CHAPTER 4

THE EFFECTIVENESS OF DIAGNOSTIC, THERAPEUTIC AND PREVENTIVE RECOMMENDATIONS IN PROVIDING MEDICAL CARE TO NAVAL AND MARITIME INDUSTRY WORKERS WITH CARDIOVASCULAR DISEASES

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INTRODUCTION

Seafarers are at particularly high risk for cardiovascular disease, primarily due to the nature of their work and associated lifestyle factors. After occupational accidents, cardiovascular disease is the second leading cause of death at sea.[1]

Seafarers with cardiovascular diseases lack ready access to medical care due to logistical constraints and the specific nature of maritime work. Despite modern advances, technical limitations at sea, such as unstable signals and low data rates, significantly reduce the effectiveness of telemedicine, which is particularly important during medical emergencies. According to the World Health Organization, CVDs, particularly coronary heart disease (CHD), were the leading cause of death worldwide in 2019. An estimated 17.9 million deaths, representing 32% of the total, were caused by CVDs, with CHD accounting for 8.9 million of these deaths (50%). The etiology of cardiovascular disease is multifactorial and includes hereditary, behavioral, and environmental factors, the latter two of which are modifiable.[2]

The most significant behavioral risk factors are smoking, unhealthy diet, physical inactivity, and excessive alcohol consumption. Stressful work conditions, such as non-standard work schedules and time

[1] Ehara M, Muramatsu S, Sano Y, Takeda S, Hisamune S. The tendency of diseases among seamen during the last fifteen years in Japan. Ind. Health. 2006;44:155-160. doi:10.2486/indhealth.44.155

[2] World Health Organization. Cardiovascular diseases (CVDs) World Health Organization, Fact sheets, Detail. World Health Organization. 2021. https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

pressure, are also associated with the development of cardiovascular disease.[3]

In 2021, the European Society of Cardiology updated its recommendations for the prevention of cardiovascular disease, introducing the SCORE2 (Systematic Coronary Risk Estimation 2) system for individuals aged 40–69 years and the SCORE2-OP (Systematic Coronary Risk Estimation 2 – Older Persons) system for individuals aged 70–89 years. [4]

These tools are used to estimate the 10-year risk of both fatal and non-fatal cardiovascular events. Despite clear evidence of increased cardiovascular risk among seafarers, there are currently no specialized cardiovascular risk assessment tools developed specifically for this occupational group. There is a significant gap in cardiac research related to seafarers, especially in light of rapid advances in diagnostic and therapeutic methods. Professional seafaring is a global industry, encompassing nearly 1.9 million seafarers worldwide, and is recognized as a stressful occupation. Seafaring encompasses various specialized types of vessels, depending on the industry. For example, merchant ships (which carry cargo) include tankers and container ships, passenger ships include cruise ships and ferries, and naval vessels (used for various purposes) include destroyers and submarines. Regardless of vessel type, seafaring involves working in confined spaces and in adverse weather conditions. Shift and night work, unpredictable tasks and working hours, long working hours, and extended periods away from home are also part of the maritime profession.[5]

Moreover, seafarers are more likely than the general population to engage in unhealthy lifestyles associated with the aforementioned risk factors.[6]

This raises the question of the applicability of standard recommendations for care for patients with cardiovascular diseases in general and occupational diseases in particular to the seafarer cohort.

Objective. The objective of the study is to evaluate the available data on cardiovascular diseases and risk factors to investigate the features of medical examination of seafarers suffering from cardiovascular diseases at the current

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[3] De Lange AH, Taris TW, Kompier MAJ, Houtman ILD, Bongers PM."The very best of the millennium": longitudinal research and the Demand-Control-(Support) Model. J Occup Health Psychol. 2003;8:282-305. doi:10.1037/1076-8998.8.4.282

[4] Visseren FLJ, Mach F, Smulders YM, et al. ESC National Cardiac Societies, ESC Scientific Document Group. 2021 ESC Guidelines on cardiovascular disease prevention in clinical practice. Eur Heart J. 2021; 42(34): 3227–3337, doi: 10.1093/eurheartj/ehab484

[5] Daponte-Codina A, Knox EC, Mateo-Rodriguez I, et al. Gender and social inequalities in awareness of coronary artery disease in European countries. Int J Environ Res Public Health. 2022; 19(3), doi: 10.3390/ijerph19031388

[6] Oldenburg M, Jensen HJ, Latza U, et al. Coronary risks among seafarers aboard German-flagged ships. Int Arch Occup Environ Health. 2008; 81(6): 735–741, doi: 10.1007/s00420-007-0261-5

stage, to assess the importance of pre-voyage medical examinations and to identify the most typical nosoforms that interfere with work on ships.

