Photos: Cover: www.mediaserver.hamburg.de / Jung von Matt  
p.3: Bina Engel

Institute for Occupational and Maritime Medicine (ZfAM)  
Director: Univ.-Prof. Dr. med. Volker Harth, MPH  
Seewartenstr. 10  
20459 Hamburg  
Germany  
www.uke.de/arbeitsmedizin

Editors: Dr. med. Thomas von Münster  
Univ.-Prof. Dr. med. Volker Harth, MPH

ISBN 978-3-00-063209-9


ISMH15  15th INTERNATIONAL SYMPOSIUM ON MARITIME HEALTH
Table of Contents

GENERAL INFORMATION ......................................................................................................................... 9

Committees ........................................................................................................................................... 9

WELCOME ADDRESSES .......................................................................................................................... 10

Welcome Address by I. Denisenko, IMHA-President ................................................................. 10

Welcome Address by Senator C. Prüfer-Storcks, Hamburg Ministry of Health and Consumer Protection ................................................................. 11

Welcome Address by V. Harth, President ISMH15 ............................................................... 12

PLENARY SESSION I: Mass Rescue Operations ...................................................................................... 13

Cruise ship «Viking Sky» close to disaster under stormy weather in Norway .......................... 13

PLENARY SESSION II: Mental Health...................................................................................................... 14

Mental Health and Risk Factors in Seafarers .................................................................................... 14

PTSD among seafarers: French qualitative and quantitative study, trails to ensure a better care .. 14

Mental well-being program to reduce depression & suicide among seafarers & family ............... 15

SYMPOSIUM OFFSHORE MEDICINE ....................................................................................................... 17

Working conditions, mental and physical health of employees in the German offshore wind industry. ........................................................................................................................................... 17

BestOff – Optimisation of Health and Safety Coordination in the Offshore Wind Industry ........ 17

6 years Offshore Working Time Ordinance - working-time safeguards and occupational safety and health .............................................................................................................................. 18

Health and wellbeing of offshore employees in Denmark .......................................................... 18

Medical kit for OSR 2 offshore yachts races .................................................................................. 19

PARALLEL SESSION I-1 - Joint Session of ISMH15 and German Seaman’s Mission on:

Ethics in maritime medicine ................................................................................................................. 21

Stress in seafarers daily work life and in crisis situations. Initiatives for Psycho-social support..... 21

Maritime Welfare Facilities - utilization and relevance for the compensation of shipboard stress. 22

Potentially traumatic experiences of seafarers ........................................................................... 22

What have we and can we learn about seafarers’ health at seafarers’ centres around the world? 23

Repatriation of Seafarers – Is the Dollar more important than the Seafarer? ................................. 23

Keeping seafarers’ health data confidential: is there a need for action? ........................................ 23

Seafarers’ suicide while on board: Time for a prevention strategy .................................................. 26

PARALLEL SESSION I-2 - Pre-employment medical examination ......................................................... 28

Improving the training of Seafarers’ Doctors: Is it possible on an international scale? .......... 28

PEME: Experiences from the Appellate Body of the Norwegian Maritime Authority 1997-2018.... 28

Unfitness to navigation: nosology and incidence rate over 12 years period in France ............... 29

Early seasickness, Sopite-Syndrome and changes in psychic and physical skills after wave-exposure.......................................................................................................................... 30
PARALLEL SESSION I-3 - Maritime Rescue

What shall we do to the drowning sailor? 150 years of maritime resuscitation

Saving lives by changing from intravenous (IV) to intraosseous (IO) vascular access on board ships

Medical kit for single-handed offshore yachts races

MEDICHEM-IMHA-JOINT ICOH SATELLITE SYMPOSIUM

“Chemical hazards in maritime health I”

Heart rate variability in shipyard welders

How welding fume exposure could be reduced in shipyard welders

Exposure of seafarers to solar UV radiation

Noise and Vibration Exposure On Board Container Vessels – Results of a Field Study

MEDICHEM-IMHA-JOINT ICOH SATELLITE SYMPOSIUM

“Chemical hazards in maritime health II”

