

**CAN GENERAL CARDIOVASCULAR RISK EVALUATION
FACILITATE THE ASSESSMENT OF FITNESS FOR WORK
AND CONTRIBUTE TO THE REDUCTION
OF CARDIOVASCULAR INCIDENTS AMONG SEAMEN
AND FISHERMEN ?
ARTICLE FOR DISCUSSION**

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ABSTRACT

Apart from accidents and work related injuries caused by external factors, being the primary cause of death at sea and repatriation of seamen and fishermen from ship to hospital on shore, acute cardiovascular incidents are the main internal causes of

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their death, both at sea and on land, as well as of long lasting sick leave and disability (14).

In the regulations on health requirements for persons working on sea-going ships and in inland navigation (orders of the Ministry of Health 1993, 1996, 2003, guidelines (39), EU directives and other national regulations) and in the register of diseases and conditions disqualifying from such an employment (EU directive, annex to the order of the Ministry of Health 1993, European Commission (32,33), ILO/WHO guidelines(39), cardiovascular diseases are only generally mentioned. The minimal scope of examinations is recommended for seafarers in age up to 50 years, and for older seafarers, but without the assessment of their occupational risk. This gives rise to ambiguities in interpretation at the time of issuing their health certificates, and also in judicature when analyzing cause-and-effect relationship between the occurrence of an acute cardiovascular incident during the ship's voyage and conditions of the work at sea.

Principles, possibilities and benefits are discussed in this paper, which may be expected from the general assessment of cardiovascular diseases risk at the time of the health assessment for the work at sea. The risk forecasting, health certification and the question of choosing primary preventive methods are included in this presentation.

INTRODUCTION

Epidemiological studies have pointed at the very high incidence of cardiovascular diseases among the male population aged above 40, particularly in countries of Central and Eastern Europe, and caused by these diseases high sickness absence and early loss of fitness for work. Such a situation applies also to the general population in Poland, although a slight improvement in the indicators has been noticed in recent years.

The same applies to the occupational group of seamen and fishermen in Poland and in other countries (Roberts, Hansen, Saarni).

In the years 1992–1996, in Poland about 1000 cardiovascular disease (CVD) incidents, including over 100 fatal ones, were classified each year as work-related accidents (31).

The number of such events recorded at sea is also high. Every year, more than 20 Polish seamen and fishermen die at sea of myocardial infarction, stroke, circulatory failure or arrhythmia. Even more seafarers are for these reasons disembarked, treated abroad and later repatriated home.

An acute cardiovascular incident on a sea-going ship almost always goes the natural course of the disease. This is caused by work environment factors: inexperienced pre-

medical assistance given on board, delayed diagnosis, limited treatment possibilities, delayed evacuation of the patient to a hospital, weather conditions, etc. (10,14), This results in peri-infarctial or peri-apoplectic mortality in such cases of about 50%, as compared to 8% and 30%, respectively, among patients treated on land (44).

Regardless of individual fates of seafarers with CVD and their reduced chances for survival at sea, the subsequent disability and economic loss for the patient and his family, and high costs for the ship owner and also to the whole society are a problem. (16). Therefore, it is necessary to look for solutions: to prevent these diseases by improving the conditions of work at sea and this way to reduce the number of dangerous CVD incidents.

In the same time, it would be wrong to disqualify too many well trained and experienced seafarers from work on ships, by rigorous interpretation of regulations on their health certification, when they want to continue their employment after an CVD incident.

AIM

The aim of the present study is to point out and discuss the role of the evaluation of the general cardiovascular risk indicator in:

- forecasting the CVD incident in a seafarer,
- assessing of fitness for work on ships (issuing the health certificate),
- working out principles of primary prevention in the marine environment, either individual or collective, for persons with a high general CVD risk.

GENERAL CARDIOVASCULAR DEATH RISK

The term risk means the probability of illness or death. The magnitude of the risk depends on the occurrence of many individual features and environmental factors that have been named the risk factors. This assessment is the result of a mathematical calculation, and as such it may be defined in per cent.

By employing appropriate statistical methods one can calculate the risk taking into account risk factors. Such an approach to the risk evaluation is important in practice.

The factors of the CVD risk may be classified into modifiable and non-modifiable ones. The first group includes factors related to the lifestyle (physical activity, diet, cigarette smoking, alcohol consumption) and physiological and biochemical factors

(arterial blood pressure, overweight, glucose concentration, total, HDL and LDL cholesterol, triglycerides, fibrinogen, homocysteine, C-reactive protein, uric acid).

The elimination of each risk factor from the above mentioned ones will result in reduced probability of an acute cardiovascular incident.

Non-modifiable risk factors are: sex, age, genetic markers, CVD in the family history. Such factors can neither be altered nor eliminated.

The SCORE risk assessment system (ten-year risk of cardiovascular death in high-risk populations) was worked out and based on numerous prospective surveys in Europe (European Cardiologic Society). It permits a quick estimation of the general individual risk based on five risk factors (age, sex, cigarette smoking, arterial blood pressure, cholesterol concentration). Not only makes this system possible assigning a patient to a particular risk group, but it also allows predicting the change of the risk after the reduction or elimination of the modifiable factor.

The risk of death from CVD in a ten-year period equal to or higher than 5% qualifies the patient to a high-risk group.