1. Materials and methods

During the work, the medical documentation of seafarers who had been under dispensary observation of the medical commission for the inspection of the fleet for the presence of cardiovascular diseases since 2016 was studied. The period of 2017 was chosen for the assessment. The features of age, frequency of examinations, prevalence of individual nosoforms, progression of diseases during repeated examinations, polymorbidity and the presence of concomitant diseases were studied.

Cases of refusal to issue a medical certificate after medical examinations of persons for work on ships, which were conducted by the medical center for the inspection of the fleet for 39 months from 01.2017 to 08.2020, were analyzed. The most typical grounds were assessed and divided into groups:

- Threat to the health of the candidate for seafarers due to exposure to harmful and dangerous production conditions;
- Inability to perform work due to health conditions;
- Threat to surrounding workers/navigation safety;

2436 cases of refusal to issue a medical certificate for the specified period were included for analysis.

2. Results

The most common reasons for refusing to issue a certificate are:

- dental diseases – 437 cases,
- increased body mass index – 364 cases,
- mixed vascular dystonia and arterial hypertension – 349 cases,
- liver dysfunction – 258,
- urolithiasis -152,
- atherosclerotic cardiosclerosis – 149,
- increased blood glucose levels – 145,
- gallbladder polyp – 139,
- kidney cyst – 126,
- Gilbert's syndrome – 71.

Other reasons, such as malignant neoplasms, blood diseases, AIDS, syphilis, etc., were encountered in isolated cases and generally amounted to within 10% of cases.

Groups of diseases are included in the list of contraindications for both one and several reasons. For example, dental diseases are a contraindication to work in the fleet primarily due to the limited possibility of providing medical

care during the voyage in the event of an exacerbation due to the action of harmful factors, such as general vibration. The contraindication "Increased body mass index" or BMI (it should be emphasized that an increase in BMI is a contraindication regardless of the presence of a diagnosis of "obesity") corresponds to the impossibility of adequately performing duties, reduced mobility, agility, and, on the other hand, affects the safety of navigation due to the development of obstructive sleep apnea syndrome.

The analysis of the results indicates discrepancies between the grounds for refusing to issue a certificate and the actual reasons for the persistent loss of professional fitness and death of fleet employees during the voyage period. Based on our previous own research and analysis of literary sources, the leading causes of disability and death of sailors remain injuries and cardiovascular diseases.

"Other" causes of disability during the voyage included toxic anemia, polyneuropathies and encephalopathies, oncological diseases, etc. "Other" causes of death included respiratory diseases, oncological diseases, infectious and parasitic diseases.

In 2017, 163 seafarers with signs of cardiovascular diseases were under the dispensary observation of the medical commission. 152 cases were selected for the study, since in 11 cases the patients did not undergo medical examinations in 2017 for various reasons, or it was not possible to reliably assess the information.

All patients were men of Caucasian race. The age of the patients ranged from 18 to 71 years, with an average of 49.2 years. 98 people (64.4%) were aged ≤50, 39 (25,6%) – aged 31-49, 15 (10%) men – aged ≥30.

Almost 2/3 of the patients who were under medical observation belonged to the group over 50 years old. Based on the distribution of sailors by age groups, the majority of sailors belong to the age category of 49 years or younger. [7]

As the harmfulness of work increases, the percentage of sailors over 50 years old reaches 5%, or, apparently, 2%. This is due to the development of diseases that are contraindications for work under harmful or dangerous factors. A relatively large number of people over 50 years old is observed among the officer corps (captains, senior mechanics).

On the other hand, among senior officers there are practically no people under 30 years old, which is due to the peculiarities of training and career growth. The predominance of seafarers who are subject to medical examination for cardiovascular diseases, persons over 50 years of age, testifies both to the mostly officer composition of this cohort and to the relative safety of the officer's work.