Chemical hazards due to fumigation of freight containers and cargo on bulk ships

The assessment of atmospheric exposure in a shipyard

Cancer after Production and Use of Asbestos in the Seaport and City of Hamburg

PARALLEL SESSION II-1 - Maritime Epidemiology I

Infectious disease mortality in british merchant seamen since 1900: from causes to controls

Hospital contacts in Danish seafarers compared to other trades: a register-based study in 2002-2016

Establishing a Norwegian Registry of Maritime Health

Incidence of diseases and injuries on board ships

PARALLEL SESSION II-2 – Safeguarding Health & Safety on board

The Impact of the MLC 2006 and Health and Safety on Board – Results from a Pilot Study

Occupational risk perception, stressors and stress of fishermen

Effects on the WIB OSHMS program for improving safety and health of seamen

New Hire and Existing Crew Medical Repatriations: Does Experience Matter? A Five-year Study

29th Scientific Symposium of the German Maritime Health Association (DGMM) – Maritime Rescue

Emergency Transport of the Sick, Injured or Wounded on Board German Navy Vessels: Today and Tomorrow [Rettungsmittel für den Verwundetentransport an Bord von Marineschiffen heute und morgen]

PLENARY SESSION IV - Cruise Medicine

Cruise medicine - a special challenge!

Cruise Medicine - what does the customers expect?

CONNECTING THE MARITIME HEALTH SCIENCE COMMUNITY - International Maritime Health (IMH)

International Maritime Health (IMH) – new goals for the scientific future
Best IMH scientific article of the year 2018 ........................................................................................................ 47
International Maritime Health Foundation: possibilities for further development in maritime medicine ................................................................. 48
PARALLEL SESSION III-1 - Digitalization in Maritime Medicine I ........................................................................ 50
Implementation of Artificial Intelligent (AI) Systems for seafarer’s Health Assistance .................. 50
A model to improve medical assistance on board ships - Radio Medical contacts of respiratory issues ........................................................................... 51
PARALLEL SESSION III-2 - Chronic disease in Maritime Medicine .............................................................. 53
A qualitative study on health risks of Iranian seafarers working on ocean going tankers .......... 53
The prevalence of Metabolic Syndrome and its components according to BMI among Filipino Seafarers ........................................................................................................ 53
Prevalence of metabolic syndrome in Filipino seafarers: a “k” line experience ........................................ 54
Tendency of Diseases among Seamen during the six years and program for improving health of seamen .................................................................................................. 55
PARALLEL SESSION IV-1 - Medical training onboard and ashore ................................................................. 56
Vessel specific On-board training: connecting elementary and medical first aid with medical care ........................................................................................................... 56
The clinical preparation for the duties as a ship’s doctor - The field of conflict military to civil ...... 57
Teaching ‘Medical Care On Board Ships’ in the 21st Century – A New Approach ........................................ 57
30 hours in the ICU – a special challenge – a case report from Mein Schiff 4 TUI CRUISES ...................... 58
Further training of the medical team at TUI Cruises .................................................................................. 59
PARALLEL SESSION IV-2 - Digitalization in Maritime Medicine II .............................................................. 60
Maritime Telemedical Assistance Service at the UCMMiT in Gdynia. Analysis of 5 years of activity ............................................................................................................................ 60
Telemedicine for the German navy – a new approach for 24/7 medical assistance around the world ................................................................................................. 60
Telemedical Maritime Assistance Service – Case reports from the Military Hospital Hamburg ...... 61
Advanced telemedicine solutions for improving medical assistance at sea ........................................... 61
PARALLEL SESSION IV-3 - Sleep & Sleep Disorders in Maritime Medicine .................................................. 63
Fatal monotony: Increased daytime sleepiness on board ........................................................................... 63
Sleepiness of day workers and watchkeepers on board at high seas: a cross-sectional study .......... 63
A decision support system for optimal crew scheduling considering fatigue and crew well-being. 64
Mental Fatigue at Sea: A Bird’s-Eye View on Causes and Countermeasures ......................................... 65
PARALLEL SESSION V-1 - Psychosocial aspects of pre-employment medical examinations .................. 67
Profiling of Filipino Merchant Marine Officers According to their Stressors and Coping Mechanisms ........................................................................................................... 67
A workshop on: “Insights into Mental Health of Seafarers” ........................................................................ 68
The Doctor as Facilitator – The Pre-employment medical examination in context .............................. 68
Mental Illness at Sea – Legal Issues - Learning from actual cases .............................................. 69

