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Implementation of an onboard COVID-19 vaccination programme: a university partnership to vaccinate seafarers

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ABSTRACT

Background: *The coronavirus disease 2019 (COVID-19) pandemic caused many seafarers to be stranded on their ships due to lack of access to a vaccine and fear of contracting the COVID-19 virus limiting their ability to work on the ship. Once COVID-19 vaccinations were available, a lack of access to the vaccine continued to exist in the underserved seafarer population. This lack of access to the COVID-19 vaccine meant that seafarers were sometimes unable to leave their ships for months beyond their original contracts.*

Materials and methods: *The University of South Florida (USF) College of Nursing collaborated with the USF Morsani Colleges of Medicine and Pharmacy in the development and implementation of an onboard COVID-19 vaccination programme at the request of the Port of Tampa Ministries.*

Results: *In 6 months, 1237 seafarers from 30 countries and 5 continents received the COVID-19 vaccination as a result of this programme.*

Conclusions: *Partnership between a commercial port and a College of Nursing at a local university enabled hundreds of seafarers to be vaccinated against COVID-19. This programme serves as a model for industry and academic partnerships that can have a global impact on health and wellness.*

(Int Marit Health 2022; 73, 2: 59–63)

Key words: seafarers, health and wellness, COVID-19 vaccinations, maritime industry, industry and academic collaboration, onboard vaccinations

INTRODUCTION

The coronavirus disease 2019 (COVID-19) global pandemic was first recognized in the Spring of 2020 by the World Health Organization [1]. The designation of global extended to those persons inland and at sea. As such, the maritime industry was uniquely affected due to the nature of the work. Seafarers often hail from a different country than the flag under which the ship sails. Additionally, the ships transport goods between even more countries. Thus, these standard operating conditions unintentionally created unforeseen barriers once the global pandemic was declared. When seafarers become sick or injured on board, there are few options for treatment at sea [2, 3], ships' officers, even with the help of telemedicine, have limited medical equipment and medicines on board. Additionally, depression can be high even in the best of times, due to loneliness, stress, fatigue, insomnia, separation from families, repetitive food, and others. During the COVID-19 pandemic, many seafarers were denied shore leave and were often unable to return home, leaving some seafarers stranded on a ship for more than a year. These practices prevented seafarers from accessing important services such as health care and communication with families [4]. Some countries restricted air flights to and from countries with outbreaks, and many seafarers could not leave when their contract expired [3].

When the COVID-19 vaccines became available in spring of 2021, the leadership at the Port of Tampa requested that faculty at the College of Nursing (CON) at the University of

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South Florida (USF) in Tampa, Florida, partner with them on a vaccination drive. Plans were made to invite employees and eligible family members to register for a vaccination event at the Port, and over 100 vaccinations were given. Although cruise lines were not running, the Port stayed active with cargo ships and tankers that regularly dock at the Port of Tampa. These events solidified the partnership between the Port of Tampa and the CON, and created a path for expansion. The purpose of this article is to describe how that expansion served to meet the needs of seafarers who docked at the Port of Tampa during the pandemic, once a vaccine became available.

The non-profit Port of Tampa Ministries operates a Seafarer's Centre that is purely donation based. This invaluable entity offers shore respite and services for seafarers within the Port of Tampa. During the aforementioned vaccination drive in the spring of 2021, the Port of Tampa Ministries Chaplain (cleric) approached the USF CON faculty regarding the plight of the seafarers on cargo ships in port who were not allowed to leave the ships due to issues with access to the vaccines. The Chaplain described that many seafarers were effectively ship-bound for up to and over a 12-month span in some cases. Only those seafarers who had been vaccinated against COVID-19 could take shore-leave or disembark in their home ports; however, most were not vaccinated as very few agencies provided this service on board. Thus, seafarers were caught in a vicious cycle that could be interpreted as a violation of the 2006 Maritime Labour Convention [5]. Armed with this information, a partnership between the Port of Tampa and the USF CON was formed that enabled hundreds of seafarers to be vaccinated against COVID-19.

MATERIALS AND METHODS

Once the dilemma was fully understood, the USF CON faculty collaborated with the USF Morsani College of Medicine (MCOM) and devised a plan. The USF CON faculty had already received a small internal nursing alumni-funded 'Leaders in Care' grant that provided initial operational resources, such as computer equipment, printers, paper, ink, labels, and backpacks. Faculty time was donated by USF CON. Additionally, MCOM provided the single-dose Janssen COVID-19 vaccine, injection supplies, emergency kit, and record reconciliation with the Florida Department of Health. The USF College of Pharmacy (COP) dispensed the vaccines to the USF CON faculty that were responsible for dosing and administration of the vaccine. Additionally, the USF COP provided temperature-controlled containers for transportation of the vaccine complete with time logs, medication administration, and medication reconciliation forms.

Next, the Port of Tampa Ministries Chaplain monitored the cargo and container ships that were scheduled to be in port and reached out to the Captains of those vessels to offer onboard COVID-19 vaccination services free of charge. The Chaplain communicated this information to the USF CON faculty regarding the expected dates, number of ships, and number of vaccinations needed. Secured space was provided in the Seafarer's Centre for the USF CON faculty to store equipment and supplies, vaccine preparation, storing and stocking the backpacks. Based on the number of vaccinations requested, the CON faculty obtained the vaccines via MCOM in conjunction with the COP, and transported them in a cooler to the Seafarers Centre at the Port. Once the vaccines were prepared and the supplies readied, the Port of Tampa Ministries Chaplain transported the USF CON faculty to each ship and accompanied them on board for vaccine administration. More often than not, the Chaplain brought a volunteer that carried gear and assisted with paperwork completion by the seafarers. Transportation Worker Identification Credential (TWIC®) access was crucial to board the ships, and provided by the Port Chaplain, an employee of the Port. It should be noted that all appropriate clearances, port passes, safety training, and port badge identifications were obtained by the USF CON faculty prior to the implementation of the onboard COVID-19 vaccinations project. All members of the vaccination team employed appropriate safety precautions and wore safety vests, masks, goggles, gloves, hardhats, non-slip soled shoes, and port identification. Three USF CON faculty members along with alumni volunteers and graduate students rotated vaccination shifts from implementation of the onboard COVID-19 vaccination project in June, 2021, through December, 2021. All three USF CON faculty members were advanced practice, doctorally prepared nurses.

Once admitted though multiple security clearance checkpoints, the team boarded the ships and set up a vaccination station in an area designated by the Captain or First Officer. If needed, a translator was identified by the Captain, and that person was available until the team left the ship. Vaccine administration station locations included officer's mess, dining halls, infirmaries, conference rooms, leisure/multi-purpose rooms, and even the bridge in one case. Seafarers completed standard vaccination administration and consent forms and the USF CON faculty reviewed the forms with the seafarers and determined eligibility to receive the vaccine. When feasible, the USF CON faculty reviewed the common side effects in a group, but always asked each individual if they had any questions as privately as possible. Common questions included, "Can I take a shower?" and "When can I go back to work?". There were also occasional questions about compatibility with medications. All questions were answered to their satisfaction. After COVID-19 vaccination, the seafarers were monitored by the USF CON faculty for a period of no

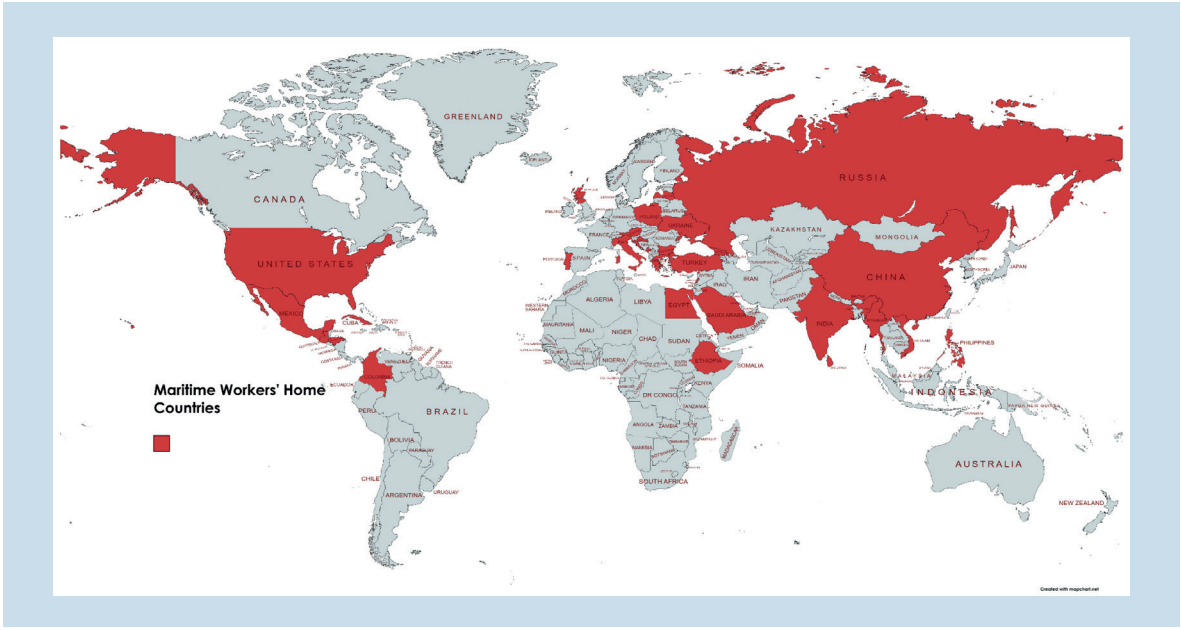

Figure 1. Maritime workers' home countries

less than 15 minutes. Vaccinated seafarers were provided an official Centres for Disease Control and Prevention (CDC) COVID-19 vaccination card which was also stamped and signed by the USF CON faculty. In most cases, the USF CON faculty stamped and signed the "yellow fever" vaccine card also that is carried by many seafarers. Each Captain or First Officer was provided with a log of vaccinated seafarers. All used medical supplies were removed from the ships by the USF CON faculty and disposed of in compliance with the Occupational Safety and Health Administration (OSHA) regulations. Upon returning to the Seafarers Centre, the USF CON faculty logged the vaccination information into a spreadsheet provided by the Florida Department of Health, which was submitted to them within 24 hours. Unused vaccine doses and signed consents were returned to the MCOM at the end of every day.

RESULTS

In the almost 6 month time span from June, 2021, through mid-December, 2021, the USF CON faculty administered 1237 COVID-19 vaccinations to seafarers. Of those, all but two vaccine recipients self-identified as male. These seafarers hailed from 30 different countries located across five continents (Fig. 1).

Of all the vaccinations administered, no adverse events or reactions were observed or reported. One seafarer with a history of injection-induced vasovagal syncope was monitored for an additional 15 minutes without incident.

Anecdotally, the majority of seafarers were outwardly appreciative and profusely thanked the team, took pictures (with permission), offered food and beverages, and were, in some cases, visibly emotional. Most were very knowledgeable about the vaccine, and all were anxious to get it.

DISCUSSION

It is important to note that the USF CON faculty also marketed this opportunity to graduate nursing students and nursing alumni. All of the students and alumni who participated were advanced practice nurses, and their participation helped streamline and shorten the time that was spent on board. The student/alumni prepared and administered the vaccine while the faculty completed the participant spreadsheet, collected consents, and stamped vaccination cards. Students earned valuable clinical hours during a time when many clinical sites were closed due to the pandemic. The time spent obtaining, preparing, administering, and logging the vaccines was the most costly part of the programme, often consuming 6–8 hours a day for team members.

The majority of this effort was conducted in the hot, humid and often rainy conditions of Florida. Students and alumni were screened for being able-bodied not only due to the weather conditions, but the multiple flights of steep stairs and precarious gangways. Occasionally, the team requested that the seafarers meet them at the bottom of the gangway for a tailgate vaccination when it was not reasonable for the nurses to board the ship. What might be determined to be safe for seafarers is not always safe for nurses who are not used to the conditions.

A styrofoam cooler was used with cold water bottles to keep the temperature of the vaccine within the recom-

mended guidelines, and was monitored continuously with an internal thermometer. Care was taken to place the cooler in an air-conditioned vehicle during transport and away from direct sunlight. Vaccine doses were never discarded due to temperature failure, but were occasionally discarded when the team was unable to board the ship in a timely manner due to required inspections, or early ship departure.

Most of the seafarers spoke enough English to converse with the team, and their sense of humour was enjoyed. The team often remarked on the seafarer's camaraderie and the leadership of the Captains, who were often the first to roll up their sleeves. The Captain on the very first ship that was boarded recommended that a stamp be used for the vaccine cards, which was ordered right away. The stamp included the vaccine name, dose, and USF Health Clinic identification, and the nurse added the date, and their signature. The stamp was used on both the CDC COVID-19 vaccination cards and the yellow fever cards that were not laminated.

The Janssen COVID-19 vaccine was chosen for this programme because it only required one dose. It is also very easy to prepare because it does not need to be reconstituted, and can be transported in a cooler for up to 12 hours. The only drawback is that once it is drawn up in a syringe, it must be used within 2 hours. Therefore, when more than one ship was to be boarded in a day, the nurse prepared the vaccine after they boarded the ship. The team was never on a ship more than 90 minutes, because the most vaccinations administered on any ship was 20. Occasionally, second doses and booster vaccinations of the Pfizer vaccine were given to seafarers who were eligible. These were planned in advance, and the seafarers were required to provide their vaccine cards as proof of eligibility. Pfizer vaccines were prepared by the pharmacy at the MCOM. Because of the short window, Pfizer vaccines were planned for the first ship to be boarded.

During the first few months of the programme, seafarers that received an initial dose of vaccine elsewhere and needed the second dose were unable to receive that follow-up vaccination unless the original dose was Pfizer. This changed after the International Maritime Health Association released an interim position paper in September 2021, 'Vaccination of Seafarers Against COVID-19' [6]. This position paper paved the way for the use of different brands of COVID-19 vaccine to complete the recommended series. Thus, the team was able to complete the series for many seafarers in the fall of 2021.