[7] Ігнатьєв О.М., Панюта О.І., Костромін П.С. Підстави для відмови у видачі медичного сертифікату при проведені медичних оглядів моряків// Вісник морської медицини. – 2021. – №2. – с. 14 – 18

During the studied period, almost half (75 people) of the patients underwent medical examinations once a year, the other half (77 people) at least 2 times with an interval of less than 12 months. The increase in the frequency of examinations in the conditions of medical examinations of seafarers has features due to the discrete nature of work. From voyage to voyage, a change in cargo, positions, health requirements, ship, etc. is possible. Therefore, repeated medical examinations of seafarers are intended, first of all, to assess the results of in-depth examination, treatment and rehabilitation measures. In 12 cases, after a repeated medical examination, the diagnosis changed – in 8 cases the condition was recognized as more severe than during previous examinations, in 3 cases the severity of the disease decreased, in 1 case the diagnosis was detailed from syndromic "cardiosclerosis" to the nosoform "CHD". The main diagnoses for which the seaman was monitored were associated with increased blood pressure, CHD, varicose veins of the lower extremities, and other pathological conditions (Table 1).

Table 1

Main cardiovascular reasons for seafarers dispanserisation

Nosoform	Age			Abs. Number	%
	≥30	31-49	≤50		
Vegetovascular dystonia	12	23	17	52	34.2
Arterial hypertension stage I	2	7	54	63	41.4
Arterial hypertension stage II	-	1	5	6	3.9
CHD (ACS, angina, cardiosclerosis, arrhythmias, etc.)	-	2	15	17	11.1
Varicose veins	1	3	7	11	7.2
Other diseases	-	3	-	3	1.9

Hypertension (HT), defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg measured in a clinical setting or the need for antihypertensive medication, is a major risk factor for cardiovascular disease (CVD). [8]

Worldwide, it causes approximately 8.5 million deaths annually, mainly due to stroke, coronary heart disease, and kidney disease.[9]

[8] McEvoy JW, McCarthy CP, Bruno RM, et al. ESC Scientific Document Group. 2024 ESC Guidelines for the management of elevated blood pressure and hypertension. Eur Heart J. 2024; 45(38): 3912–4018, doi: 10.1093/eurheartj/ehae178

[9] NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. Lancet. 2021; 398(10304): 957–980, doi: 10.1016/S0140-6736(21)01330-1

Hypertension is highly prevalent among seafarers, affecting between 43% and 50% of this occupational group, and is a key risk factor for CVD in the maritime industry. Moreover, elevated systolic blood pressure is a significant adverse prognostic factor included in the 10-year cardiovascular risk assessment using the SCORE2 scale.[10]

Epidemiological studies clearly show that the risk of developing hypertension increases with factors such as obesity, smoking, dyslipidemia, and comorbidities such as diabetes. Notably, some authors believe these risk factors are more prevalent among seafarers than in the general population.[11]

In the practice of medical commissions for the examination of the fleet, the non-obligation of repeated medical examinations in the same commission leaves the question of the form of registration of detected disorders of vascular tone regulation in case of non-compliance with the minimum criteria for establishing the diagnosis of arterial hypertension.

Based on the above, the diagnosis of VSD is established when the specifics of conducting medical examinations in some patients do not allow confirming or disproving the diagnosis of arterial hypertension within the framework of one examination. From a clinical point of view, the influence of harmful factors (stress, vibration) of the maritime complex contributes to the development of symptoms that in the domestic tradition are considered pathognomonic for VSD – headache, lability of pulse and blood pressure, irritability, sleep disturbances, etc.

When work in the fleet is stopped, the symptoms are significantly alleviated or disappear, and in case of continued work, they tend to develop persistent arterial hypertension. Uncomplicated arterial hypertension of the 1st art. – a diagnosis that is not a contraindication to work in the fleet.

Complicated hypertension, comorbid pathology, for example, hypertension and coronary artery disease, stage II hypertension. Are contraindications for work in the fleet. Diff. diagnostics of forms of hypertension faces the problem of professional selection. In the clinic of internal diseases, the issue of reliable distribution of hypertension is possible and, apparently, desirable to be postponed in time from the moment of initial appeal for in-depth examination, observation of blood pressure profiles, attempts to correct hypertension by modifying behavior and other measures.