PARALLEL SESSION V-2 - Digitalization in Maritime Medicine III .......................................................... 70
Digital tools - how can they improve healthcare at sea? ................................................................. 70
Development of an informatics system for handling ship's pharmacy .............................................. 70
Repatriation Risk Assessment: Applying Machine Learning in Maritime Health PEMEs ................. 71
Prevention of Malaria in seafaring- time for a paradigm shift? ....................................................... 71

PARALLEL SESSION V-3 - Gender Mainstreaming, Health & Wellbeing ................................................. 73
Mental Health promotion program in the workplace with focus on transport .................................... 73
Women seafarers’ health needs and expectations .............................................................................. 74
Women seafarers: specificities related to maritime work and pregnancy ......................................... 74
Re:fresh: A Health and Wellness Study of Indian Seafarers Onboard Ocean-going Ships ............. 75

PARALLEL SESSION V-4 - Public Health and regulatory affairs ............................................................ 76
Cross comparative analysis of some European on-board medical chest and medical equipment. .... 76
Impacts of the implementation of the Maritime Medicine Ordinance in Germany ........................ 76
Evaluation of the medical refresher courses .................................................................................... 77
Establishing uniformity of inspection among inspectors issuing IHR Ship Sanitation certificates .... 78
Training Needs Assessment Among Public Health Staff at European Designated Ports .............. 78

PLENARY SESSION V - Telemedical maritime assistance service and digitalization ................................ 80
Liability of TMAS doctors. Responsible for treatment, or merely an advisor? ................................. 80
The seafarers “Health Passport”. An integrated electronic health record (EHR) for a global maritime industry ................................................................. 81
E-healthy ship - Health Management on board ................................................................................ 82

Poster Walks .......................................................................................................................................... 83
Poster Walk I-a - Lung ............................................................................................................................ 83
Effect of Hyperbaric Environment on Pulmonary Function in Professional Divers ......................... 83
A review on nutrition and decompression sickness in recreatiional SCUBA divers ....................... 84
Examination of Fitness for Recreational Diving on Passenger Ships ............................................. 84
Emergency medical evacuation in the offshore oil and gas industry ............................................. 85
Firefighters on board – physical demands on various ship .............................................................. 85

Poster Walk I-b - Mental Health ........................................................................................................... 87
Challenges and coping strategies among women of offshore wind workers living the 14/14 schedule ................................................................................................................................. 87
Socio-psychological stress in the professional activities of seafarers ............................................. 87
Stress and strain among merchant seafarers depending on the three voyage episodes ............... 88
Psychophysical stress and strain of maritime pilots in Germany: A cross-sectional study ........... 89
Poster Walk II-a - Training & Education ................................................................. 90
Learning process from eLearning tasks to simulation ........................................ 90
Applying technology to maritime health and security training ...................... 90
Blended learning - a practical, beneficial and flexible solution .................... 91
Training of medical ship doctors in psychological stress of multicultural crews on cruise ships ............................ 92
Management of Cardiac Arrest and CPR onboard passenger ships ............... 92

Poster Walk II-b - Miscellaneous ........................................................................ 94
International Maritime Health Foundation – a new platform for building science in maritime medicine ................................................................. 94
The Textbook of Maritime Health: Third edition. Knowledge is power and should therefore be shared ................................................................. 95
Toxic Jellyfish in Thailand ................................................................................ 95
Adaptive Resilience Management in the Port – Presentation of an Interdisciplinary Research Project ................................................................. 96
Challenges to periodic drinking water analysis in cargo ships ...................... 96

Poster Walk III-a: Seafarers Health ................................................................. 98
Ergonomics onboard ....................................................................................... 98
Study of temporary disability for marine complex workers, engaged on a shift work .......... 98
Overweight among seafarers working on board merchant ships ................... 99
How to carry healthy exercise habits on board – and maintain them .......... 100
The new paradigm of the professional health competence formation in the maritime cadets ... 101
Management of Seafarers Occupational Health ........................................... 101