CONCLUSIONS

The far-reaching outcome of this project is proof that collaboration between industry and academia can have global impact. When approached, the CON faculty appreciated the need and responded with a measured, thoughtful approach that can serve as a model for future collaborations. When health and wellness are involved, industry should look no further than their own backyards for an academic partnership that positively affects change. At the time of this article, the supplies, vaccine, and faculty time are still being donated by USF CON, MCOM, and COP. University of South Florida Health remains steadfast in their commitment to the programme as long as the need exists.

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Conflict of interest: None declared

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Screening for type 2 diabetes and hypertension in seafarers' medical examinations

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ABSTRACT

Background: *The aims of the study are: 1) to replace the urine glucose test for diabetes with more than 50% false negatives, with an accurate screening for type 2 diabetes and hypertension in the mandatory biannual fit-for-duty medical examinations of seafarers; 2) to produce data driven "Green Ship" health promotion in the ships. A new health promotion and disease prevention public health intervention programme integrated in the fit-for-duty medical examinations for seafarers is being developed.*

Materials and methods: *The lack of an accurate diagnosis of type 2 diabetes is replaced by accurate HbA1c and/or fasting glucose tests and the test for hypertension in various disease stages is based on the International Associations' Guidelines. A "Green Ship" health promotion programme is proposed for all on board, not only for diseased crew members.*

Results: *A protocol for an accurate biannual screening for diabetes and hypertension is presented. Educational programmes for medical doctors and seafarers on the management of hypertension and diabetes on board will be developed. Presuming that all crew members are potentially on their way to be pre-diseased or are diseased, the "Green Ship" health promotion programme is implemented for the whole crew.*

Conclusions: *The International Labour Organization and the National Maritime Authorities are prompted to revise the International and the National Guidelines for Seafarers Medical Examinations, respectively. Concerted actions are requested to implement public health promotion projects in shipping. Maritime medical doctors are prompted to use health dialogues and to report the clinical data in the Excel file. Sustainability is obtained by complying with the Sustainable Development Goals (3, 4, 8, 10, and 17).*

(Int Marit Health 2022; 73, 2: 64–72)

Key words: type 2 diabetes, hypertension, seafarers, fishermen, screening, early diagnosis, metabolic syndrome

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INTRODUCTION

There are over 1.6 million seafarers worldwide, with the majority originating from the Philippines, China, Indonesia, the Russian Federation, and Ukraine. Seafarers leave their homes and families to live on board as their second home, often for 9 to 12 months at a time. Today, over 50,000 merchant ships carry 90% of world trade. The people responsible for maintaining, running, and operating the fleet are seafarers. Seafarers ensure that the essential household items — televisions, laptops, clothing, etc. — are all brought to us by sea [1].

Seafarers have routine biannual fit-for-duty medical examinations based on the International Labour Organization (ILO) conventions and the Maritime Labour Convention (MLC, 2006) [2]. To ensure that medical practitioners contribute towards harmonising the standards for seafarer medical examinations, the first International Guidelines for Conducting pre-sea and Periodic Medical Fitness examinations for Seafarers was first published in 1998 and revised in 2013 [3]. Medical certificates for seafarers and fishermen have historically been issued to secure their fitness, to stay safe and healthy, to reduce risks to other crew members, and for the safe operation of their ships which are generally far away from hospitals. Seafarers, have a great inequity in health at work, with a higher risk of overweight, metabolic syndrome, type 2 diabetes and hypertension and a need for accurate early diagnosis and prevention [4–8].

While the objective 100 years ago for the fit-for-duty medical examinations was purely related to the safety of the seafarers and the ships, now the ILO guidelines inspire to include protocols related to the general health of seafarers beyond the fit-for-duty protocol. The focus on early diagnosis of type 2 diabetes and hypertension seems to be a good choice for intervention based on the evidence that pre-hypertension and pre-diabetes can be reversed by non-pharmacological and pharmacological measures [9–11]. One important problem is that urinary glucose has been widely used as a screening tool for diabetes in the fit-for-duty examinations as described in APPENDIX F in the ILO international guidelines. However, due to its low sensitivity, it cannot be recommended as a valid screening test for diabetes [12–14]. In February 2021 the International Maritime Health Association (IMHA), Europeche, and the European Transport Workers Federation (ETF) prompted The Maritime Health Research and Education-Net (Mahre-Net) to address the problems. The objective of this paper is therefore to describe how screening with accurate diagnostic tests for type 2 diabetes and hypertension can be done as an integrated part of the routine fit-for-duty health examinations for seafarers to produce valid data for personal preventive health advice, for research and for more systematic health promotion in the workplaces on board.

MATERIALS AND METHODS

STUDY DESIGN

An integrated health promotion and disease prevention program in the fit-for-duty medical examinations for seafarers together with a “Green Ship” health promotion programme is presented.

The newly-established ‘International Diabetes and Hypertension Research group in seafaring, fishing and transport workers’ consists of specialists in diabetes epidemiology, diabetology, occupational epidemiology, occupational and maritime medicine, cardiology, and public health [15].

The aim of the group is to provide a foundation for safe and healthy preventive strategies within the UN Global Sustainable Goals. Seafarers around the world work under different climate conditions, 12 hours/day 7 days a week, away from home for several months at a time. Hence, seafarers are especially vulnerable compared to most shore workers and may need to be referred to specialists in suspected and confirmed cases of hypertension and/or diabetes. The group discussed the main problems with the diagnostics of diabetes using urine sticks and proposed ways to take adequate scientific-based diagnostics of seafarers in the fit-for-duty examinations with continuous registration of clinical data in the Excel Data Entry Form.

The proposed clinical data registration includes gender, nationality, work function/area on board in fishing and seafaring vessels, height and weight, body mass index, glycated haemoglobin (HbA1c), fasting glucose, waist circumference, blood pressure, smoking, intake of fruit and vegetables (grams) and physical activity. Waist circumference is suggested to be marginally better than body mass index as a surrogate marker for total body fat and can identify thinner people with increased visceral adipose tissue and increased cardio metabolic risk [16]. Waist action levels could be useful for health promotion to raise awareness of the need for weight management [17]. Automatic disease stage classification is added to the Excel spreadsheet for hypertension and diabetes according to the International Society of Hypertension Global Hypertension Practice Guidelines and the American Diabetes Association, respectively [18, 19].

ACCURATE DIAGNOSIS OF TYPE 2 DIABETES IN THE CLINIC

Urinary glucose has been widely used as a screening tool for diabetes since it is non-invasive, cheap and easy to perform. The problem with the low sensibility when using urine sticks for diagnosis of type 2 diabetes has existed for many years, but only recently been discussed in relation to maritime medical health examinations [12, 13].

Since 2011, HbA1c has been used to diagnose diabetes in most countries and replaced blood glucose performed in the fasting state or 2 hours after an oral

Table 1. Clinical variables to be recorded in the Excel file at the fit-for-duty medical exams

Variables	Value labels
1. INF	Informed Consent: Permission to use anonymised data for research: Yes = 1; No = 2
2. AGE	Years of age
3. GEN	Male = 1; Female = 2
4. NAT	Nationality: Own country = 1; Other = 2
5. WOR	Coastal fish bridge = 11; Costal fish not bridge = 1; Deep sea fish bridge = 12; Deep see fish not bridge = 2; Seafarer bridge = 3; Sea-deck = 4; Sea-engine = 5; Diver = 6; Off-shore = 7
6. MED	Taking medicine: No = 1; For diabetes = 2; For hypertension = 3; For both = 4
7. HEI	Cm (no decimals)
8. WEI	Kg (no decimals)
9. WAI	Cm (no decimals)
10. AC1	Glycated haemoglobin: %, 1 decimal
11. FG	Fasting glucose: mg/dL no decimals
12. SYS	Systolic blood pressure (no decimals)
13. DIA	Diastolic blood pressure (no decimals)
14. SMO	Smoker = 1; Non-smoker = 2; Ex-smoker = 3
15. FRU	Fruit and vegetables daily consume: high, small, none
16. PHY	Physical activity, involve all kinds of movement where you become short of breath: high, small, none

glucose tolerance test [20]. The use of HbA1c was made possible after establishment of a reference measurement procedure for international standardisation of routine A1c assays [21]. There were several reasons for this recommendation. HbA1c was already used in clinical practice for decision making on antidiabetic treatment. Compared to glucose measures, HbA1c is stronger associated with most long-term micro- and macrovascular diabetes complications [20]. Measurement variability is negligible (~1%) compared to blood glucose (12–15%) [22]. HbA1c does not require fasting and is obviously less time consuming than the cumbersome oral glucose tolerance test. To be considered, it was recently suggested that HbA1c may underestimate the prevalence of type 2 diabetes when compared with fasting glucose [23].

RESULTS

Table 1 shows the proposed clinical variables to be recorded with some examples of the classification and coding according to the international medical guidelines. Analysis of the epidemiological data will allow for the identification of trends in prevalence of diabetes and hypertension in different levels of severity in the population strata and countries to estimate the development and identify areas for intervention. Early and precise diagnostics contribute to improved clinical performance to start early prevention and thus save quality-adjusted (QALY) living- and working years. The ILO is prompted to include this protocol with Tables 1–3 as supplement to Appendix F in the international guidelines for accurate diagnostics of diabetes, hypertension, medical advice and research. The National Maritime Authorities are prompted to revise the National Medical Certificates for Seafarers as for example the Danish and the Norwegian Forms according to the revised international guidelines [24, 25]. The seafarers' doctors are prompted to adapt the scientific protocol, to use the revised medical certificates and to transfer the data in Excel format to the competent national research institute for data analysis and reporting. The recoded data gives the maritime medical doctors a comprehensive overview of the risk stages for precise medical evaluation, medical dialogue, advice and for research (Excel Data Entry Form; Tables 1, 2).

MEDICAL FOLLOW-UP OF SEAFARERS WITH NEWLY DIAGNOSED TYPE 2 DIABETES

Patients with type 2 diabetes are evaluated and followed up in general practice in accordance with the national, in this case the Danish, common public health portal on the Internet and the Danish College of General Practitioners guidelines [26–29]. At the time of diagnosis and in the future, **at least annually,** an overall assessment is made of the patient's risk profile and relevant treatment needs. Reg-

Table 2. Examples of clinical variables automatic recoded for medical evaluation, personal health advice and research*

FRU	PHY	AGE	WORK	SMO	HTN	DM-HbA1c	DM-FG	BMI	BMI group
600	30	23	Coastal fish	Smoker	Stage 1	Normal	Normal	25.5	Over
600	30	63	Deep sea fish	Smoker	Stage 1	Normal	Normal	23.1	Norm
600	30	48	Sea bridge	Ex-smoker	Stage 1	Pre	Pre	30.5	Obes
600	30	61	Sea deck	Smoker	Normal	Normal	Pre	22.1	Norm
600	30	56	Sea engine	Non-smoker	Stage 1	Normal	Pre	22.2	Norm
600	30	32	Diver	Non-smoker	Normal	Pre	Pre	28.1	Over
600	30	52	Coastal fish	Non-smoker	Normal	Pre	Pre	26.3	Over

Hypertension stage codes (HTN)**	**Systolic [mmHg]**		**Diastolic [mmHg]**
Normal	≤ 130	and	≤ 85
High normal blood pressure (pre-hypertension)	131–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	≥ 160	and/or	≥ 100

Diabetes stage codes (DM)***	**HbA1c limits**	**Fasting glucose limits (en ayunas)**
Normal	≤ 39 mmol/L (5.6%)	≤ 100 mg/dL (≤ 5.5 mmol/L)
Pre-diabetes	39–47 mmol/L (5.7–6.4%)	100–125 mg/dL (5.6–6.9 mmol/L)
Diabetes	≥ 48 mmol/L (6.5%)	≥ 126 mg/dL (≥ 7.0 mmol/L)

*Automatic recoded values based on the variable examples in Table 1 and the Excel Data Entry Form

**International Society of Hypertension Global Hypertension Practice Guidelines https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.15026

***American Diabetes Association https://www.diabetes.org/diabetes/HbA1c/diagnosis

ular check-ups according to the guidelines given in the national scientific societies clinical guidelines is a cardinal point in care (Table 3). The general practitioners and the diabetologists will take the **seafarers specific situation** in consideration at the checks:

- **annual checks** to track and follow the development of any diabetic complications and adjust the individual treatment plan;
- **intermediate checks** (typically every 3–6 months) to monitor whether the individual therapeutic goals are achieved in terms of diet, weight, exercise and other healthy lifestyles as well as blood sugar, blood pressure and lipids, and if necessary, adjust the treatment and/or goals;
- **self-monitoring of blood glucose for seafarers with type 2 diabetes is necessary.**

Instructions and relevant equipment in the medical chest on board are needed and proposed added to the actual revision of the International Medical Guide for Ships. A few crewmembers on board shall know how to measure blood glucose and to treat severe hypoglycaemia using intramuscular glucagon, which must be present on all ship chests. Request that equipment for self-control of type 2 diabetes should be in the Ships Medical Chest.

Compared to shore workers, seafarers are, due to their long-term stay away on the ships, socially vulnerable type 2 diabetes patients with a need for special attention, as described by Rogvi et al. [30]. If a person with diabetes develops any kind of diabetic complication, he or she should be referred to a specialized diabetes clinic if possible.

MEDICAL FOLLOW-UP OF SEAFARERS WITH NEWLY DIAGNOSED HYPERTENSION

Measuring blood pressure is one of the most common procedures performed at a medical office. For the accurate diagnosis and management of blood pressure, proper methods are recommended to be used [31]. Accurate measurement of blood pressure is essential to classify individuals, to ascertain blood pressure-related risk, and to guide management. A recognised automatic blood pressure measurement apparatus should be used [32]. Three measurements should be carried out by the examining physician while the person is in a seated position. In the 30 minutes before the blood pressure is taken, there should be no smoking, no caffeine nor exercise. In the 5 minutes before the blood pressure is taken the person should sit still.

