa.eu/health//sites/health/files/systems_performance_assessment/docs/com2014_215_final_en.pdf

17. Abaya ARM, Roldan S, Ongchangco JCE, Ronquillo-Sarmiento RM, Sarmiento RFR. Repatriation rates in Filipino seafarers: a five-year study of 6,759 cases. Int Marit Health. 2015 Dec 22;66(4):189–95.

18. Oldenburg M, Baur X, Schlaich C. Occupational risks and challenges of seafaring. J Occup Health. 2010;52(5):249–56.

19. Roberts SE, Nielsen D, Kotłowski A, Jaremin B. Fatal accidents and injuries among merchant seafarers worldwide. Occup Med Oxf Engl. 2014 Jun;64(4):259–66.

20. International Transportation Workers' Federation. Survey of ITF maritime affiliates on HIV/AIDS, health and wellbeing: A broader vision of seafarer wellbeing. [Internet]. 2015 [cited 2017 Jul 17]. Available from: http://www.itfglobal.org/media/819789/hiv_survey.pdf

21. Jensen OC, Lucero-Prisno Iii DE, Canals ML. Integrated occupational health care for seafarers across the continuum of primary, secondary and tertiary prevention. Int J Integr Care. 2010 Mar 8;10:e035.

22. Alcaraz M, Solomon E, Ching S, Paul M, Teves P, et al. Current profile of filipino physicians doing medical examination of seafarers in the Phillippines: Need for maritime medicine training? Int Mar Health. 2016;

23. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA. 2000 Apr 19;283(15):2008–12.

24. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. Ann Intern Med. 2009 Aug 18;151(4):264–9, W64.

25. Buus N, Kristiansen H, Tingleff E, Rossen C. Systematic litterature re-viewing for academic papers. Sygeplejersken [Internet]. 2008 [cited 2017 Jan 19];(10). Available from: https://dsr.dk/sygeplejersken/arkiv/sy-nr-2008-10/litteratursogning-i-praksis-begreber-strategier-og-modeller

26. U.S National Library of Medicine. Introduction to Boolean Logic [Internet]. 2016 [cited 2017 Feb 13]. Available from: https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/020_350.html

27. U.S National Library of Medicine. Truncation [Internet]. 2016 [cited 2017 Feb 13]. Available from:

https://www.nlm.nih.gov/bsd/disted/pubmedtutorial/020_460.html

28. Scott DM, Strand M, Undem T, Anderson G, Clarens A, Liu X. Assessment of pharmacists' delivery of public health services in rural and urban areas in Iowa and North Dakota. Pharm Pract. 2016 Dec 31;14(4):836.

29. Robertson K, Feldman K. Clinician outreach to improve the quality of rabies postexposure prophylaxis administration: Maryland's experience, 2010-2011. Vector Borne Zoonotic Dis Larchmt N. 2014 Jun;14(6):454–60.

30. Chanda E, Ameneshewa B, Mihreteab S, Berhane A, Zehaie A, Ghebrat Y, et al. Consolidating strategic planning and operational frameworks for integrated vector management in Eritrea. Malar J. 2015 Dec 2;14:488.

31. Bjerre LM, Paterson NR, McGowan J, Hogg W, Campbell C, Viner G, et al. Do Continuing Medical Education (CME) Events Cover the Content Physicians Want to Know? A Content Analysis of CME Offerings: J Contin Educ Health Prof. 2015;35(1):27–37.

32. Overbosch FW, Koeman SC, van den Hoek A, Sonder GJB. Dutch travel health nurses: prepared to prescribe? J Travel Med. 2012 Dec;19(6):361–5.

33. Boddington NL, Simons H, Launders N, Gawthrop M, Stillwell A, Wong C, et al. Evaluation of Travel Medicine Practice by Yellow Fever Vaccination Centers in England, Wales, and Northern Ireland. J Travel Med. 2012 Mar 1;19(2):84–91.

34. Tsega AY, Hausi HT, Steinglass R, Chirwa GZ. IMMUNISATION TRAINING NEEDS IN MALAWI. East Afr Med J. 2014 Sep;91(9):298–302.

35. Sistenich V. International emergency medicine: How to train for it: International emergency medicine: how to train for it. Emerg Med Australas. 2012 Aug;24(4):435–41.

36. Meshkat N, Misra S, Hunchak C, Cleiman P, Khan Y, Ritchie LMP. Knowledge gaps in the diagnosis and management of patients with tropical diseases presenting to Canadian emergency departments: are the gaps being met? CJEM. 2014 Nov;16(06):458–66.

37. Gottlieb M, Collins FH, Takken W, James S. Needs for Monitoring Mosquito Transmission of Malaria in a Pre-Elimination World. Am J Trop Med Hyg. 2014 Jan 8;90(1):6–10.