Poster Walk III-b: Chemical and physical hazards ........................................ 103
Noise assessment in a population of shipyard workers ................................ 103
Acute occupational phosphine intoxications: a retrospective study by the Belgian Poison Centre ................................................................. 103
Medical and sanitary risk of fumigators and seafarers when working with fumigated cargoes ... 104
Control of the holds sealing and prevention of phosphine poisoning in sailing ................................................................. 104
Acute occupational phosphine intoxications in the maritime shipping sector: a retrospective review ................................................................. 105
Incinerators in seaports as a factor of environmental contamination by heavy metals ................................................................. 106

Poster Walk IV-a: Miscellaneous ................................................................. 107
Off-label use of prescribed medicinal products on board ships .................... 107
Service Profiles of Maritime Doctors in Denmark ........................................ 107
Norovirus on a cruise ship: lessons learned for outbreak control and crisis management .......... 108
Travel medicine for sailing on cruise ships? .............................................. 109
The development of the port of rijeka as indivisible part of the city through the centuries ...... 109

Poster Walk IV-b: E-Health .............................................................................. 111
MayDay MayDay-Virtual simulation in Medical communication onboard................................. 111
Maritime Telemedicine for seafarers: current situation and Thailand perspective .................. 111
Telemedicine of expert level in the practice of marine medicine ........................................... 112
Medical Applications for iPhone and Android ........................................................................ 112
Improved telemedical assistance at sea with point-of-care syndrome-based for infections..... 113
Author Index.............................................................................................................................. 114
GENERAL INFORMATION

Committees

ISMH15 PRESIDENT

• Volker Harth

INTERNATIONAL SCIENTIFIC COMMITTEE

• Jörg Abel
• Joseph Abesamis
• Marcel Joseph Alcaraz
• Manuel-Georg Burkert
• Tim Carter
• William Murray Coombs
• Eilif Dahl
• Ilona Denisenko
• Karl-Peter Faesecke
• Christos Hadjichristodoulou
• Volker Harth
• Jan Heidrich
• Alf Magne Horneland

• Maria Jeżewska
• Jacek Kot
• David Lucas
• Nebojša Nikolić
• Marcus Oldenburg
• Alexandra Preisser
• Hartwig Quirll
• Marcin Renke
• Bernd Fred Schepers
• Klaus Seidenstücker
• Jens Tülsner
• Thomas von Münster

NATIONAL ORGANISING COMMITTEE

• Jan Heidrich
• Volker Harth
• Bernd Fred Schepers

• Klaus Seidenstücker
• Thomas von Münster
• Marina Zettl

CONGRESS ORGANISER

Universität Hamburg Marketing GmbH
Feldbrunnenstraße 9
20148 Hamburg, Germany
Welcome Address by I. Denisenko, IMHA-President

Dear Friends and Colleagues,

on behalf of the International Maritime Health Association, it is a great pleasure to welcome you all to the 15th International Symposium on Maritime Health from 12-15 June in the beautiful Free and Hanseatic City of Hamburg.

The City of Hamburg has a reputation as Germany’s gateway to the World. The biggest German port, the third biggest in Europe. Being one of the maritime cities in Germany, Hamburg hosts the International Tribunal of the Law of the Sea and the Institute for Occupational and Maritime Medicine. The International Symposium on Maritime Health is the only maritime health event of its kind.

This year’s conference attracted over 400 delegates from different parts of the world. It features plenary sessions, workshops, interdisciplinary symposia, expert panels and a rich cultural and social program. I would like to express my sincere gratitude to the organizers, who worked in collaboration with IMHA to help make this Symposium possible: the German Maritime Health Association, the Institute for Occupational and Maritime Medicine (ZfAM), the Deutsche Seemannsmission, Hamburg Port Health Center, Universität Hamburg Marketing GmbH and Hafencity University.