Table 3. Danish College of General Practitioners (DASAM) type 2 diabetes follow-up checks*

	Diagnosis	Intermediate checks	Annual checks
Self-care in general	•		•
Objectively:			
Weight	•	•	•
Blood pressure	•	•	•
Foot examination	•		Possibly
Electrocardiogram (ECG)	•		Possibly
Biochemistry:			
HbA1c	•	•	•
Lipid status	•		•
S-creatinine/estimated glomerular filtration rate	•		•
Urinary albumin-creatinine ratio	•		•
Conversation about living conditions and work factors:			
Smoking status	•	•	•
Exercise habits	•	•	•
Diet/alcohol	•	•	•
Psychosocial support working condition **on board**	•		•
Insulin treatment: **home**/**on board** glucose measurement		•	•
Complication status	•	•	•
Medication review	•		•
Treatment goals	•	•	•
Other actions:			
Referral to patient-oriented teaching in the/hospital	•		•
Referral to podiatrist	•		•
Referral to dietitian	Possibly	•	Possibly
Eye examination	•		•
Dentist	Possibly		Possibly

*https://vejledninger.dsam.dk/media/files/4/type2-ark1.pdf

During the assessment of blood pressure it is necessary to make sure the cuff is of the right size and in the right place, the cuffed arm should be placed on a flat surface, like a table, and at heart level. The person should sit upright, with feet flat on floor and without having a conversation [33].

AVOID FOLLOWING

— Putting the cuff over clothing, rather than a bare arm, can add 10–40 mmHg to a measurement [34];
— Having a full bladder can raise the blood pressure with 10–15 mmHg;
— Talking or having a conversation can raise the blood pressure an additional 10–15 mmHg;
— Failing to support the arm at heart level can raise the blood pressure 10 mmHg;
— An unsupported back can increase a measurement by 5–10 mmHg. That same range applies to feet left dangling from an exam table or high chair;
— Crossing legs can raise the blood pressure 2–8 mmHg.

REFERRAL OF HYPERTENSIVE SEAFARERS TO HYPERTENSION CLINICS?

Compared to shore workers, seafarers are socially vulnerable with a need for special attention and may need to be referred to a hypertension clinic [35, 36]. A referral may also be relevant for providing instructions for self-hyperten-

sive control on board and at home. Automatic referral was made for newly diagnosed grade 1 hypertensive patients for further one-to-one dietitian counselling (on top of primary care physician's usual care). The findings did not support automatic referral of newly diagnosed grade 1 hypertensive patients [37].

MEASURE BLOOD PRESSURE ON A REGULAR BASIS ON BOARD AND AT HOME

Because high and elevated blood pressure often occurs without any symptoms, checking blood pressure is the only way to know for sure whether it is too high. It is important to measure blood pressure in seafarers who are being treated for high blood pressure. At least two automatic apparatus should be available on all ships in the event that one of the devices breaks [38, 39].

All seafarers can measure their blood pressure at home and at sea with a home blood pressure monitor. They can learn steps to lower the risk for health problems from high blood pressure such as heart disease and stroke. Instructions and the relevant equipment in the Ships Medical Chest on board are required [39]. In addition, courses are needed for the seafarers and the medical doctors as well as revisions of the International Medical Guide for Ships are on the way.

DISCUSSION

This is the first known attempt to introduce a permanent programme with Public Health science into maritime medicine combined with the seafarers' fit-for-duty health examinations. So far, the gold standard for fit-for-duty maritime health examinations does not include health promotion [40]. No attempts have been done to create a scientific protocol to combine fit-for-duty health examinations and scientific based health promotion projects, which is the aim here. With the increasing prevalence of non-communicable diseases and the low success rate for health promotion projects on board, there is a strong need to apply permanent Public health interventions in shipping [41, 42].

A focus on early and accurate screening for type 2 diabetes mellitus and hypertension seems to be cost-effective [43–47]. Sustainability is obtained by having seafarers coming biannually for medical examinations, anyway as a permanent intervention. Medical doctors' health dialogues with the seafarers during fit-for-duty examinations and the on-board health promotion initiatives to help for prevention and reversion of pre-diabetes and pre-hypertension (Fig. 1).

"GREEN SHIP" HEALTH PROMOTION FOR ALL CREW MEMBERS

Crew members generally span all age groups with increasing prevalence of overweight, dyslipidaemia, obesity hypertension, and diabetes by increasing stages of development with age (Fig. 2). Early diagnostics and starting prevention is important in all age-groups as the risk factors for development of type 2 diabetes and hypertension develop with age across the lifespan for all crew members (and not only for those with the diseases). All crew members have the potential to develop these diseases and there is a need for continuous education on prevention to benefit from an overall prevention strategy culture for all age-groups. So, the preventive efforts should not be reserved for diagnosed seafarers, but should be extended to the entire crew. There is a need for ideas and studies on how to develop and implement a structure of sustainable "green" scientific-based health promotion systems for all crew members and all stakeholders [48].

To build a global preventive culture at the workplace, the ILO recommends education and training not only for the workers but for all stakeholders [49]. A question may arise, how the shipping leaders can help to promote mental health, physical activity and reduced boredom on board that potentially can affect the health of the seafarers. For example, to make it easier to add physical activity to the daily routines it is necessary to provide the needed time and access to on-site gyms and walking paths, thus creating a culture of health in the workplace, something similar to the inspiring German e-healthy ship project [50, 51].

A supportive healthy environment includes opportunities for all crew members with and without a diagnosis for allowance during their workdays for relevant work breaks, restroom visits, access to nutritious meals in good social company; access and time to physical activity in the mornings and middle of the days without fatigue. It is a problem that the basic education for seafarers and the managers does not include how to implement health promotion culture. Thus, there is a need for health promotion training besides the basic education for maritime doctors, seafarers, fishermen, maritime authorities, maritime universities, shipping companies and research institutes [52].

PREVENTIVE INTERVENTIONS

Continuous education, course activities, collection and analysis of scientific data are the core issues. Educational materials for seafarers, cooks, navigators, and other crew members on how to manage hypertension and type 2 diabetes on board will be developed. National research groups will produce and disseminate teaching materials, offer education, and conduct pilot testing of on-board health protocols in coordination with the international research group. Epidemiological and qualitative studies are needed to clarify how crew members keep their work and good health with well-treated hypertension and diabetes. The ILO is prompted to add the diagnostic protocol

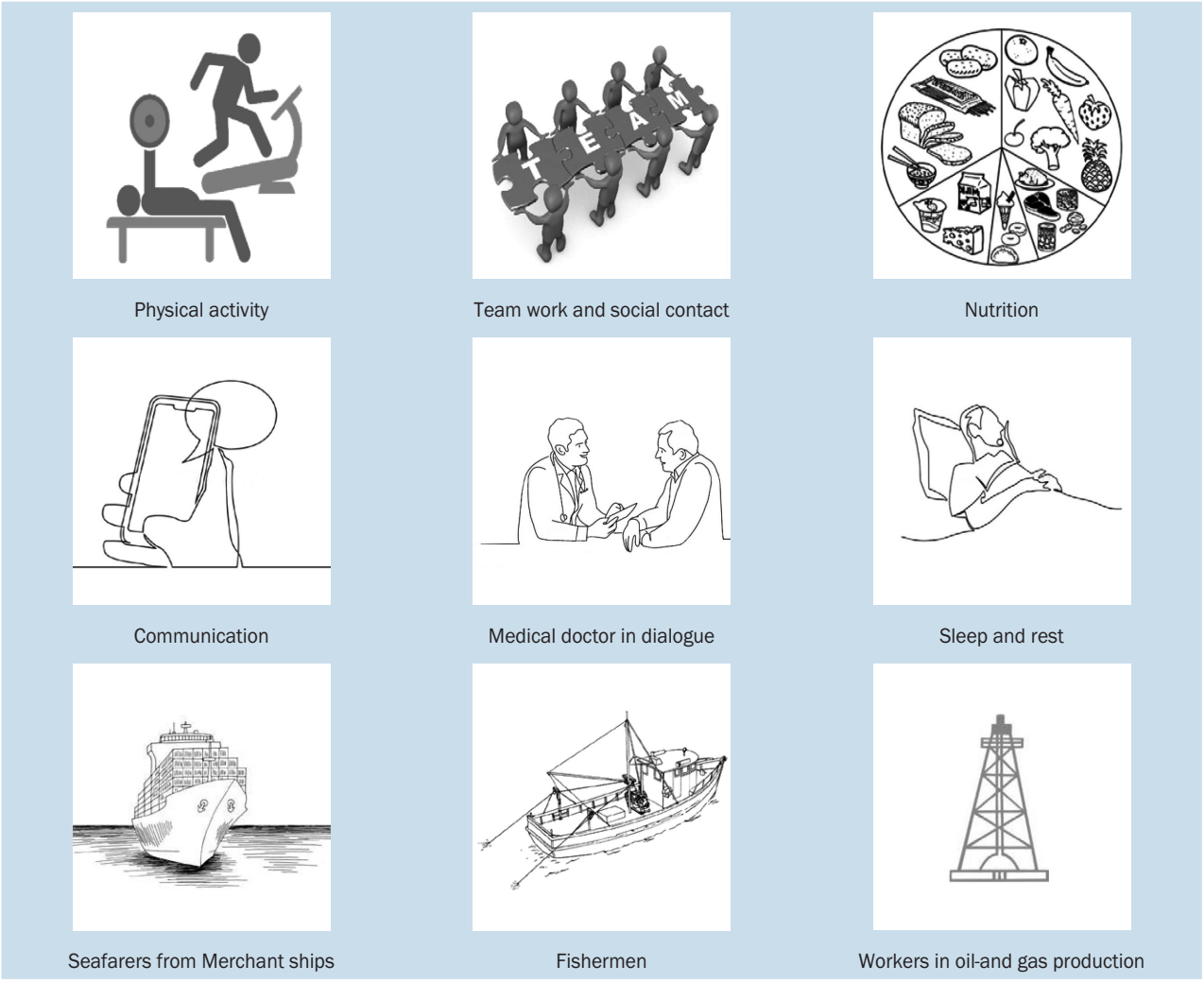

Figure 1. Maritime medical doctors are prompted to go into dialogue in the clinical fit-for-duty medical examinations with the seafarers on the personal health risk management related to the ongoing health promotion programs on the ships.

1	8%	14%	12%	11%	10%	11%	13%	11%	7%	3%
2	≤ 24	25–29	30–34	35–39	40–44	45–49	50–55	55–59	60–64	65+
3	Stage of susceptibility			Stage of subclinical disease			Stage of clinical disease		Stage of recovery or disability	
4	Normal			Pre-diabetes/pre-hypertension			Diabetes/hypertension		Treatment continues	

Figure 2. Age groups of merchant seafarers and the presumed age-related disease development. Rows 1–2 shows the distribution of the proportions (%) in each age group of merchant fleet seafarers based on data from Seamen Registry of Latvian Maritime Administration 2013 (reproduced from: Gailitis R. Assessment of contribution of maritime education institutions in Latvian seafarers pool. J Marit Transp Eng. 2013; 2: 4–12). Rows 3–4 indicate the natural history of hypertension and diabetes mellitus development in an individual over the ages, in the absence of intervention, adapted from the United States Centres for Disease Control and Prevention principles of epidemiology (Principles of epidemiology; an introduction to applied epidemiology and biostatistics [Internet]. Available from: https://stacks.cdc.gov/view/cdc/11200 [cited 2022 Feb 14]).

to their guidelines for fit-for-duty medical exams. Shipping companies, seafarers, and maritime medical doctors will develop, and pilot test the "Green Ship" health promotion for all on board. The German e-healthy ship is an example of an inspiring new-thinking in this area [50, 51, 53]. Health promotion protocols for hypertension and diabetes with non-pharmacological and/or pharmacological management will be developed. Consensus meetings within the International Research Group for hypertension and Diabetes will decide which variables as a minimum are relevant for

international research collaboration. The maritime medical doctors are prompted to use health dialogues with the seafarers and to hand out further information with invitation to complete one of the Mahre-Net health questionnaires. Interview schemes in the maritime clinics need to be updated according to the protocol. Online training courses need to be developed and implemented for the stakeholders. The process will be a success when some ship owners, the seafarers and the medical doctors adopt the proposal even before the new protocol is implemented officially by the ILO and the National Maritime Authorities. In contrast to the few previous maritime health intervention studies conducted with poor results, this is a permanent intervention, to be successful over time [41, 42].

CONCLUSIONS

The ILO and the National Maritime Authorities are prompted to revise the International and the National Guidelines for Seafarers Medical Examinations, respectively with the scientific protocol. Seafarers' doctors are encouraged to align to the screening programme as part of the fit-for-duty health examinations and to use "health dialogues" with the seafarers. The researchers go in dialog with the stakeholders for planning of the "Green Ship" implementation. Random samples of the seafarers will complete questionnaires to evaluate the interventions. The "first movers" will be pioneers, starting to collect scientific data and paving the way for a permanent evidence-based health promotion in maritime medicine. The project connects well with the following Sustainable Development Goals: 3: Good health and well-being for all workers; 4: Quality education; 8: Decent work and economic growth; 10: Reduction of inequity; 17: Partnerships to achieve the goals with the primary tasks.

Conflict of interest: None declared

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Bed bugs on ship: a French review

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ABSTRACT

Background: *Linked to the increase in international travel and development of insecticide resistance, a resurgence of bed bug infestation has been observed since the 2000's and become now a worldwide public health problem. Passenger ships as part of the tourism industry are traditionally infested by bed bugs, but the whole maritime world is now concerned.*

Materials and methods: *We conducted a short questionnaire-survey among the 22 doctors of the French seafarers' health services to assess the level of this phenomenon in the occupational maritime environment.*

Results: *Twenty seven per cent of the doctors reported that a patient shared to them a bed bug infestation on board. In that case, all declared that the infestation impacted the patient's life on board. Eighteen per cent responded that a shipowner had already sought their support in face of a bed bug infestation. Lastly, 27% considered that bed bug infestation is an increasing problem.*

Conclusions: *Bed bugs infestation on board has a major impact on the seafarers and passengers, and significant economic consequences. Preventive measures need to be implemented to limit the risks of dissemination. It is essential to inform and educate seafarers on best practice.*

(Int Marit Health 2022; 73, 2: 73–76)

Key words: bed bug, ship, seaman, pest control, prevention, naval medicine

INTRODUCTION

The bed bugs are hematophagous arthropods from the Cimicidae' family gathering two species: the common bed bug, Cimex lectularius, and the tropical bed bug, Cimex hemipterus. They feed on vertebrates' blood and grow from an off-white larva of 1 mm to, at the adult stage, a red brownish ovoid insect who measures between 5 to 7 mm long. The growth is delayed by cooler temperatures or the lack of food. Their lifetime is usually 4 to 5 months, but they can survive 2 years without feeding [1].