Doctors of the medical commission have neither the time, nor the conditions, nor the funding for this. The conflict between the gradual development of the

[10] Kirkutis A, Norkiene S, Griciene P, et al. Prevalence of hypertension in Lithuanian mariners. Proc West Pharmacol Soc. 2004; 47: 71–75, indexed in Pubmed: 15633617

[11] Szafran-Dobrowolska J, Renke M, Jeżewska M. Is it worth to continue to analyse the factors of cardiovascular risk among the sailors? Review of literature. Int Marit Health. 2019; 70(1): 17–21, doi: 10.5603/IMH.2019.0003

disease and a discrete diagnosis cannot be resolved during a single examination. Such a decision on the presence of forms of hypertension in a sailor that are a contraindication for work in the fleet is made based on the results of dispensary observation, examination in specialized clinics and after consultations with specialized specialists. Which determines the large proportion of patients with hypertension among the dispensary group. According to the results of dispensary observation, the severity of the disease may increase, for example, the initially established sailor "cardiac type VSD" after examination and consultations is changed to stage II hypertension.

It is also possible to alleviate the initially established diagnosis, which can be extremely important for the sailor's further work capacity. Thus, in the indicated 3 cases of a decrease in the severity of the disease in 2017, the patient after a comprehensive examination: – the initially established diagnosis of stage II hypertension. Was changed to the diagnosis of stage I hypertension. (2 cases); – the initially established diagnosis of stage I hypertension., complicated, was changed to the diagnosis of stage I hypertension, uncomplicated. (1 case). Based on our practice, the most common reason for the "aggravation" of the diagnosis during the initial appeal are the formal requirements for the severity of the diagnosis for hospitalization of the patient in a hospital. That is, a diagnosis of a patient that could end his career in the navy is made as a result of outdated bureaucratic procedures and requires significant efforts to subsequently refute.

Coronary heart disease is recognized as a leading cause of death in both developing and developed countries. Modifiable risk factors include lipid profile, hypertension, smoking, metabolic disorders such as diabetes and obesity, physical inactivity, and environmental pollution. Non-modifiable risk factors include, among others, genetic factors. There are limited definitive data in the literature on the prevalence of coronary heart disease among individuals working at sea. However, a study conducted on a population of German seafarers showed an increased risk of CVD among those working on ships.[12]

A Polish research group conducted treadmill stress tests on 50 seafarers aged 19 to 66 years who reported non-specific chest pain. Forty-two percent of participants had a positive stress test result, with an increasing trend consistent with both age and length of service at sea.13[13]

Furthermore, a study of over 85,000 Swedish seafarers confirmed elevated CVD mortality among those professionally involved with non-passenger vessels.

[12] Oldenburg M, Jensen HJ, Latza U, et al. Coronary risks among seafarers aboard German-flagged ships. Int Arch Occup Environ Health. 2008; 81(6): 735–741, doi: 10.1007/s00420-007-0261-5

[13] Kliz J, Kapiszka T, Tomaszewski R. The use of submaximal exercise stress testing in early detection of ischaemic heart disease in seamen. Bull Inst Marit Trop Med Gdynia. 1990; 41(1–4): 37–45, indexed in Pubmed: 2135924

Particular attention was paid to occupational risk factors for CVD, including shift work, stress, and noise exposure. Another Polish study, conducted on a group of 11,325 Polish seafarers and deep-sea fishermen, found a high incidence of heart attacks in this population. Seafarers were identified as a high-risk group for fatal heart attacks, especially if the incident occurred on board a ship.[14]

Ischemic heart disease, which is consistently associated with angina pectoris and myocardial infarction, is a contraindication for most work in the fleet. Therefore, there are significantly fewer patients with coronary artery disease under dispensary observation than patients with hypertension. In addition, patients with such forms of coronary artery disease that do not have clinical manifestations in the form of angina pectoris/infarction, but are incidental findings according to the results of laboratory and instrumental tests, are subject to the issue of suitability on an individual basis. Taking into account the peculiarities of medical examinations, in approximately half of the cases (8 out of 17), the doctors of the medical commission did not diagnose coronary artery disease, limiting themselves to syndromic "masks" – atherosclerosis of the coronary vessels (ACS), cardiosclerosis with the development of arrhythmia, etc. This tactic is not erroneous during the initial examination, but requires a detailed diagnosis during dispensary observation.