We have put all our efforts together in order to bring a top-notch scientific program that covers the latest updates in maritime medicine and related field. The Organizing Committee chaired by Prof. Dr. Volker Harth has come up with an excellent program, featuring speakers from all over the world as well as a wonderful social program, including the visit to the famous Duckdalben International Seafarers Club, which in 2011 was named the best in the world, boat trip through the historical city channels. I sincerely hope we will enjoy these four days in Hamburg, benefit from the debates, educational and as well networking opportunities that the Symposium will offer, meet old friends and make the new ones.

Fair winds and following seas!

Dr. Ilona Denisenko
IMHA President
Welcome Address by Senator C. Prüfer-Storcks, Hamburg Ministry of Health and Consumer Protection

Ladies and Gentlemen,

It is with great pleasure that I welcome you all to the Free and Hanseatic City of Hamburg for the 15th International Symposium on Maritime Health (ISMH15).

The influence of Hamburg’s 830-year maritime tradition can be witnessed throughout the city, from the historic warehouse district to the state-of-the-art cruise ship and container terminals. Hamburg is the largest German port and the third largest container port in Europe. Every year we welcome around 13,000 seagoing vessels and 250,000 seafarers to our port. The health and wellbeing of seafarers is of great concern to us. While there has been a rapid improvement in the working conditions experienced by port workers over recent decades, the same cannot be said for mariners upon the high seas. They still face problems similar to those experienced by previous generations. I am therefore thankful that experts will focus on the theme of "Sea, Port, Health and Environment” at ISMH15 and discuss new strategies for the promotion of health and the prevention of accidents and occupational illnesses in the maritime context.

The Free and Hanseatic City of Hamburg is committed to healthcare and research, and we have been focussed on maritime health for almost 130 years. Our city is home to the world's first port-specific health authority as well as the Bernhard Nocht Institute for Tropical Medicine (BNITM), and the Institute for Occupational and Maritime Medicine (ZfAM). The ZfAM is part of the Hamburg Ministry of Health and Consumer Protection, and has close ties to the University Medical Centre Hamburg-Eppendorf. The ZfAM is committed to researching the adverse effects of work-related stress on human health and protecting the lives and health of seafarers. The Free and Hanseatic City of Hamburg is furthermore dedicated to the safeguarding of peace and justice at sea, and is home to the International Tribunal for the Law of the Sea. I hope that this international symposium will be a resounding success and I thank you for your valuable contribution to the protection of workers’ health in the maritime sector.

Cornelia Prüfer-Storcks,
Hamburg Ministry of Health and Consumer Protection
Dear colleagues, ladies and gentlemen,

on behalf of the German Maritime Health Association (DGMM) and the University Medical Center Hamburg-Eppendorf (UKE) I am delighted to welcome you to the 15th International Symposium on Maritime Health (ISMH15) in Hamburg.

Under the auspices of the International Maritime Health Association (IMHA), ISMH15 will convene under the motto “Sea, Port, Health & Environment”. About 350 experts from all over the world are expected to present the most recent scientific results and discuss innovative approaches in maritime health. The conference programme includes several keynote lectures and more than 130 abstract-based oral and poster presentations, and is supplemented by panel discussions and working group meetings.

In cooperation with the International Commission on Occupational Health (ICOH), two satellite symposia will broach the issue of chemical hazards in maritime health. Additional interdisciplinary satellite symposia, e. g. on offshore medicine or on health threats at points of entry, will be held to enlarge the scientific scope.

The Free and Hanseatic City of Hamburg harbours the largest German seaport named the country’s "Gateway to the World". The conference venue at the recently opened HafenCity University is located directly on the waterfront at the seaport’s edge, within the unique architecture of transforming harbour areas (Hafencity). The nearby located warehouse district (Speicherstadt) is the largest intact and coherently designed warehouse ensemble in the world and is included in the UNESCO World Heritage list.

Hamburg is well known for its culture, history and lifestyle. The social programme comprises receptions at the City Hall and the famous International Seamen’s Club Duckdalben with a harbour boat trip, and a dinner at the Rowing Club Favorite Hammonia including a canal tour. Surely all these events will give you vivid memories of Hamburg. I hope you will enjoy your stay and wish you exciting meetings and stimulating talks.