Their bites are painless, with variable response from no reaction to papular urticaria or systemic reactions [2, 3]. Skins lesions generally resolve within a week, and are usually treated by antihistamines, topical and/or systemic corticosteroids. If scratched and not treated, chronicity or superinfection can appear. Then, topical or systemic antibiotics should be discussed [4]. Actually, there is no evidence of pathogen transmission from bed bugs to humans [4, 5].

Due to their limited size and photophobia, the bed bugs are difficult to detect since during the day, they hide in dark places such as baseboards and furniture, especially bed bases and mattresses or those made in fabric, paper, and wood. At night, they are attracted by the carbon dioxide exhaled and the body heat and attack preferentially humans. Deprived of wings, they are enable to fly or jump [2] and are usually conveyed on board by passengers and seafarers' luggage and others belongings.

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Table 1. Results of the questionnaire

Questions	Yes	No
During consultation, did a patient shared to you a bed bug infestation on board?	6 (27%)	16 (73%)
If so, did he tell you that the infestation had an impact on life on board?	6 (27%)	16 (73%)
Has a shipowner already sought your support in face of a bed bug infestation?	4 (18%)	18 (82%)
Do you consider that bed bug infestation is an increasing problem?	6 (27%)	16 (73%)

After a phase of decline from the fifties to the nineties, the limitation of the use of human toxic pesticides and the development of resistance did provoke the reemergence of the bed bug [5, 6]. Resistances to dichlorodiphenyltrichloroethane, carbamate insecticides, organophosphates and pyrethroid insecticides are now described [7–11]. The problem has been enhanced by the increase in international travel and is now a worldwide problem [12, 13].

Diversification of infested sites, with prevalence for the tourism industry and private homes, are one of major consequences of the resurgence of bed bugs [3, 14]. As an international mode of transportation, ships have always been a means of dissemination for infectious agents and their vectors [15, 16] such as bed bugs.

Several ship passengers [17–19] and even submarine vessel cases [20] with description of bed bugs infestation have been published in the grey literature, but we only found one scientific article about bed bug and ship. In 2008, Mouchtouri et al. [21] realised a surveillance study about vector species on 21 passenger ships. Three were infested by bed bugs.

To date and to our knowledge, there is no specific recommendation or guidelines for the ships from scientific or governmental structures. However, many passenger ships have well developed Integrated Pest Management systems with training courses for staff members and protocols on insect or rodent infestation management [15]. Moreover, the guide for ship sanitation published by the World Health Organization provides standardised sanitary measures to prevent the spread of diseases agents and their vectors and to respond appropriately in case of outbreak [22].

The aim of our study is to assess reemergence of bed bug in the maritime world.

We held a questionnaire-survey among the physicians of the French seafarers' health services.

MATERIALS AND METHODS

In France, the medical follow-up of seafarers is ensured by a specific occupational medicine department under the supervision of the French Ministry of Transportation. It gathers 22 occupational physicians in local units along the French coast.

To evaluate physicians' knowledge and opinion concerning the bed bug reemergence, we created on Google Forms, a questionnaire survey including five questions:

- During consultation, did a patient shared to you a bed bug infestation on board?
- If so, did he tell you that the infestation had an impact on life on board?
- Has a shipowner already sought your support in face of a bed bug infestation?
- Do you consider that bed bug infestation is an increasing problem?
- Do you have any comments?

The responses to the survey were collected from December 2021 to January 2022.

RESULTS

All physicians included answered to the questionnaire. The results are presented in Table 1.

Twenty seven per cent of the physicians reported that a patient shared to them a bed bug infestation on board. In that case, all declared that the infestation impacted the patient's life on board. Eighteen per cent answered that a shipowner already sought their support in face of a bed bug infestation. Lastly, 27% considered that bed bug infestation was an increasing problem.

The comments raised questions over the environmental treatment to eradicate a bed bug infestation and revealed that the French seafarers' health service's physicians are concerned by an eventual risk that bed bugs could be vectors of infectious disease. One of the participants noted that he had to take over bed bugs' infestation twice this year whereas he had never heard of this problem during his entire career. Another physician declared that the problem is underestimated, especially among the fishermen. A comment explained that shipowners rely on private specialized companies to treat bed bug infestations.

DISCUSSION

Our survey showed that bed bugs infestation is a growing issue for French seafarers. While the frequency of infestations appeared still limited, the occurrence of bed bugs has a major impact of board. Ships are occupational and living spaces altogether. Limited living spaces increase

the impact of bed bugs outbreaks, as confirmed by physicians' statements. For example, with a limited number of rooms and beds, it is impossible to avoid their use by ship crews. Moreover, sleep disturbances due to the itching and the anxiety associated to bed bugs bites [8, 23] could lead to professional misconducts and mistakes.

Bed bugs infestations could have relevant economic consequences and are bad press in the tourism industry. However, few shipowners called the French seafarers' health service's physicians on this issue. As expressed by one of the occupational physicians, the bed bugs infestations are probably underestimated.

The limitation of our survey is essentially the bias of selection and declaration, not allowing us to generalise our results.

To prevent infestation, early identification of the insect is primordial, information and education of seafarers especially cruise ship staff are the main relevant axis to develop [3]. In 2014, a survey on the working practices of private- and public-professionals sector in France reported that workers mainly rely on the observation of bed bugs, bed bugs faeces and blood stains on sheets [13].

To limit hiding places for bed bugs, a limitation of furniture and more regularly using plastic items are recommended. Sealing cracks and crevices also limit the non-reachable areas [14].

The first stage of nonchemical control is to dispose of the infested items. When possible, using sealed plastic to avoid spreading during the transportation. Seagoing staff should carefully clean the furniture with vacuum and steam (above 60°C [140°F]). The vacuum cleaners need to have a disposable bag, removed in a sealed bag after use [14]. All the laundry should be washed at 60°C (140°F).

In case of a proven infestation (30 or more bed bugs), an intervention of specialised professionals is needed for a two-sequence treatment with pyrethroids, insect growth regulators or silicates.

CONCLUSIONS

The resurgence of bed bugs is a public health problem reaching the maritime world. Our survey confirms that bed bugs infestation has a major impact on ship. Implementation of relevant preventive measures to limit the risks of dissemination and education of seafarers on good practices are needed.

Conflict of interest: None declared

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VIA MEDICA

CASE REPORT

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Reactivation of hepatitis B virus infection in a seafarer: an omitted problem of maritime medicine

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ABSTRACT

Infection with hepatitis B virus (HBV), despite the implementation of extensive preventive measures, has remained one of the biggest health problems worldwide. There are still people not covered by the compulsory vaccination programme and carriers of an actively replicating virus among professionally active seafarers. The article is based on a case report of a seafarer with life-threatening reactivation of long-term uncontrolled HBV infection that resulted in decompensated cirrhosis and liver transplant. The case shows clinical aspects of chronic hepatitis B and contributes to discussion about HBV infection with regard to seafarers. The article also analyses the current legal regulations and guidelines in terms of preventing new infections and detecting people already infected with HBV. Considering the specific nature of work on seagoing ships, it is justified to recognise the seafaring as a profession with a high risk of HBV infection. Monitoring the course of the disease can prevent reactivation of inflammatory process and serious consequences of chronic hepatitis B during a cruise. The elementary issue is specific prophylaxis, that is, covering the unvaccinated persons with the vaccination programme. The prevalence of HBV infection and the specifics of the seafarer labour market require development of new international regulations, which will unify Pre-Employment Medical Examination (PEME) protocols and take into consideration compulsory vaccination.

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Key words: hepatitis B, seafarers, chronic hepatitis, hepatitis reactivation, maritime medicine, epidemiology, vaccination

INTRODUCTION

Infection with hepatitis B virus (HBV), despite the implementation of extensive preventive measures, including immunisation, has remained one of the greatest global public health problems for decades [1, 2]. Although the epidemiological situation worldwide has improved significantly, there are still people not covered by the compulsory vaccination programme and carriers of an actively replicating virus among professionally active seafarers. This creates the problem of providing these people with necessary, appropriate care, regular monitoring the course of the disease, qualifying for antiviral treatment and assessing their fitness for work on sea-going ships.

Chronic hepatitis B (CHB) develops in about 5% of adult patients infected with the virus, and many of them do not develop acute hepatitis [1, 3]. A characteristic feature of the disease is its phases which reflect the changing relationships between the immune system and the virus [4]. This is expressed by the presence or absence of HBV antigens (HBsAg, HBeAg–), specific antibodies and fluctuations of

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HBV viral load. In individual periods, the degree of inflammation activity varies from the high replication phase with high viral load to latent infection in which HBV-DNA is practically undetectable. The situation in which the virus replicates again and the concentration of HBV-DNA increases significantly is called reactivation [3, 4]. Recurrence of viral replication may finally result in significant, clinical deterioration of liver function. Chronic HBV infection is frequently asymptomatic for many years or produces mild, non-specific symptoms, such as fatigue or depressed mood. In chronic active hepatitis necroinflammatory changes in liver parenchyma with progressive liver fibrosis lead to the development of irreversible liver cirrhosis, which in many cases is the first clinical manifestation of the disease. Another consequence of chronic HBV infection is the increased risk of hepatocellular carcinoma, which remains greater than in the general population even after successful treatment [1, 3–5].

Nowadays, antiviral therapy is available for CHB patients and the eligibility criteria for treatment are strictly defined. CHB infections can be treated with interferon alpha (IFNα, currently pegylated — PegIFNα) or nucleos(t)ide analogues (NAs) such as entecavir or tenofovir. Antiviral agents suppress HBV replication and, consequently, they can slow the liver fibrosis, reduce incidence of hepatocelullar carcinoma and improve long term survival. Although effective treatment may protect against serious complications of CHB, complete eradication of the HBV is not possible. The virus remains in the hepatocytes in the episomal form of DNA — covalently closed circular DNA (cccDNA), which can in some circumstances cause HBV reactivation (HBVr) [4–6]. Below we present a case report of a seafarer with HBVr who developed liver failure requiring liver transplantation.

CASE REPORT

A 61-year-old man was admitted to the Department of Tropical and Parasitic Diseases due to the exacerbation of CHB. The patient was a professionally active chief officer working on cargo ships. He did not report any past medical history except HBV infection. He consumed alcohol occasionally and had never taken immunosuppressant for any reason. HBV infection (HBsAg+) was diagnosed about 40 years earlier, but the patient was not under medical care despite the diagnosis. He has never been referred to an outpatient infectious diseases clinic for further observation and treatment. No clinical assessment of indications to perform more detailed laboratory and imaging examinations was performed. For several months, a gradual deterioration in the patient's health and elevated activities of alanine aminotransferase (ALT) were observed, with a marked increase 2 months before admission to hospital (ALT 1128 U/L). Based on medical history no factor has been identified as a trigger for this increase.

On admission, the patient was in a fair general condition. He complained of weakness and easy fatigue, flatulence, and lack of appetite. The physical examination revealed intense yellowing of the skin and sclera; the abdomen was soft and distended, the liver was not palpable; there were no signs of shock or peritonitis. The patient was confirmed to be infected with HBV; high viral load was found — HBV DNA 2.87×10^6 IU/mL. The infections with other hepatotropic viruses such as: hepatitis A, hepatitis C, hepatitis D, cytomegalovirus, Epstein-Barre virus and human immunodeficiency virus were excluded as well as toxic damage to the liver. The results of other laboratory tests are presented in Table 1.

The abdominal ultrasound showed a liver of normal size and echogenicity, a contracted gallbladder containing a stone of about 10 mm, a non-dilated common bile duct and intrahepatic bile ducts, a homogeneous, enlarged spleen of 127 mm in length, and enlarged prostate gland. No other abnormalities were found.

The patient was treated symptomatically and, after exclusion of any HBV drug resistance, antiviral therapy with Entecavir was initiated. As a result, a decrease in the activity of transaminases was observed, with a persistently high concentration of bilirubin and an increase in prothrombin time given in international normalized ratio (INR) — data are presented in Figure 1.

Despite the treatment, the patient's condition deteriorated. Significant weakness, loss of appetite, itching of the skin and jaundice persisted. Additionally, there were symptoms of haemorrhagic diathesis (nosebleed, bleeding into the right conjunctival sac) and ascites. The patient remained in full verbal and logical contact, but reported problems related to sleepiness and flapping tremors.

Additional studies included:

- In abdominal computed tomography scan, the liver was not enlarged, hypodense, with relatively larger left and caudate lobes — monitoring for cirrhosis indicated. There was free fluid in the peritoneal cavity — perihepatic fluid; however, due to a small amount of fluid between intestinal loops and in the pelvis minor its aspiration for laboratory examinations was not possible. The spleen was enlarged 155 × 55 × 73 mm; two additional spleens were observed. In addition, a small amount of fluid was found in the pleural cavities;
- Doppler ultrasound showed a slightly higher hepatic artery resistance index, without any abnormalities in hepatic blood flow;
- Gastroscopy revealed signs of erythematous gastropathy.