Thus, in 2017, one of the sailors' primary syndromic diagnosis of "cardiosclerosis with bundle branch block" during a re-examination after an additional examination was changed to CHD, Right bundle branch block, CHF 0. Obliterating artery disease is a contraindication for work with physical overstrain, under conditions of vibration, etc., which excludes the possibility of working in the fleet.

Varicose veins (VV) are also a contraindication for the development of severe forms. VV can provoke the development of thrombosis, thrombophlebitis, be the physical basis for the development of chronic forms of DIC syndrome with the threat of developing PE. Which requires dispensary observation of patients with VV with monitoring of the coagulation status and prevention of the development of complications.

Atrial fibrillation (AF) is the most common arrhythmia worldwide, affecting 2–4% of the adult population.[15]

Current estimates indicate that AF will affect 6–12 million people in the United States by 2050, and 17.9 million people in Europe by 2060. As recently

[14] Eriksson HP, Forsell K, Andersson E. Mortality from cardiovascular disease in a cohort of Swedish seafarers. Int Arch Occup Environ Health. 2020; 93(3): 345–353, doi: 10.1007/s00420-019-01486-5

[15] Lippi G, Sanchis-Gomar F, Cervellin G. Global epidemiology of atrial fibrillation: An increasing epidemic and public health challenge. Int J Stroke. 2021; 16(2): 217–221, doi: 10.1177/1747493019897870

as 2013, it was projected that the number of people over 55 with this arrhythmia in the European Union would more than double the current number between 2010 and 2060.[16]

Data on AF in seafarers are scarce in the literature. The authors found one old study, conducted over 30 years ago, that assessed the frequency of arrhythmias in healthy seafarers. A study conducted in 1990 included 50 people who underwent 24-hour electrocardiogram (ECG) monitoring, and no cases of atrial fibrillation were recorded among the participants. [17]

Furthermore, one of the reasons for the increasing prevalence is the aging population and increasing life expectancy, even in the presence of comorbidities. The predicted further development of this trend has led to atrial fibrillation being considered a global epidemic problem.

Other diseases with which patients were under dispensary observation included instrumentally detected "consequences of myocarditis" and atrial fibrillation. Myocarditis leads to the development of cardiofibrosis, which, unlike perivascular atherosclerotic, is diffuse in nature and has a higher tendency to develop tachyarrhythmias in patients. In fact, any clinically significant post-myocarditis cardiosclerosis should manifest itself as tachyform rhythm disturbances. On the other hand, at the current stage of development of functional and radiological diagnostics, signs of "cardiosclerosis" on ECG, ultrasound, during Holter monitoring, which cannot be attributed to coronary heart disease by age and clinic, are traditionally attributed to post-myocarditis cardiosclerosis, regardless of the presence/absence of a history of rheumatism, heart valve defects, dilatation of cavities, etc. Combined, background and concomitant diseases were observed in 51 patients of the dispensary group. They were mostly represented by obesity, kidney cysts, visual impairment, diabetes mellitus, comorbid conditions of hypertension-CHD, hypertension-VRV and other diseases (Table 2).

Table 2

Concomitant diseases, what were diagnosed during dispanserisation seafarers with cardiovascular disorders

Nosoform	Age			Abs. number	%
	≥30	31-49	≤50		
Obesity	2	5	15	22	43
Kidney damage (cysts)	-	-	9	9	17.6

[16] Krijthe BP, Kunst A, Benjamin EJ, et al. Projections on the number of individuals with atrial fibrillation in the European Union, from 2000 to 2060. Eur Heart J. 2013; 34(35): 2746–2751, doi: 10.1093/eurheartj/eht280

[17] Tomaszewski R, Kapiszka T, Sokołowski A, et al. Zaburzenia rytmu serca u zdrowych marynarzy. Wiad Lek. 1990; 43(15–16): 769–772.