Prof. Dr. Volker Harth (MD, MPH)
President ISMH15
Chairman of the German Maritime Health Association
PLENARY SESSION I: Mass Rescue Operations

Chairs: J. M. Haga, B. F. Schepers

Cruise ship «Viking Sky» close to disaster under stormy weather in Norway

A. J. Ulven, Bergen

**Background:** During a heavy storm on 23 March 2019 the cruise ship *Viking Sky* (built 2017, gross tonnage of 47,800) was crossing the Hustadvika Bay in Norway with 1373 international passengers and crew. The ship suffered a full stop of all four engines, lost control and issued a mayday signal at 14:15 hours. The storm and waves up to 50 feet were heading against the shore and the ship drifted rapidly towards land. When the two dropped anchors caught sufficiently and the engineers had managed to restart one engine, the ship was about 100 m from running aground. Passengers and crew experienced a realistic fear of losing their lives.

**Methods:** A qualitative analysis of Norwegian and international news coverage of the incidence and rescue during the period 23-31 March 2019.

**Results:** At 15:00 hours a full evacuation was decided. Two purpose-built rescue boats had to turn back because of the dangerously high swells. Individuals were airlifted to a rescue center ashore using a fleet of five helicopters. The helicopter evacuation continued for approximately 20 hours. 436 guests and 458 crewmembers still remained on the ship while 479 passengers had been airlifted. 27 of them were sent to hospital because of injuries. In addition 9 crewmembers from a freighter were rescued by helicopter in the same area. The ship reached port in Molde on 24 March 2019 at 16:30.

**Conclusions:** The regional rescue services were prepared and well trained. Airlifting 479 persons from a cruise ship to shore during a fierce storm in less than 24 hours will stand as one of the most impressive civilian maritime helivacs ever. The competent ship’s officers and crew managed to prevent a potentially tragic disaster and kept the passengers calm. The presentation will be updated with results from official reports and ongoing investigations on upfront risk assessment, route-planning, technical shortcomings and ship construction.
PLenary Session II: Mental Health

Chairs: S. Mache, A. M. Horneland

Mental Health and Risk Factors in Seafarers

R. Lefkowitz, New Haven, Connecticut; M. Slade, New Haven, Connecticut; C. Redlich, New Haven, Connecticut

Background: Despite evidence that seafaring is a mentally stressful occupation, there is little published on incidence and prevalence of depression, anxiety, and work-related stress in seafarers, nor the risks that these conditions contribute to injury, illness, and death. The primary objective of this research project was to better understand the extent of seafarer depression and anxiety and associated risk factors, in order to reduce the impact of mental illness in seafarers. To achieve these goals, we initiated a cross-sectional study of working seafarers.

Methods: The study utilized a cross-sectional survey study of active working seafarers recruited through emails, social network websites, and other advertising through seafarer organizations including the International Transport Workers' Federation (ITF), Sailors' Society, and Seamen's Church Institute, and through shipping registries. Descriptive statistics were used to describe the psychosocial workplace environment, rates of depression and anxiety, and injury and illness rates in the seafarer population. Logistic regression was used to determine risk factors for depression in the seafarer population.

Results: Preliminary results of the 1572 seafarers found the following. Seafarers were mainly male (89%), with a mean age of 40.7 years (s.d=12). Regarding worksites, 55% of seafarers were deck workers, 29% were in the engine department, and 7% stewards (with 8% other). Average tenure was 16 years (s.d=11). A diverse representation of flags and vessels was observed. Using the 9-Item Patient Health Questionnaire (PHQ-9) depression screening tool (completed in 1262 surveys), 25% of seafarers scored 10 or above, screening positive for depression. Logistic regression modelling determined increasing age to be a protective factor against screening positive for depression using the PHQ-9 (OR 0.985; 95%CI: 0.974, 0.996).

Conclusions: One-quarter of seafarers screened positive for depression. Preliminary analysis of the data found a significant burden of depression but not anxiety in the seafarer population. There was an inverse relationship between depression risk and age. Further analysis, controlling for demographic and occupational variables, and considering work environmental measures, will be conducted to determine risk factors for seafarer depression.