In the following days of hospitalisation, there was an increase in ascites with hyponatremia 124 mmol/L, deterioration of kidney function with an increase in creatinine concentration to 1.34 mg/dL. Due to the increasing pa-

Table 1. Laboratory test results at admission

Parameter	Results	Normal range
Alanine aminotransferase (ALT)	261 U/L	< 45 U/L
Aspartic aminotransferase (AST)	333 U/L	< 35 U/L
Ammonia	53 µmol/L	18–72 µmol/L
α-fetoprotein (AFP)	128.37 IU/mL	0–7.29 IU/mL
Total bilirubin	32.1 mg/dL	0.3–1.2 mg/dL
Alkaline phosphatase (ALP)	145 U/L	40–150 U/L
γ-glutamyltransferase (GGT)	133 U/L	11–59 U/L
International normalized ratio (INR)	1.36	0.8–1.2
Creatinine	0.71 mg/dL	0.6–1.3 mg/dL
Haemoglobin (Hg)	12.4 g/dL	14–18 g/dL
Leukocytes	9.41 G/L	4–10 G/L
Platelets (PLT)	262 G/L	150–450 G/L
Albumin	28 g/L	32–46 g/L
Fasting glucose	100 mg/dL	77–99 mg/dL
Natrium	133 mmol/L	136–145 mmol/L
Kalium	4.1 mmol/L	3.5–5.1 mmol/L

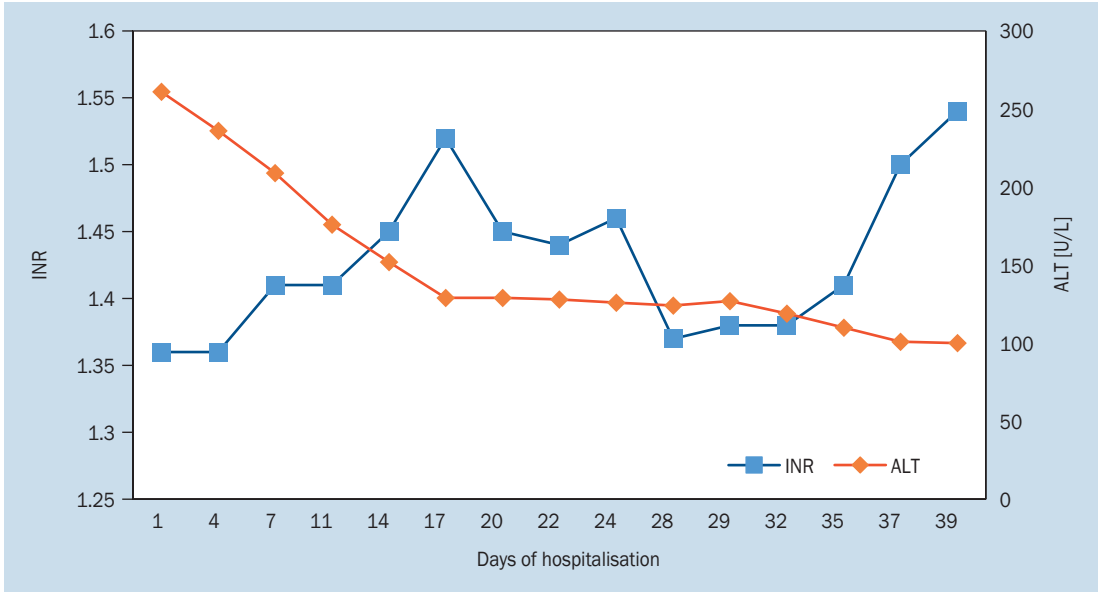

Figure 1. Changes in alanine aminotransferase (ALT) and international normalized ratio (INR) levels during hospitalisation

rameters of inflammation, antibiotic therapy was used. Selected results of the tests at the end of hospitalisation are presented in Table 2.

In follow-up examinations, a significant reduction in viral load (HBV DNA 589 IU/mL) was observed. The assessment of drug resistance using HBV DNA assay showed that the HBV strain was fully susceptible to antiviral drugs. The patient's MELD score was 32. After 6 weeks the patient was transferred to the Department of Liver and Internal Medicine Unit, Department of General, Transplant and Liver Surgery in Warsaw where he was qualified to liver transplantation and underwent this procedure successfully.

Currently the patient remains under the care of the liver transplant and infectious diseases outpatient clinics on

Table 2. Selected results of laboratory tests at 5 weeks of hospitalization

Parameter	Results	Normal range
Alanine aminotransferase (ALT)	101 U/L	< 45 U/L
Aspartic aminotransferase (AST)	178 U/L	< 35 U/L
Ammonia	39.6 µmol/L	18–72 µmol/L
α-fetoprotein (AFP)	8.82 IU/mL	0–7.29 IU/mL
Total bilirubin	26.43 mg/dL	0.3–1.2 mg/dL
Alkaline phosphatase (ALP)	166 U/L	40–150 U/L
γ-glutamyl transferase (GGT)	89 U/L	11–59 U/L
International normalized ratio (INR)	1.54	0.8–1.2
Creatinine	1.44 mg/dL	0.6–1.3 mg/dL
Haemoglobin (Hg)	10.4 g/dL	14–18 g/dL
Leukocytes	14.4 G/L	4–10 G/L
Platelets (PLT)	150 G/L	150–450 G/L
Albumin	25 g/L	32–46 g/L
Fasting glucose	90 mg/dL	77–99 mg/dL
Natrium	125 mmol/L	136–145 mmol/L
Kalium	4 mmol/L	3.5–5.1 mmol/L

continuous, fully effective antiviral treatment with entecavir and his clinical condition is stable and good.

DISCUSSION

It is estimated that over 240 million people worldwide are chronically infected with HBV, with the highest prevalence of infection in low socioeconomic countries, i.e. Southeast Asia, Western Pacific Region and Africa, where the percentage of infected people in the general adult population reaches 6.2% [1, 2, 4]. Globally, viral hepatitis led to 1.34 million deaths in 2015, most of them (96%) were caused by untreated long-term complications, such as cirrhosis (720,000 deaths) and hepatocellular carcinoma (470,000 deaths) [1–5]. This number was comparable with the number of deaths from tuberculosis and higher than those caused by HIV. Worrying is the fact that, while the mortality due to tuberculosis and HIV is declining, the mortality of viral hepatitis is still increasing over the years [1, 2]. The cited data shows that hepatitis B infection remains one of the biggest health problems worldwide.

Data on work on seagoing vessels indicate an increased risk of HBV infection among seafarers who are employed in regions with high prevalence of the virus. Moreover, the increase in risk is not only associated with being ashore, but may also result from the specificity of this profession and the employment structure on board the ship. Sea shipping is an industry of global nature, and the ship-owners, driven by low employment costs, are looking for workers in the most remote parts of the world [7, 8]. Statistics show that the seafarers' labour market is dominated by Filipinos, who constitute up to 80% of all employees [7, 8]. Interestingly, the Philippines is the country with one of the highest rates of HBV infections in the world, where 16.7% of the general adult population are HBsAg positive, which corresponds to 7.4 million chronically infected people [9].

Working on seagoing vessels is related with exposure to extremely parlous conditions. Despite advances in injury prevention in recent decades, seafaring remains one of the most dangerous occupations over the world, which could lead to occupational accidents, such as injuries, falling, being struck by heavy seas on deck [10, 11]. Taking into account significant infectivity of HBV, hazardous working conditions and potential risk of contact with blood seafarers should be qualified as a profession at high risk of exposure to HBV infection. This means that relevant regulations and procedures are required in Pre-Employment Medical Examination (PEME) [12] including detection of infected people and specific prevention of new cases, as well as post-exposure prophylaxis on board.

Protocols for PEMEs developed by national maritime organizations or private shipping companies are based on guidelines published by the International Labour Organization (ILO) and the International Maritime Organization (IMO) [12, 13]. ILO/IMO guidelines do not recommend any routine laboratory tests for seafarers, although they are widely used in practice [12, 13]. This shows the need of finding consensus between organizations and local authorities for unified PEME protocol. The problem of detection and

prevention HBV infection should not be omitted in such a discussion. Nevertheless, most of the seafarers come from developing countries with high prevalence of HBV (e.g. China, the Philippines, Indonesia, the Russian Federation, Ukraine) [2, 7]. What is more, ILO/IMO guidelines do not mention any obligatory vaccinations for seafarers [13]. Considering the nature of the work on the seagoing ships and epidemiology of HBV and other infectious diseases, it seems to be serious oversight.

The epidemiological situation of hepatitis B has been systematically improving for many years. As a result of the introduction of the universal immunisation programmes from 1980s to the early 2000s and the improvement of the standards of medical procedures, the number of cases and the incidence of hepatitis B decreased significantly [2, 14]. The Word Health Organization (WHO) recommends vaccination against HBV for all infants within 24-hours after birth, followed by 2 or 3 doses to complete the series. According to latest WHO estimates, in 2019 coverage of three doses reached 85% worldwide and the proportion of children under 5 years of age chronically infected with HBV dropped down under 1% from around 5% in the pre-vaccine era [2, 14]. Universal hepatitis B immunisation programmes that target infants, with the first dose at birth, have been highly effective in reducing the incidence and prevalence of hepatitis B in many endemic countries. However, these programmes will not have an impact on HBV-related deaths until several decades after their introduction [14].

The WHO recommends vaccination against hepatitis B to people who are particularly vulnerable to infection, but does not list seafarers working on seagoing vessels in this group, as is the case with health care workers [2, 14]. As indicated by analyses of epidemiological data, specific prophylaxis and an increase in the percentage of vaccinated people result in a significant reduction in HBV infections [15]. This confirms the need to vaccinate the population of seafarers who were not covered by the universal hepatitis B immunisation programmes. Here is the role of the doctors assessing seafarer's fitness for work at sea, who should advise vaccinations for workers including not only hepatitis B, but also other vaccinations recommended for travellers. It seems to be justified that the provision on compulsory vaccination should be included in ILO/IMO guidelines and in the national relevant regulation on health conditions required from seafarers.

Chronic hepatitis B reactivation occurs most often in the course of immunosuppressive therapy, biological therapy or antitumor chemotherapy; however, spontaneous reactivation without any apparent reason is also possible [3] — as in the case described above. Given the lack of specific symptoms indicative of active HBV replication, it is possible that inflammation may reactivate during a deep-sea voyage. As the example of our patient shows, the development of full-blown liver failure may occur in a relatively short time. Seafarers often work on seagoing ships for many months, also in hazardous places, without access to qualified healthcare. This poses a risk of reactivation of hepatitis B and the development of liver failure during the cruise without the possibility of obtaining adequate medical intervention.

The serious consequences of hepatitis B indicate the importance of the diagnosis and treatment of HBV infection. The confirmed presence of the HBsAg surface antigen is the basis in the diagnosis of infection, but it should be remembered that in the case of seroconversion in the HBs system, the antigen may be undetectable [1, 4, 16]. Therefore, additional determination of anti-HBc antibodies is justified, thanks to which we are able to identify people with the so-called latent HBV infection, also prone to reactivation of the inflammatory process. It should be remembered that hepatitis B vaccination in this group of patients is not effective and it does not prevent from HBVr [1, 4, 15]. It is also important to avoid the term "chronic carrier" when referring to people infected CHB, since it may cause misconception that latent HBV infection has no serious consequences. Recent studies have focused on the new biomarkers, such a HBV core-related antigen (HBcrAg), which can be helpful in identifying patients with transcriptionally active cccDNA [16]. In the near future it may be a very useful tool in identifying people especially prone to HBVr. Moreover, the detection of HBV-DNA levels has become a fundamental practice for establishing the extent of viral replication and guiding the start of therapy [16].

CONCLUSIONS

Taking into account the specific nature of work on seagoing ships, it is justified to recognize the seafaring as a profession with a high risk of HBV infection. This statement should be followed by activities aimed at preventing new infections, detecting people already infected in order to qualify them for potential antiviral treatment. Monitoring the course of the disease can prevent reactivation of inflammatory process and serious consequences of the chronic hepatitis B during a cruise. The lack of this type of action has led to liver failure and transplantation in the seafarer described in the case report. The fundamental issue is specific prophylaxis that is, covering the unvaccinated persons with the vaccination programme. At the same time, one should not forget about the remaining vaccinations recommended for travellers, which are also recommended for seafarers. That is why it is so important to be aware of this problem among doctors issuing seafarer medical certificates. The prevalence of HBV infection and the specifics of the seafarer labour market should induce international maritime intuitions to develop new regulations for the employment of seafarers,

which will be unified and take into consideration compulsory vaccination.

Conflict of interest: None declared

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The COVID-19 pandemic and maritime telemedicine: 18-month report

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ABSTRACT

Background: *The onset of the coronavirus disease 2019 (COVID-19) pandemic has greatly impacted maritime telemedicine services. The aim of this study is to describe the impact of the pandemic, both quantitatively and qualitatively, by analysing the teleconsultations by doctors from the French Tele-Medical Assistance Service (TMAS).*

Materials and methods: *We carried out a descriptive observational study of retrospective data from the TMAS files. The main inclusion criterion for the files was a diagnosis of "influenza due to an unidentified virus". We extracted the following data: type of ship, gender, age, nationality, role on board, reason for the call and symptoms, number of calls, navigation zone, severity, medical decision, whether or not a COVID-19 test had been carried out, and treatments prescribed on board.*

Results: *One hundred and ninety-nine files were included of which 39 (20%) were clusters. We were able to analyse data from 384 patients. The study population comprised 376 suspected COVID-19 patients, of whom 334 (87%) were symptomatic and 42 (10.9%) asymptomatic. Eight (2.1%) patients were not thought to have COVID-19 but their call was related to the pandemic. Of the symptoms presented by the patients, fever was the most frequent (n = 196; 59%), while 129 (39%) presented a cough, 60 (18%) a headache, 41 (12%) non-specific ear, nose, throat signs, and 40 (12%) dyspnoea. Two hundred fifty-two (75%) patients stayed on board, 55 (17%) were disembarked, for 14 (4%) a ship diversion was arranged, and 13 were evacuated including 4 medical evacuations.*

Conclusions: *The most important problem encountered related to managing asymptomatic or pauci-symptomatic patients at sea, which was the subject of the majority of calls. The TMAS doctors played an important role in managing the pandemic by emphasising the need for social distancing and quarantine procedures at sea to limit the spread of the virus, while adapting to the sometimes difficult implementation conditions and logistics for medical decision and quarantine.*

(Int Marit Health 2022; 73, 2: 83–88)

Key words: maritime telemedicine, COVID-19, maritime teleconsultation, maritime health

INTRODUCTION

In France, medical assistance at sea is provided by three partners, the Maritime Rescue Coordination Centre (MRCC), the Tele-Medical Assistance Service (TMAS) based in Toulouse and the Medical Maritime Coordination Service (SCMM) [1].