Continuation of table 2

Visual impairment	-	1	3	4	7.8
Impaired tolerance to glucose, DM II	-	1	1	2	3.9
Comorbid CVD diseases	-	3	6	9	17.6
Other diseases	1	2	2	5	9.8

Concomitant diseases were overweight, visual impairment (color anomalies, myopia, presbyopia), diabetes mellitus and various diseases that occurred once – gallbladder polyp, gastroduodenitis, hearing loss, fatty hepatosis, viral hepatitis. Also, in a number of patients, ultrasound examination revealed cysts in the kidneys that did not have any clinical or laboratory manifestations. Based on modern requirements, they were diagnosed. "Comorbid" diseases were not classic hypertension and coronary heart disease, since such patients are fundamentally not suitable for work in the fleet. In fact, in patients with hypertension of the 1st degree. during an in-depth examination, laboratory (dyslipidemia) or instrumental (atherosclerosis of the aorta, cardiosclerosis) signs were detected, which should have been interpreted as the presence of a diagnosis of coronary heart disease in the absence of angina pectoris/ infarction. That is, there was hyperdiagnosis associated with the development of laboratory and instrumental capabilities of medical commissions.

3. Discussion

When assessing the health of active workers of the fleet and the maritime complex, an “illogical” decrease in the morbidity and mortality of workers from all causes is observed, despite the significant impact of various harmful environmental factors and the production process. This phenomenon of better health indicators than among workers in light professions and people who are not working is called the “healthy worker effect” (HWE). HWE is due to the processes of self-selection and directed professional selection, which are all the more likely to single out only a “healthy” group of workers, the more difficult and harmful working conditions are at work. From a traditional perspective, the prerequisites for the selection of healthy workers are poor health, which will deteriorate as a result of the action of harmful factors, or the inability to perform work due to health conditions. A feature of professional selection in transport, in general, and, in particular, in the maritime economic complex, is an additional requirement for the safety of work, both for the employee and for others and equipment. On the other hand, HWE leads to a special structure of morbidity, including with persistent disability among seafarers, in which injuries and cardiovascular accidents prevail.

"Dispensary examination" in occupational pathology refers to a set of measures aimed at preserving the working capacity of an employee who has health disorders. In practice, "dispensary examination" means expanding the scope or involving such forms of medical care that are not included in the list of mandatory ones. In accordance with the current legislation of Ukraine, dispensary examination may include: – increasing the frequency of medical examinations, expanding the list of laboratory and instrumental studies, consultations by specialists; – prescribing outpatient, inpatient, specific treatment; – prescribing dietary nutrition; – referral to sanatoriums; – referral to rest homes. Dispensary measures are prescribed to improve the employee's well-being, preserve his working capacity, prevent the development of such stages and forms of diseases that will be a contraindication for further work. The actual prerequisites for medical examination are the impossibility of involving only healthy workers in hazardous work and the illegality of dismissing workers who have developed diseases that are not contraindications to performing hazardous work. That is, medical examination is a process that is the reverse of professional selection and the "phenomenon of a healthy worker. On the other hand, increasing the share of the medical examination group among workers increases the risk of developing occupational diseases, the frequency of occupational injuries, the relative number of days of incapacity for work, forms a group of "long-term and frequently ill workers", etc., which reduces the efficiency of work.

This conflict is gaining particular importance for the maritime economic complex, given the large number of adverse factors affecting the seafarer, the tendency to combine positions and the impossibility of quickly replacing a crew member during a voyage. Based on the distribution of seafarers by age groups, the majority of seafarers belong to the age category of 49 years or younger. Therefore, the medical examination of seafarers must take into account not only the condition of the worker, but also the limitations of the voyage period. Also, the medical examination of seafarers faces the problems of discrepancies between national legislation and the requirements of shipowners, who are represented by international corporations. It seems that the appointment of medical examination measures cannot be sufficiently controlled. The lack of a unified national system of providing medical care to seafarers, the fragmentation of individual institutions – medical centers, specialized hospitals, sanatoriums, laboratories, leads to the fragmentation of medical care, up to the impossibility of exchanging information about the seafarer's health between individual health facilities.

The main source of data on the state of medical care for seafarers are annual reports of medical services. When analyzing these publications, it is worth

noting that, depending on the work of individual services, the information is incomparable. Thus, the content of the reports will directly depend on:

- Assistance is provided on a national basis or by international organizations;
- assistance is provided in the territorial waters of one country (including inland waters), one maritime region or is global in nature;
- Assistance is provided on a planned basis or urgently;
- in the case when assistance is provided urgently, it is provided within the framework of medical posts of passenger ships, rescue operations or the work of telemedicine centers. etc.