Funding: This study funded by the ITF/Seafarers’ Trust, and CDC/NIOSH grant K01 OH010681, with additional support by RightShip.

PTSD among seafarers: French qualitative and quantitative study, trails to ensure a better care (ISMH15-Young Investigator Award)

C. Jego, Saint Nazaire; C. Grepinet-Ayewubo, Brest

Background: Numerous studies highlight the risk factors for developing PTSD. There is a growing consensus into the importance of both detecting and delivering care appropriately, particularly regarding early stage prevention using defusing and debriefing strategies. Recognition of the significance morbidity of this psychiatric disorder led to national plans in France: establishment of the
ISMH15 15th INTERNATIONAL SYMPOSIUM ON MARITIME HEALTH

CUMP (emergency medico-psychologic support units) in 1995 and creation of psychotrauma care units. However, studies of PTSD in the merchant navy are rare and seafarers appear to have been overlooked in most health surveillance and care networks. This is despite the fact that this profession is recognised as the most dangerous job worldwide, with accident rates higher than any profession on land. These hazards have only increased with direct exposure to piracy and the migrant crisis. Furthermore, remoteness (from healthcare) - the essence of a ship - is a risk factor to develop PTSD.

**Methods:** The authors performed study of PTSD prevalence among a sample of seafarers through THQ and PCL-5 questionnaires, combined with individual interviews with some selected seafarers who had experienced a traumatic event at sea.

**Results:** 114 questionnaires filled by merchant seafarers (including fishermen) were validated to be included in this study and showed a prevalence of 20.17% of full and sub-syndromal PTSD. This study led to the establishment of links between the CUMP and the SSGM (French National Occupational Health Department for Seafarers): real-life experience in the Indian Ocean of immediate, on the ground, post-trauma care.

**Conclusions:** This maiden study highlights the importance of systematic screening after major adverse events at sea for this very exposed population, which should be considered at risk of developing PTSD. It is therefore necessary to adopt procedures to detect and prevent PTSD’s immediate risks and its comorbidities. This should be done by trained health care providers, separately from the providers delivering fitness for work certificates, by: the creation of a providers’ network with an organisation specific to the maritime environment, in close contact with TMAS, MRCC, and shipowners; the use of telemedicine because of ships' geographical isolation coupled with the breakup of crews once on land; awareness campaign and training of their healthcare providers (primary care, occupational health); education of crews (through STCW first aid and medical courses) and shipowners.

**Mental well-being program to reduce depression & suicide among seafarers & family**

S.A.A. Chowdhury, London; A. Serang, Mumbai

Background: Life is extremely challenging for a seafarer. Multiple issues such as demanding work environment, adherence to strict deadlines, difference time zones, and away from home affect seafarers’ mental health. According to internal claims figures from the UK P&I Club, deaths by suicide among seafarers more than tripled from 4.4 per cent in 2014 to 15.3% in 2015.

**Method:** NUSI launched NUSI SAHARA last year. Sahara which means support in local language is 24/7 free of cost Psychological Counselling Helpline to Indian seafarers and families through specially trained psychologists and counsellors who can be reached easily by toll free number, internet platforms like skype, Whats app.

One year after launching, NUSI SAHARA received 537 phone calls from seafarers and their families. Around 65% of the calls were from seafarers and rest are from their family members. These figures confirm that seafarers have more physical and psychological stressors and fewer resources to help them to cope but their families also face mental trauma and stress while living away from their loved ones, Almost 70% of seafarers and their family members reported to have stress and anxiety issues while 50% faced problems related with management. 40% reported calls were around family, relationship related issues. 25% of the total calls are related to lack of ship-shore connectivity. Quite
interestingly 20% seafarers were concerned and stress because harassment and conflicts even extreme physical violence with co-workers.

In addition to one to one counselling, NUSI SAHARA also organised 108 capacity building workshops which was attended 3240 seafarers and their families. These workshops helped them to mitigate stress and learn effective coping strategies and hands on technique to deal with stress.