The seas and oceans of the world are divided into different Search And Rescue (SAR) areas, where the responsibility is either international or attributed to a specific state. The TMAS deals with all the calls they receive regardless of the SAR area called from, the flag state of the vessel or the nationality of the patient.

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When medical assistance is required on board a ship, the call is either received by a French Maritime Rescue Coordination Centre (MRCC) who transfers it to the TMAS, or directly by the TMAS doctor. The teleconsultation can result in the patient being treated on board, disembarked or evacuated. In these last two cases, the MRCC that is coordinating operations, the TMAS and the SCMM coordinate the health-related aspects of the rescue, with or without medically-assisted rescue, by air or by sea, and by making contact with the land-based rescue services.

The onset of the coronavirus disease 2019 (COVID-19) pandemic greatly impacted maritime medical teleconsultation, and thus the calls made to the TMAS. Teleconsultation activities have increased significantly since the start of 2020 (+13% of calls for all types of coding in 2020 compared to the preceding year) [2]. We sought to objectively describe this impact, both qualitatively and quantitatively, by analysing the teleconsultations carried out by the TMAS doctors. Therefore, we undertook a descriptive, retrospective epidemiological study between 1 February 2020 and 31 July 2021.

MATERIALS AND METHODS

We carried out a descriptive study on retrospective data from the teleconsultation report files.

DATA COLLECTION

The calls received by the TMAS are recorded in a specific database known as AppliCCMM®. From this database, we extracted all records with the medical diagnosis coding of "influenza due to an unidentified virus". It was agreed at the start of the epidemic to use this code for all calls related to the COVID-19 pandemic since a "coronavirus" code does not exist. This coding is done by the doctor carrying out the teleconsultation and is obligatory to conclude the file. We extracted all files with this code opened between 1 February 2020, the date set for the start of the pandemic, and 31 July 2021. A file could refer to either one patient or to a cluster. It was possible to describe each patient independently by analysing each file.

The data collected for each patient covered: type of ship, age, gender, nationality, role on board, reason for the call, number of medical follow-up calls, navigation zone, degree of severity (CCMU coding: Clinical Classification of Emergency Patients), the medical decision by the TMAS doctor, whether or not a COVID-19 test had been carried out and the treatments prescribed on board.

The CCMU degrees of severity are the following:

- CCMU 1: Clinical status considered stable. No further diagnostic or therapeutic actions required. Simple clinical examination;
- CCMU 2: Stable lesion status and/or functional prognosis. Complementary diagnostic or therapeutic actions required, to be carried out by the SMUR (mobile emergency and intensive care services) or the emergency services;
- CCMU 3: Lesion status and/or functional prognosis considered to be worsening in emergency department or during an SMUR intervention, but not life-threatening;
- CCMU 4: Potentially life-threatening pathological situation, with no immediate resuscitation required;
- CCMU 5: Life-threatening prognosis emergency care comprising immediate resuscitation required.

ETHICS

During the teleconsultation, the patients were informed that their anonymised data could be used for research purposes. The procedure complied with the Declaration of Helsinki [3]. In compliance with the French public health code, this retrospective study follows the MR-004 regulatory procedure on the processing of personal data for study, assessment and research purposes not involving the human person. It is recorded in the internal MR-004 register of Toulouse University Hospital Centre (CNIL number: 2206723 v 0).

DATA ANALYSIS

The analysis firstly looked at the whole population, and then at three different groups: symptomatic suspected COVID-19 patients, asymptomatic suspected COVID-19 patients, non-COVID-19 patients whose calls for assistance were related to the pandemic.

The data were extracted and anonymised from AppliCCMM®, in Microsoft Excel 2007® format (Microsoft Corporation, Redmond, WA). A TMAS doctor verified and validated the data extracted from the application prior to their inclusion. The statistical analysis was conducted using Microsoft Excel 2007® software (Microsoft Corporation, Redmond, WA).

The categorical data were expressed in frequencies and percentages. The continuous variables were expressed as mean ± standard deviation.

RESULTS

Between February 2020 and July 2021, the TMAS recorded 3455 files for 9092 calls. Of these 3455 files, 211 were coded "influenza due to an unidentified virus" (6%), of which 12 had no link to COVID-19. As such, 199 files were included of which 39 (20%) were clusters. The analysis thus covered 384 patients of whom 334 (87%) were symptomatic and 42 (10.9%) asymptomatic. Eight (2.1%) patients were not thought to have COVID-19 but their call was related to the pandemic.

The patients made between 1 and 29 calls with an average of 3.2 ± 3.4 calls per patient.

SOCIODEMOGRAPHIC DATA

The gender ratio male/female was at 18 (364/20). The median age was 38 ± 11 years. The sociodemographic data are detailed in Table 1. The population comprised 46 nationalities. The majority of the patients were from France (n = 129; 33.6%), followed by the Philippines (n = 82; 21%) and India (n = 39; 10%).

SPECIFIC DESCRIPTION OF THE CALLS FOR SYMPTOMATIC PATIENTS

Fever was the most frequent (n = 196; 59%) symptom presented by the patients. The other symptoms are detailed in Table 2.

The treatments administered were paracetamol for 252 (66%) patients; antibiotics such as amoxicillin and clavulanic acid for 22 (6%) patients and oxygen for 17 (4%) patients. One hundred eight patients received no treatment according to the data entered in the medical files (32%).

COMPARISON BETWEEN THE SYMPTOMATIC SUSPECTED COVID-19 PATIENT GROUP AND THE ASYMPTOMATIC PATIENT GROUP

The asymptomatic suspected COVID-19 patients had either come into contact with a COVID-19 case, or tested positive during systematic screening.

The medical decisions and degrees of severity are detailed in Table 3.

Our analysis of the changes to the decisions made over time shows a decrease in the number of patients cared for on-board as the study progressed (Fig. 1).

The majority of the tests taken came back positive, in both asymptomatic and symptomatic patients. Of the symptomatic patients, 72 (22%) tested positive for COVID-19 (lateral flow or polymerase chain reaction [PCR]). Twenty (6%) patients tested negative. 242 (72%) patients were not tested.

Of the 42 asymptomatic patients, 28 (67%) tested positive for COVID-19 (lateral flow and PCR undifferentiated). Three (7%) patients were contact cases who then tested negative and 11 (26%) patients were not tested.

An analysis of the changes to the testing rates over time shows a linear increase as the study progressed (Fig. 2).

DESCRIPTION OF THE CALLS FOR THE NON-COVID-19 PATIENTS

Of the 8 non-COVID-19 patients whose calls were related to the pandemic, 5 had run out of a chronic treatment because of an extended quarantine at sea or a supply problem, and 2 patients were suffering from psychological distress linked to the health crisis. The last call was to request authorisation to embark due to a hospitalisation 15 days previously following the discovery of an atrial fibrillation in a COVID-19-related context.

Table 1. Sociodemographic data of the patients

Characteristics	Values (n = 384)
Mean age ± standard deviation	38 ± 11
Gender ratio: male/female	18: 364/20
Role on board:	
Officer	77 (21%)
Non-officer professional	286 (74%)
Passenger	11 (3%)
Vacationer	10 (2%)
Type of ship:	
Passenger ship	145 (38%)
Commercial ship	137 (36%)
Fishing vessel	57 (15%)
Pleasure boat	10 (3%)
Service vessel	35 (8%)
Location of the vessel:	
Atlantic Ocean	247 (64%)
Indian Ocean	71 (19%)
Pacific Ocean	34 (9%)
Mediterranean Sea/Black Sea	32 (8%)

Table 2. Symptoms

Symptoms	Values (n = 334)
Fever	196 (59%)
Cough	129 (39%)
Headache	60 (18%)
ENT signs (odynophagia, rhinitis, nasal congestion)	41 (12%)
Dyspnoea	40 (12%)
Asthenia	39 (12%)
Loss of smell	29 (9%)
Loss of taste	25 (7%)
Loss of taste and smell	17 (5%)
Chest pain	14 (4%)
Nausea or vomiting	6 (2%)
Diarrhoea	3 (1%)
Abdominal pain	4 (1%)

DISCUSSION

The pandemic increased the number of calls to the TMAS (+13% of calls for all types of coding in 2020 compared to the preceding year) [2], relating to several types of problem.

Table 3. Medical decision and severity

	Symptomatic patients (n = 334)	Asymptomatic patients (n = 42)
Medical decision		
On-board care	252 (75%)	27 (64%)
Disembarked	55 (17%)	14 (33.5%)
Ship diversion	14 (4%)	1 (2.5%)
Health evacuation	9 (3%)	0 (0%)
Medical evacuation	4 (1%)	0 (0%)
Severity		
CCMU 1	254 (76%)	30 (71%)
CCMU 2	40 (12%)	12 (29%)
CCMU 3	31 (9%)	0 (0%)
CCMU 4	8 (2%)	0 (0%)
CCMU 5	1 (1%)	0 (0%)

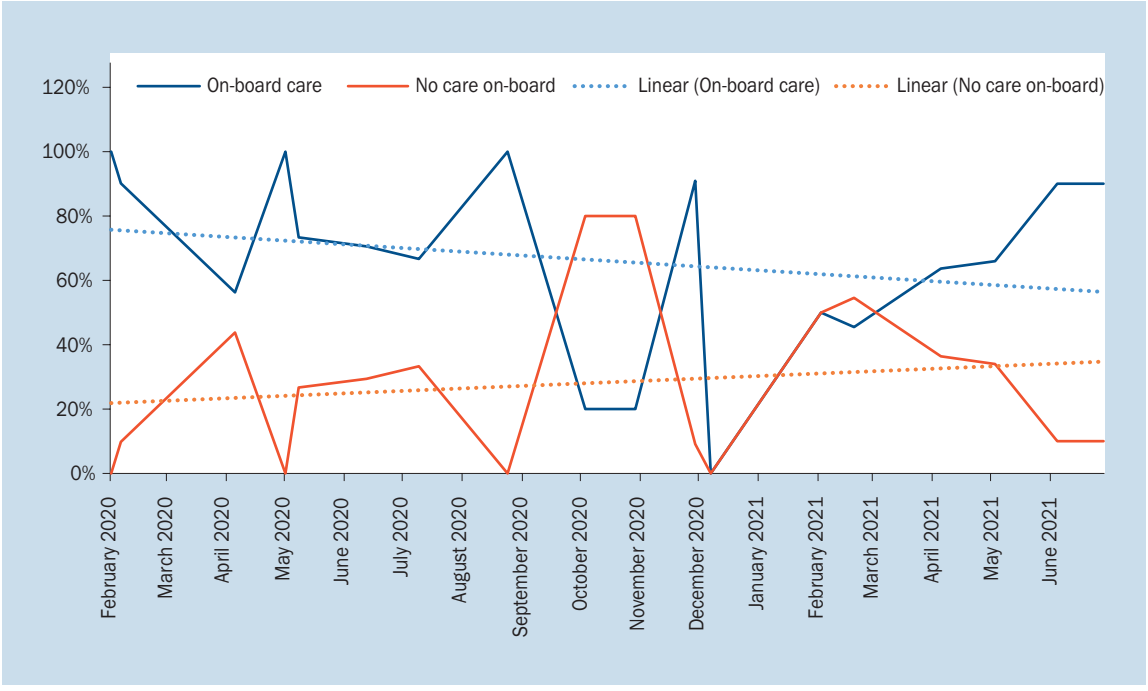

Figure 1. Changes in decisions over time

The most important problem related to managing asymptomatic or pauci-symptomatic patients at sea, which was the subject of the majority of calls. Boats can be significant vectors of transmission, which can clearly be explained by their closed and confined environment, and by the inherently crowded conditions of on-board communal life. It is also a vector of cross-country, or even cross-continental transmission, similarly to air traffic [2]. It is difficult to quarantine on a ship [4–6]. This generates extra costs for the shipowner, and can also be difficult to accept for the seafarers forced to spend even longer periods away from their families, which is effectively more work hours unpaid for the majority of them. This was all the more the case at the start of the epidemic when global propagation was disparate and misunderstood by many seafarers, who thus had difficulty understanding the importance of strict quarantine. However, very few changes to the medical decisions occurred as time went on, despite the arrival of

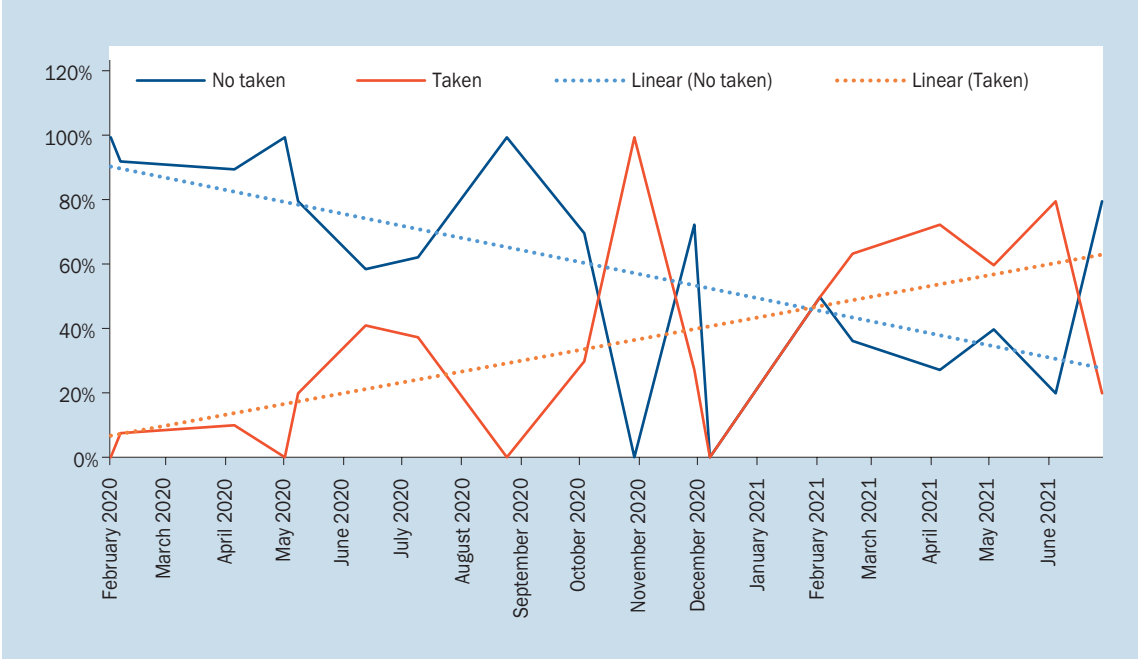

Figure 2. Changes in tests taken or not taken over time

rapid on-board diagnostic tests (available over-the-counter in France since April 2021), the better understanding of the virus by the whole crew, and the increasing experience of the TMAS doctors [7–11].