Therefore, the reports of some services contain information on 50 episodes of medical care during rescue operations in national waters per season, and others – thousands of results of medical examinations of seafarers annually.

Based on the above, it should be noted that research in the field of maritime medicine focuses on the focused study and analysis of data on comparable groups of seafarers to identify important patterns in the development of diseases. A generalized study of all available information can be considered as of little significance from the point of view of compliance with scientific requirements due to legal, medical-deontological and ethno-cultural limitations and differences. This imbalance between the scientific interpretation of clinical and diagnostic data obtained in the study of a separate cohort of patients and the processing of large data sets of great statistical interest increases the requirements for scientific information.

When comparing the grounds for refusing to issue a medical certificate and the causes of disability and mortality, there are objective differences:

1. A significant part of accidents in the fleet is caused by external factors – falling into the hold, drowning, electric shock, etc. That is, they occur under circumstances that are not related to the employee's previous state of health and that could not have been predicted during the medical examinations.

2. The causes of permanent disability or death of a seafarer on a voyage are mostly acute diseases – injuries, strokes, heart attacks, bleeding, intoxication, overheating, infectious and parasitic diseases. But during medical examinations, the main reason for refusing to issue a certificate is chronic conditions, since candidates for seafarers with acute diseases do not appear for medical examinations, that is, self-selection takes place.

3. The main reasons for refusing to issue a certificate are diseases that may worsen during the voyage, such as dental pathology, dystonia, urolithiasis, etc.

On the other hand, this pathology is practically not observed among the causes of disability and death, since the reason for refusal is based on the

impossibility of performing work and the difficulties of organizing medical, legal and insurance assistance to the seafarer on the voyage, and not on a direct threat to life. In addition to the above objectively determined discrepancies, there are other reasons due to the imperfection of medical knowledge and the inability to predict and prevent all adverse events within the framework of existing medical practice.

1. Thus, despite hundreds of suspended patients, cardiovascular diseases remain the leading cause of death of seafarers on the voyage and one of the main causes of disability.

2. Respiratory diseases, primarily bronchial asthma and exacerbation of COPD, as well as pneumonia, are one of the causes of disability and death of seafarers on a voyage, but among the considered almost 2500 cases of recognition of seafarers as unfit, there was not a single case of unfitness due to lung disease. This is due to the lack of the ability to predict the development of such diseases as pneumonia, as well as the lack of a targeted study on lung disease until recently.

3. The minimal spread of atrial fibrillation among seafarers in contrast to the general population requires additional explanation either from the position of the phenomenon of self-selection or from the position of the secondary nature of this diagnosis.

CONCLUSIONS

1. Medical examination of the fleet remains an effective method of detecting and controlling the development of cardiovascular diseases in sailors.

2. Atrial fibrillation, which is one of the causes of death and permanent disability of the fleet, is practically not a reason for refusing a medical certificate.

3. Cardiovascular diseases are one of the main reasons for not being allowed to work in the fleet, but, despite the selection, remain the main cause of death and the second cause of permanent disability of the fleet.

4. The requirements of modern classifications for a clear division of functional and permanent disorders of blood pressure regulation by severity and the inability to do this in one examination are the main reason for the medical examination of the majority (80%) of patients.

5. The necessity and mandatory nature of the requirements of modern classifications regarding taking into account the diagnosis, rather than the actual functional state of the seafarer, when determining fitness for work in the fleet contributes to the use of syndromic diagnoses, mask diagnoses and other measures aimed at counteracting the bureaucratic attitude towards assessing the health of the seafarer.

SUMMARY

In article, the authors examine the issues of medical care for naval and maritime industry workers from the perspective of the direct application of existing general clinical guidelines and legal requirements.

The authors analyzed the prevalence of major cardiovascular diseases (coronary heart disease, hypertension, arrhythmia) based on both literature data and their own observations, as well as the impact of these diseases on the medical examination, treatment, and assessment of work capacity in seafarers.

The authors demonstrate the specifics of diagnostics in maritime medicine and describe the reasons for making decisions that are controversial from a general clinical perspective.

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