CARDIOVASCULAR DEATH RISK ASSESSMENT IN SEAFARERS

The application of the SCORE system for the assessment of CVD death risk in the population of seamen and fishermen is a simple and quick method and does not require considerable financial expenditure. The routine risk assessment during obligatory prophylactic examinations every two years of seafarers aged up to 50 years, and every year for those over 50 might allow identification of persons with a high CVD death risk virtually without the necessity of widening the scope of examinations required.

EXPECTED CORRELATION BETWEEN CVD DEATH RISK AND THE ISSUING OF THE HEALTH CERTIFICATE FOR A SEAFARER

One should expect marked coincidence between high cardiovascular death risk and a negative opinion on fitness for the work at sea in the age group of 50–65 years. Such an assessment is probably also useful for the males in age group 40–50 years, with a high CVD death risk.

MEDIUM AND/OR HIGH CVD DEATH RISK OF A SEAFARER AND THE USEFULNESS OF PRIMARY PREVENTION IN THE WORK PLACE – THE SHIP

The prevention of cardiovascular diseases depends on the identification of persons with a high cardiovascular incidence and death risk, and in making the appropriate decisions as to the pharmacological treatment (taking into consideration the possible negative side effects of pharmacotherapy (6). Its purpose is to slow down the progress of the disease and reduce the number of acute cardiovascular incidents - a target point of the observation of the prevention effectiveness (3, 5).

It should be borne in mind that the assignment of a given person to a high-risk group is not equivalent to the necessity of starting pharmacological treatment. In particular, this applies to young people, who will benefit from the change in their lifestyle rather than from slightly lowering the arterial blood pressure or cholesterol level.

Therefore, a great significance is attached to training maritime university students in a role of health leaders on ships (15, 14). In The Nationwide Program for the Prevention of Coronary Heart Disease – POLSCREEN it is the physicians of primary health care who identify the risk groups and provide health education in the primary and secondary prevention (28).

Working at sea, seafarers are not in a permanent contact with the family doctor. During the stay in the home country, they only sporadically visit a doctor, because many of them have no health insurance. Therefore, the contact with a doctor at the time of the mandatory periodic health examinations may be an opportunity to get advise on prevention.

At sea, the activity of support groups, aiming at elimination or moderation of the risk factors, could be an inexpensive and simple preventive measure. This concerns body mass reduction, physical activity enhancement, modification of diet, controlling the smoking habit and supporting moderation in alcohol consumption (16).

The organization of a fitness room on a ship with basic sport equipment would give an opportunity to actively spend the leisure time, will improve physical condition and reduce the body mass of seafarers. Such activities also raise awareness regarding profits of the healthy life style, and helps to eliminate risk factors without using expensive medicaments.

For introducing such methods of prevention, good cooperation with the ship owner is essential. The indication of economic gains for him by implementation of the health promoting strategy will help to establish such cooperation.

BENEFITS OF THE CVD RISK ASSESSMENT DURING THE PERIODIC MEDICAL EXAMINATIONS OF SEAFARERS

Medical

- the possibility of a more precise evaluation of the state of health and cardiovascular death risk, reduction of the possibility of making wrong decisions

Economic

- reduced expenses connected with the rescue action, sudden disembarkation on health grounds, hospitalization abroad, repatriation, death at sea, loss of a qualified worker,
- indemnities to be paid in the case of confirmed work-related accident (16),

Social

- prolongation of the period of service at sea (38).

INCONVENIENCES RELATED TO INTRODUCING THE CVD RISK ASSESSMENT

The SCORE table, assessing the ten-year cardiovascular death risk for a high-risk population, can be applied to healthy persons with no CVD symptoms, and it is used for primary prevention only. This system does not assess the risk of cardiovascular diseases, myocardial infarction, or not fatal cerebral stroke. It was designed for European population living in a moderate climate.

Seamen and fishermen work in variable weather conditions, in a shift work system and under permanent stress. The general risk in this case may be even higher than that given by the SCORE tables also in other cases:

- in persons with a remarkably positive family history of premature cardiovascular diseases,
- in the case of sedentary way of life of seafarers (automatic operation of the ship, not much physical work for the crew) and obesity,
- in persons approaching the successive higher age category,
- in cases of asymptomatic atherosclerosis,
- in people with low HDL cholesterol, elevated level of triglycerides, B and Lp(a) apolipoprotein, fibrinogen, homocysteine, C-reactive protein, impaired glucose toleration.

The risk assessment with the use of the SCORE tables provides the best information

for the age group of 40–65 years. For young persons, underestimation of the distant risk is possible.

Despite positive results obtained with the use of the SCORE table, risk factors should be consistently controlled already in the younger age group.

CONCLUSIONS

After reviewing the literature and the existing regulations and analysing the health risks connected with the work at sea, and having our own experience in conducting the medical examinations of seafarers, we may draw the following conclusions:

1. The general cardiovascular death risk assessment is the health and life risk indicator relatively simple and easy to be applied in the occupational group of seamen and fishermen.
2. It seems that the application of such an assessment during the periodic medical examinations of seafarers should result in medical, economic and social benefits.
3. It is worthwhile to compare the results of examinations and decisions made when issuing health certificates before and after the application of the cardiovascular death risk assessment.

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