38. Walker PF. Pre-travel consultation and hepatitis B: a double opportunity for preventing infection in at-risk patients and life-threatening complications in HBV carriers. J Travel Med. 2013 Jun;20(3):143–5.

39. Guillermet E, Alfa DA, Gbodja R, Jaillard P. Professional changes induced by a redesigned immunization supply chain in the Comé Health Zone, Benin. Vaccine. 2017 Apr;35(17):2189–94.

40. Jentes ES, Blanton JD, Johnson KJ, Petersen BW, Lamias MJ, Robertson K, et al. The Global Availability of Rabies Immune Globulin and Rabies Vaccine in Clinics Providing Direct Care to Travelers. J Travel Med. 2013 May 1;20(3):148–58.

41. Streit JA, Marano C, Beekmann SE, Polgreen PM, Moore TA, Brunette GW, et al. Travel and tropical medicine practice among infectious disease practitioners. J Travel Med. 2012 Apr;19(2):92–5.

42. Kozarsky PE, Steffen R. Travel medicine education-what are the needs? J Travel Med. 2016 May;23(5).

43. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. Int J Surg Lond Engl. 2014 Dec;12(12):1495–9.

44. Lucero-Prisno D, Muramatsu S, Hisamune S, Ehara M. Mainstreaming health in maritime education and training. Int Marit Health. 2005;300–2.

45. Andrioti D, Skitsou A, Charalambous G, Kyriopoulos J. An international partnership interdisciplinary training programme on public health. Health Sci J. 2015(4):1–9.

46. International Labour Office, Sectoral Activities Programme, Joint ILO/IMO Meeting on Medical Fitness Examinations of Seafarers and Ships' Medicine Chests. Proposed revised guidelines on the medical examinations of seafarers: report for discussion at the Joint ILO/IMO Meeting on Medical Fitness Examinations of Seafarers and Ships' Medicine Chests, (Geneva, 26-30 September 2011). Geneva: ILO; 2011.

47. World Federation for Medical Education. Continuing Professional Development of medical doctors. Vol. 2003. Copenhagen: WFME global standards for quality improvement: quality standards;

48. Andrioti D**,** Faurby M, Videbæk Le J, Jensen OC. Do Danish Maritime Doctors Value Continuous Education Initiatives? Health Econ Outcome Res Open Access. 2017; 3:3, DOI: 10.4172/2471-268X/1000137

7. Annex 1

Additional tables

The table below presents the maritime doctors perceived importance of the 15 items related to different training needs and how they perceive the importance of each topic divided into the three categories. The table illustrates that 40.1 Rules and regulation within maritime medicine was the topic which least doctors (7.84%) perceived as not important to receive training within.

Maritime doctors' perception of training needs

	Not important n=51 (%)	Neither important nor unimportant n=51 (%)	Important or very important n=51 (%)
40.1 Rules and regulations within maritime medicine	4 (7.84)	12 (23.53)	35 (68.63)
40.2 Organisation of Maritime Health Services and Resources in Denmark and abroad	13 (25.49)	19 (37.25)	19 (37.25)
40.3 Telemedicine/radio medical advice	15 (29.41)	19 (37.25)	17 (33.33)
40.4 Occupational disease diagnostics, prevention and reporting	14 (27.45)	23 (45.10)	14 (27.45)
40.5 Health and safety at work	8 (15.69)	18 (35.29)	25 (49.02)
40.6 How to do early diagnosis, prevention and follow-up of common chronic conditions (e.g. diabetes, overweight/obesity and hypertension) at seafarers	20 (39.22)	15 (29.41)	16 (31.37)
40.7 Working conditions and health risks on board	5 (9.80)	14 (27.45)	32 (62.75)
40.8 Medical communication between doctor and patient	18 (35.29)	20 (39.22)	13 (25.49)
40.9 Gender issues	17 (33.33)	23 (45.10)	11 (21.57)
40.10 Maritime medicine emergencies	7 (13.73)	15 (29.41)	29 (56.86)
40.11 On board/Shipboard medicine	9 (17.65)	13 (25.49)	29 (56.86)
40.12 Fitness evaluation and Medical Examination Guidelines	5 (9.80)	7 (13.73)	39 (76.47)
40.13 Clinical registers for follow-up and research of seafarers	19 (37.25)	17 (33.33)	15 (29.41)
40.14 WHO/International Health Regulations (IHR)	15 (29.41)	20 (39.22)	16 (31.37)
40.15 Methods for professional update	10 (19.61)	19 (37.25)	22 (43.14)

List of Figures

List of Tables