Another problem evidenced is inherent to all teleconsultations, whether these take place at sea or on land [12, 13]. This relates to the absence of a physical examination, which is a limitation of telemedicine and a certain source of error. This is also often aggravated by language barriers, which are common for seafarers on the open seas [12]. To offset this difficulty, objective examinations such as measuring temperature, pulse oximetry and respiratory rate appear to be effective and particularly useful in the context of COVID-19 [14]. The most frequent symptoms in our study are similar to those found in the literature, i.e. fever and cough. The nationalities also match those found in previous publications [2, 13, 14].

We can note that only 2 patients called with signs of psychological distress over this period. This results should be put in the context of a probable reluctance to seek psychological care in young patients, whose life history and socio-cultural background may not encourage them to consider calling for help for this type of symptom. This aspect probably requires another study in order to confirm the data on the psychological impact of the prolonged missions, difficulties in getting home and in replacing the crew and of financial problems linked to the decrease in maritime transport and embarkments and unpaid wages due to the pandemic [15–17].

CONCLUSIONS

We noted an increase in the number of teleconsultations during the first phases of the SARS-CoV-2 pandemic, with many COVID-19 infections confirmed by tests. The TMAS doctors thus played an important role in managing the pandemic by emphasising the need for social distancing and quarantine procedures at sea to limit the spread of the virus, while adapting to the sometimes difficult implementation conditions and logistics. This specific epidemic-related role was not part of routine practice in teleconsultation before the pandemic [17]. As such, all the doctors and professionals working in at-sea medical care were required to adapt to be able to continue providing care for seafarers across the world, while also attempting to stem viral transmission.

Conflict of interest: None declared

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Training in the detection of psychological distress on board ships through health simulation during the COVID-19 epidemic

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ABSTRACT

Background: *An innovative medical simulation course was offered to seafarers during their statutory medical education refresher course. During the coronavirus disease 2019 (COVID-19) pandemic, they experienced difficulties dealing with mariners' mental health problems.*

Materials and methods: *One hundred and fifty-three seafarers underwent training at the C3S medical training centre in Lorient Hospital. At the end of the module they were asked to fill in a questionnaire.*

Results: *Ninety-seven per cent of them were satisfied with their training. They felt that their training had given them confidence to deal with these problems when returning to sea. On this occasion, we tested their feelings on the psychological consequences of the COVID-19 pandemic on board and compared their answers with the data available in our telemedical assistance service (TMAS) and in the literature.*

Conclusions: *Simulation training is an appreciated and effective educational tool for raising awareness and training medical managers in psychological or psychiatric situations.*

(Int Marit Health 2022; 73, 2: 89–94)

Key words: psychiatric training, simulation, seafarers, COVID-19

INTRODUCTION

During the coronavirus disease 2019 (COVID-19) pandemic, statutory medical training for staff on board ships with a crew role was maintained by replacing the hospital nursing course with a health simulation course [1].

At the beginning of each training session, learners were asked about their priority needs for advice or medical training. Very often they mentioned the difficulties in managing their own stress as well as the psychological distress of their crew. This was exacerbated by the COVID-19 pandemic period, as confirmed by the scientific literature [2, 3].

Indeed, during this pandemic, the health rules applicable on board varied: quarantine conditions, the absence of screening tools on board, inaccessible vaccinations, the impossibility of disembarking the sick in certain countries increased the psychological tensions on board and created a feeling of abandonment for captains.

In this particular context, we decided to create a specific simulation scenario on the management of psychological distress on board with the educational aim of learning how to detect and deal with psychological risks on board 1 year later.

MATERIALS AND METHODS

We proposed to the seafarers coming to our centre for their medical training according to the Standards of Trainings Certification and Watchkeeping (STCW) programme, a simulation scenario of dealing with a seafarer in psychological distress.

Prior to the session, trainees were asked to fill in an anonymous questionnaire about their previous professional experiences on this subject.

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Figure 1. Scenario unfolding, seen from the control room

Figure 2. Team debriefing with video after the scenario

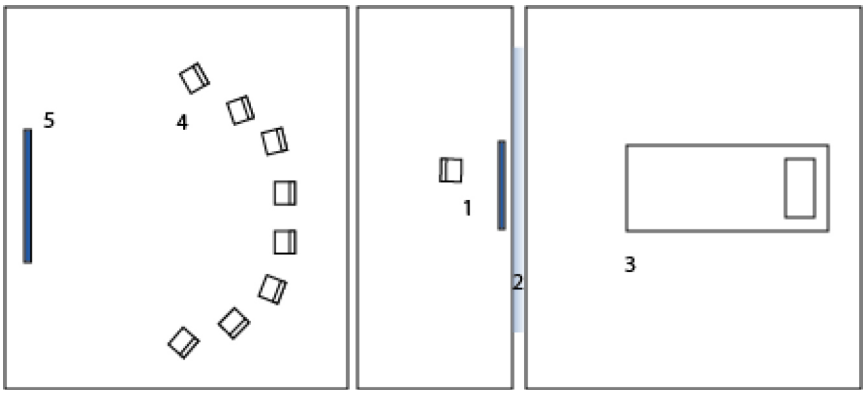

Figure 3. Map of the health simulation centre; 1 — control room; 2 — untinted glass; 3 — simulation room; 4 — debriefing room; 5 — screen for remote viewing of the scenario.

The scenario proposed, performed by a professional actor, was that of a seafarer presenting chronic anxiety increased by confinement with the appearance of suicidal ideas in a context of known alcohol addiction. Two trainee seafarers welcomed him into the reconstructed sick bay of a ship and had to take care of him. They could seek advice phoning a monitor. The latter, who is a doctor and a simulation instructor, simulated a regulation by the telemedical assistance service (TMAS). A medical kit containing, among other things, the prescribed psychiatric drugs was available in the infirmary.

The other trainees were in an adjacent room and could hear and see the scenario being played out on a screen using directional cameras and a microphone (Figs. 1, 2, 3).

At the end of the exchange with the TMAS, the scenario was stopped and a debriefing of about 45 minutes was carried out on the key points of a suicide risk screening and the therapeutic possibilities on board.

At the end of the training, they always anonymously filled in a satisfaction questionnaire on this module.

We compared the results of the first part of our qualitative and descriptive study with the TMAS data available in relation to the calls received for psychological reasons during the last 2 years, and we report these results and those of the satisfaction questionnaire at the end of this specific training module.

RESULTS

The study took place from December 2020 to October 2021.

One hundred fifty-three trainees were trained; the average age of the trainees was 39 years, and the majority were men.

Ninety per cent of the trainees were in refresher courses, and therefore had at least 5 years' experience as a shipboard medical officer.

Most of the trainees were returnees, and therefore had at least 5 years' experience as on-board medical officers; the general data are summarised in Table 1.

Table 1. Typology of trainees who were included in the survey

	Numbers	Percentage
Total number of trainees	153	
Total psychological survey questionnaires used	107	70%
Total questionnaires not usable due to e-mail problems	20	18%
Total no response	26	17%
Total female trainees	10	6.5%
Total male trainees	143	93.7%
Ages of trainees < 30	29	19%
Ages of trainees < 30 – < 40	47	31%
Ages of trainees < 40 – < 50	30	20.2%
Ages of trainees < 50 – < 60	21	14%
Ages of trainees < 60	24	15.6%
Time of the learning path:		
Initial training	15	10%
Refresher course	103	90%

Table 2. Comparison of psychological or addiction items found in the questionnaires with the regulations carried out by a telemedical assistance service (TMAS) over a period of one year.

Distribution of psychological themes	Distribution of responses to the questionnaire during the course in per cent	Distribution of psychological themes collected in TMAS calls
Number of cases of confrontations with psychological problems out of all the data collected	107/153 trainees (70%)	45/2130 medical regulation (4%)
Suicides on board	10%	Not collected
Total psychological distress	**44%**	**82%**
Anxiety disorder, insomnia	Not detailed	49%
Depressive disorder	Not detailed	24%
Psychotic disorder	Not detailed	2%
Substance use problem or withdrawal:	**82%**	**8%**
Alcohol	53%	8%
Ecstasy	2%	Not detailed
Cocaine	5%	Not detailed
Heroin	4%	Not detailed
Cannabis	15%	Not detailed
Other	3%	Not detailed

Table 2 shows the percentage distribution of some of the items in the questionnaires collected and the French TMAS collection form during the year before the course.

During 2020 TMAS received 5718 calls concerning 2130 seafarers. Several calls may correspond to the follow-up of the same seafarer.

There were 45 (2%) calls for psychiatric reasons.

We have tried to reconcile the themes in order to compare the experiences expressed by the seafarers in the questionnaire with the reality of the themes evoked in the calls to our TMAS during the year preceding the course.

Concerning their previous training and the helpers on board, 80% (87) were not aware of any tools to help them managing a psychiatric emergency.

Thirty-four per cent (36) of the trainees considered the theoretical training provided by the STCW on psychological issues to be moderately satisfactory, and 16% (17) of them considered it to be non-existent.

Addictive behaviour was a source of medical situations or incidents on board for 82% of the managers who replied, but it was rarely found in the reasons for calling TMAS (8%).

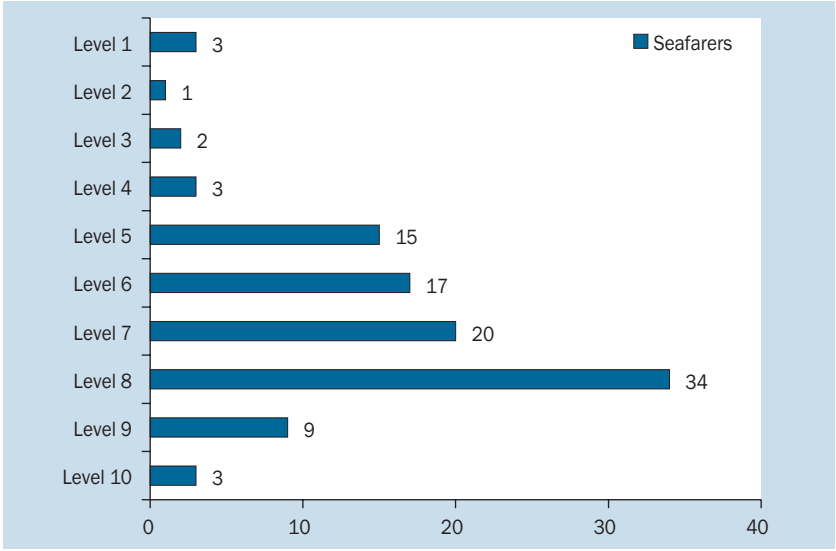

Figure 4. Judgement of the level of psychological impact of COVID-19 on board

The COVID-19 pandemic had a psychological impact on board (Fig. 4), assessed on a subjective analogue rating scale from 1 (no impact) to 10 (major impact).

The evaluation of the trainees' satisfaction after the training was distributed as follows in the questionnaires: 97% of the trainees considered the proposed scenario to be appropriate and credible and were satisfied with it.

Managing the risk of suicide remained difficult for 50% of trainees.

Forty three per cent felt better equipped to deal with it, although 11% said they were still not able to face such a situation on board.

Sixty per cent of on-board managers said that they would set up a specific organisation to manage psychological problems after the training.

DISCUSSION

CONCERNING OUR STUDY

The high response rate to the questionnaire just before the training, the exchanges during debriefings, confirm the interest of the seafarers for a specific training on the subject of psychological problems, which increased during the pandemic.

The training evaluation questionnaire was filled in just after the training at the simulation centre, which may have influenced the answers.

COMPARISONS OF ON-BOARD PSYCHIATRIC CONDITIONS COLLECTED IN OUR STUDY VERSUS TMAS AND LITERATURE DATA

Addictive pathologies occurring on board are under-represented in the calls to TMAS compared to our survey. It is possible that they are under-reported and detailed, and that they may be professionally severe for the seafarer in relation to his employer.

Anxiety is the predominant reason. It is a comorbid symptom of many psychiatric and somatic pathologies. It is a warning sign that does not allow us to conclude to a precise diagnosis.

In a recent article by Baygi et al. [4], on an evaluation of 470 seafarers with the General Health Questionnaire (GHQ-12) and the Zung Self-Rating Anxiety Scare (SAS), signs of depression were found in 12.3% of them, stress in 5.9%, anxiety in 11.6%, and non-specific psychiatric disorders in 42.6% of cases, such as sleep disorders [4].

Comparison of TMAS regulation data between 2019 and 2020 did not reveal an increase of calls on such requests despite the COVID-19 pandemic. But a new evaluation would be useful for the year 2021 because of the repetition of the COVID-19 waves, in order to better appreciate the possible delaying effects of these. The increase in the number of calls received at TMAS during the period mainly concerned on-board COVID-19 cases (+13% in 2020/2019) [5].

The main factors that exacerbate psychological problems are responsibilities on board, separation from the family and the duration of the separation, loneliness, fatigue, multi-nationality, limited recreational activities and the lack of sleep. The multiplicity of administrative tasks, the lack of time and responsibilities with less competent staff are particularly pointed out by officers [6].

A more detailed analysis of calls to the Centre de Consultation Médicale Maritime (French maritime TMAS) (CCMM) shows that on-board managers request more medical advice than ordinary sailors. Thus, in our series, almost a third of the calls concern people with responsibilities on board

(captains, lieutenants, chief engineers). However, one explanation given by one of the captains is that these calls for medical reasons, apart from access to the 4 or 5 G Wi-Fi network near the coast, are made from the gateway. This difficult and non-confidential access may limit the number of calls.

All of these phenomena, anxiety syndromes were increased during the COVID-19 period in people confined without work but are little different from those observed in places where work has not stopped [7].

Our survey shows that 10% of trainee captains say they have experienced suicides on board.

Cases have been reported by seafarers and in the non-medical press with a causality that seemed to be established with the prolonged confinement on board. However, no specific medical study has yet been carried out to verify these hypotheses. The statistics on calls to the CCMM do not show an increase of calls on this subject. They are not mentioned at all in the grounds for appeal, as this item is not included in their data.

We have seen that the year 2021 has not been included in the requests and the effect of post-traumatic stress may be revealed later. Suicide remains a particularly high risk on board ship. One out of ten officers in our cohort claims to have been confronted with it, and the literature also confirms this [8]. Mental illnesses leading to retirement from seafaring represent 3.9 per 100,000 people per year [9]. Analysis of the perception of support at work by seafarers, equal treatment influences the perception of stress, which is a favourable factor in the case of chronicity [10].

TRAINING AND AIDS

The initial training in psychiatry in the official teaching guidelines for seafarers was judged in more than half of the questionnaires to be insufficient or even non-existent. It is taught in the form of theory courses, but this format may not be sufficient for on-board practice.

The verbatim comments made possible at the end of the questionnaire express this grievance in 35% of responses. Seafarers advocate more time in practical training rather than lectures to address these issues. This was also found in the surveys on medical maritime education [11].

The particularity of stress prevention during the COVID-19 period was the subject of questionnaires sent to Norwegian seafarers during a study [12].

The results revealed that the shipboard managers who are delegated to manage psychiatric problems while sailing without proper training or proven procedures are also potentially more vulnerable to post-traumatic stress.

The captains responsible for on-board care are particularly exposed to stress during the COVID-19 period because of their medical role on board. Not only do they have to manage psychiatric pathologies that are increased by the confinements, but they could not disembark patients as usual. This can cause moral wounds that can lead to negative thoughts that can result in psychiatric pathologies in the long run [13, 14]. Some have expressed feelings of guilt following the death of seafarers diagnosed with COVID-19 who they thought had been landed too late because of the constraints.

Easy-to-use scales to help carers assessing stress or suicidal risk are available. In addition, 8-hour training courses help to limit the stigmatisation of mental illness and to provide some elementary notions of therapy. These should be included in the current training programmes for seafarers who have medical responsibility on board [15].

The teaching currently available for seafarers is of short duration, in lecture form. The academics interviewed mentioned the lack of time to include these subjects in the compulsory part of the STCW teaching, as it is already considered too broad. The current traditional type of teaching is also considered by the instructors to be unsuitable. In a survey carried out in Norway, but also in Germany, teachers mentioned that such training could be provided within the framework of the quality of life at work and the prevention of psychosocial risks by shipowners.

The need to adapt the modules to the various shipping vectors, but also to acquire intercultural management skills because of the various nationalities on board, was also stressed [16–18].

From our experience, we notice the simulation teaching model satisfies the trainees. Comparisons made with traditional training come to the same conclusion [19, 20].

CONCLUSIONS

Seafaring is a dangerous profession, with a high rate of work-related accidents, and the conditions of navigation linked to remoteness bring together the specificities of isolated medicine.

Ship's officers, who are essential interlocutors in the chain of prevention, detection, rescue and medical alert, benefit from standardised training based on notions of medical, traumatological and surgical care.

Our study and the literature show that they also have to face psychological distress increased by the COVID-19 pandemic, and they feel helpless and insufficiently trained. The themes of concern evoked have little correlation with those motivating calls to the TMAS.

Health simulation has enabled us to adapt our teaching to the demand for training in psychological distress on board, which seems to have been exacerbated by the COVID-19 pandemic. We focused on assessing the risk of suicide on board and the problems of addiction or acute intoxication and the treatments available on board.

Trainees were 99% satisfied with this type of training, which already exists for the management of psychiatric emergencies on land.

Long-term evaluation of our cohort of seafarers is planned within 6 to 12 months.

INFORMED CONSENT

Talking part in this study was voluntarily. All participants gave their informed consent before taking part in this study.

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Nutrition for seafarers during and after COVID-19

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We would like to share ideas on the publication "Healthy nutrition for seafarers during and after COVID-19 pandemic." According to Baygi et al. [1], there were no special nutritional guidelines devised for mariners during the coronavirus disease 2019 (COVID-19) epidemic at the time of drafting this letter. We all believe that nutrition is critical during the COVID-19 epidemic. A healthy dietary status can indicate good health and may be linked to robust infection resistance. It might be difficult for seafarers to obtain nutritious cuisine that meets their nutritional needs. It is also vital to recognise the cleanliness of the food in addition to the nutrition. Contamination can easily arise in a small cabin if food sanitation is lacking. Finally, there must be a procedure in place to ensure that the food carried inside the cabin is clean. Food contamination is also a possibility during the COVID-19 pandemic. Also, while there is no conclusive evidence that tainted food is the cause of the COVID-19 outbreak, it is suggested that seafarers take precautions to ensure that their food is not contaminated [2].

Conflict of interest: None declared

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The role of pharmacists in global maritime health

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Maritime health comprises a wide range of disciplines committed to improving the health of seafarers locally and internationally [1]. The maritime sector plays a key role in the global economy as this sector accounts for 80% of global trade [2]. This has led to the development of maritime health laws and regulations by international organizations including the World Health Organization (WHO), International Maritime Organization (IMO), and International Labour Organization (ILO) [1]. Although over one million maritime workers are employed across the globe, evidence revealed that they have limited access to timely healthcare services because most of their working lives are spent off shore and are sometimes classified as "hard-to-reach groups" [2, 3]. The health of mariners has therefore continued to receive comparatively little attention because of the nature of their job.

There has been significant evidence that a high amount of resistant bacteria is found in seas and oceans [4]. This evidence can be attributed to the extensive use of antibiotics in the treatment of sea animals by aquaculture industries [5]. With this fact, seafarers may be the means of transmitting previously known and unknown illnesses across national and continental borders. Thus, there is an urgent need for global maritime health to be treated as an important aspect of global health.

Pharmacists have a vital role to play in global maritime health by monitoring the supply of medicines to ships as well as ensuring the medicines are labelled with appropriate data. In addition, pharmacists can also advise shipping companies and captains on medicines to include in the medicines chest. Since pharmacists are not required by law to be on board [6], pharmacists can be tasked with the responsibility of conducting proper training of personnel responsible for healthcare on board such as the captain or any member of the crew.

Self-medication has also become the way of treating illnesses and disease conditions amongst seafarers [7]. The inaccessibility of the seafarers to adequate, reliable, and up-to-date drug information on the internet due to poor network connection also allow them to make less-informed decisions. Pharmacists can help in this regard by organizing awareness campaigns among sailors to educate them about the consequences and dangers of self-medication.

Also, in the preparation of national regulations and national policy for the supply of ship's pharmacies, pharmacists can serve as key advisors. Another means to further address maritime health concerns is via telehealth [6]. Telehealth applications and software like Pharmacy Ships (PARSI) and TelePharmaSea already exist. Pharmacists' help to control the information in the software, perform a digital review of medicines inventory as well as generate e-certificates of compliance [8].

These roles are necessitated in maritime health and the integration of pharmacists will undoubtedly reduce the burden on other health professionals, facilitate effective and efficient healthcare delivery services at sea. Pharmacists and other health professionals will continue to play a huge role in maritime health and therefore, they should be abreast of new development and information in maritime health to facilitate efficient and timely health services. Also, concerted efforts should be made worldwide to increase accessibility to medical care for seafarers.

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Magellan's circumnavigation: what lessons 500 years later for maritime medicine?

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It has been 500 years since Magellan's expedition came to an end. In 1519 at the start of this journey, which had both mercantile and exploratory aims, Magellan sailed with 5 ships and 242 men [1]. He counted on circling the earth and hoped to prove that the passage through the east would be profitable for Spanish trade. Unfortunately, on 9th September 1522 only 35 European sailors returned on board the vessel Victoria. What had happened to the other crewmen? What about Magellan? Briefly, the crew was reduced by desertions, imprisonments and deaths in combat or during mutinies. But there were also 2 great explorers' and seafarers' diseases both arising from a limited diet: scurvy and beri-beri. After 500 years, what have we learned from this journey?

Scurvy presents with haemorrhages, loosening of teeth, etc. The pathology is caused by deficiency of vitamin C. Beri-beri manifests itself by asthenia, oedema and, in severe cases, encephalopathy, caused by a deficiency in vitamin B1 (thiamine). If only a few sailors died during this historic journey because of these diseases, it must be remembered that even today sailors are affected by these deficiency pathologies [2]. Thus, there are case reports of scurvy up to the 21st century [3]. In 2013, during the 12th International Symposium on Maritime Health in Brest, a cluster of scurvy cases among fishermen was described [4]. It should be remembered, however, that treatment and especially prevention has been simple and effective since Lind showed the benefits of lemon juice [5]. As for beriberi, it does not appear that there are any recent cases in seafarers. Many doctors have contributed to its eradication. However, thiamine deficiency can also occur with alcohol dependence [6]. As many seamen have alcohol consumption disorders, maritime physicians should remain vigilant for this risk.

Finally, if we leave aside the mutinies and desertions, the Magellan's expedition was marked by clashes. Magellan himself was killed in battle with the King of Mactan Island, located in what is now the Philippines. It is quite ironic, after 500 years, to remember that European voyagers may have treated the people of the Philippines with disdain and later conquered them, when so many of the seamen of the 21st century are now Filipinos. Today, maritime transport represents 90% of the volume of world trade, much of it between China and the Europe via the Suez Canal. Crews are often made up from seafarers of many nationalities, so perhaps we have learned, in 5 centuries, to live together in an increasingly globalised world? Unfortunately, sociological research shows that seafarers, although they almost represent the ideal of internationalisation and globalisation, are employed with different rights depending on their nationality and rank [7]. This creates inequalities between members of the same crew. How then should the maritime industry face a common future, perhaps by binding international labour laws? The maritime health community, and indeed the whole maritime sector, should keep in mind that good health also requires a state of social fulfilment and security.

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INFORMATION FOR AUTHORS

The International Maritime Health will publish original papers on medical and health problems of seafarers, fishermen, divers, dockers, shipyard workers and other maritime workers, as well as papers on tropical medicine, travel medicine, epidemiology, and other related topics.

Typical length of such a paper would be 2000–4000 words, not including tables, figures and references. Its construction should follow the usual pattern: abstract (structured abstract of no more than 300 words); key words; introduction; participants; materials; methods; results; discussion; and conclusions/key messages.

Case Reports will also be accepted, particularly of work-related diseases and accidents among maritime workers.

All papers will be peer-reviewed. The comments made by the reviewers will be sent to authors, and their criticism and proposed amendments should be taken into consideration by authors submitting revised texts.

Review articles on specific topics, exposures, preventive interventions, and on the national maritime health services will also be considered for publication. Their length will be from 1000 to 4000 words, including tables, figures and references.

Letters to the Editor discussing recently published articles, reporting research projects or informing about workshops will be accepted; they should not exceed 500 words of text and 5 references.

There also will be the section Chronicle, in which brief reports will be published on the international symposia and national meetings on maritime medicine and health, on tropical parasitology and epidemiology, on travel medicine and other subjects related to the health of seafarers and other maritime workers. Information will also be given on training activities in this field, and on international collaborative projects related to the above subjects.

All articles should be submitted to IMH electronically online at www.intmarhealth.pl where detailed instruction regarding submission process will be provided.

Only English texts will be accepted.

Manuscripts should be typed in double line spacing on numbered pages and conform to the usual requirements (Ref.: International Committee on Medical Journals Editors. Uniform Requirements for Manuscripts Submitted to Biomedical Journals, JAMA, 1997; 277: 927–934).

Only manuscripts that have not been published previously, and are not under consideration by another publisher, will be accepted.

Full texts of oral presentations at meetings (with abstracts printed in the conference materials) can be considered.

All authors must give written consent to publication of the text.

Manuscripts should present original material, the writing should be clear, study methods appropriate, the conclusions should be reasonable and supported by the data. Abbreviations, if used, should be explained.

Drugs should be referred to by their approved names (not by trade names). Scientific measurements should be given in SI units, except for blood pressure, which should be expressed in mm Hg.

Authors should give their names, addresses, and affiliations for the time they did the work. A current address of one author should be indicated for correspondence, including telephone and fax numbers, and e-mail address.

All financial and material support for the reported research and work should be identified in the manuscript.

REFERENCES

References should be numbered in the order in which they appear in the text. At the end of the article the full list of references should give the names and initials of all authors (unless there are more than six authors, when only the first three should be given followed by: et al.).

The authors' names are followed by the title of the article; the title of the journal abbreviated according to Medline; the year of publication, the volume number; and the first and last page numbers. **Please note:** References you should include DOI numbers of the cited papers (if applicable) – it will enable the references to be linked out directly to proper websites. (e.g. Redon J, Cifkova R, Laurent S et al. Mechanisms of hypertension in the cardiometabolic syndrome. J Hypertens. 2009; 27(3): 441–451, doi: 10.1097/HJH.0b013e32831e13e5.).

Reference to books should give the title, names of authors or of editors, publisher, place of publication, and the year.

Information from yet unpublished articles, papers reported at meetings, or personal communications should be cited only in the text, not in References.

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