Conclusion: Some employers have started tele-counselling services for their crews but often, they are reluctant to talk about their mental health and seek necessary support because they are afraid of losing their jobs and being black listed. One year program data clearly shows service offered by seafarers’ union has started working successfully among seafarers where utilization of the resources for mental health is the lowest. The program also shows making help-seeking accessible can improve quality of life and productivity at work. ITF will be working with other affiliates from seafarers supplying countries on how NUSI SAHARA program can be replicated for global seafarers.
Working conditions, mental and physical health of employees in the German offshore wind industry.

J. Mette, Hamburg; V. Harth, Hamburg; M. V. Garrido, Hamburg; S. Mache, Hamburg; A. M. Preisser, Hamburg

**Background:** The development of the German offshore wind branch began in 2007 with the "alpha ventus" offshore wind farm, opening up a new field of employment for thousands of skilled workers, such as technical specialists. Work in the offshore wind industry is considered physically and psychologically challenging. Employees work in a remote, hostile environment with industry-specific job demands and health hazards. However, their work and health situation has not yet been scientifically investigated.

**Method:** The aim of our project was to analyse the work conditions and health of employees working on offshore wind farms in Germany by means of a multi-methodical analysis. Semi-structured telephone interviews with offshore workers and industry experts (n = 42) as well as an anonymous web-based survey with offshore workers (n = 384) were conducted. Subject areas were, among others, the workers’ job demands and resources, health, strain, sleep quality as well as workplace health promotion offshore.

**Results:** Overall, the results suggest a good physical and mental health of offshore workers. However, employees also experienced stress and fatigue in connection with their work. In particular, high quantitative demands at work were related to increased stress levels. Many employees showed a high need for recovery after their work shifts and offshore assignments. In addition, almost half of the employees complained about poorer sleep quality during their offshore stays compared to their sleep quality onshore. They also experienced physical strains, such as working in unergonomic postures, handling heavy equipment, and frequent climbing. Employees' job resources consisted, e.g., of the personal meaning of their work, the sense of community and social support from their colleagues. Especially social support was found to show stress-reducing effects. In terms of workplace health promotion, only few offers were known by the workers. As a result of the project, a handbook was developed, summarizing the results and providing recommendations for behavioural and environmental health promotion measures. In particular, the work organization and living environment offshore were identified as relevant target fields for health promotion.

**Conclusion:** The results offer new scientific insights in an increasingly important work field. The handbook provides valuable information in order to design workplace health promotion measures tailored to offshore workers' specific needs.
environmental (HSE) perspective. With work places up to 75 NM from port, thus limited rescue possibilities, and hazardous tasks to be performed, the necessity to take effective measures for ensuring health and safety of the personnel arises. One important factor in achieving these aims is coordination. Personnel of different firms and trades need to be coordinated in a way that they do not interfere or cause harm to each other. Moreover, the implementation of HSE measures requires coordination that results in improvements being effectively achieved and maintained with the heterogeneous organisational structures of offshore wind projects and the complex legal framework being taken into account.

Since very limited information about the actual realisation of HSE coordination in offshore wind is publicly available, interviews on this subject were conducted through questioning experts and employees working in the industry. Analyses of the interviewees' statements revealed, while generally being positive about the state of health and safety, a lack of communication within and between companies, unclear organisational structures, incoherent job titles as well as an indistinct and improvable distribution of responsibilities and competencies. Some interviewees criticised HSE coordinators and managers for having a deficiency in offshore experience and communication skills as well as a lack of presence at the offshore work site.

Within the BestOff project several optimisation solutions were developed. A model of an industry-specific uniform HSE coordinator was created, compiling necessary and helpful functions and competencies. Monte Carlo simulations, modelling a wind farm during O&M phase, were performed to explore the interactions between safety restrictions and economic performance indicators, thereby gathering information that can help HSE coordinators and other responsible persons making decisions. An application for mobile devices was developed which can be used to support HSE coordination as well as to improve communication and information of all persons involved in offshore works, using specifically designed functions. Finally, a handbook to assist HSE coordinators, especially in the initial phase of their job, was created, comprising the obtained information and results.

6 years Offshore Working Time Ordinance - working-time safeguards and occupational safety and health

M. Buhlinger, Berlin

Offshore work is often hard and dangerous. The German Working Time Act and the German Maritime Labour Act are not always aligned with the special requirements regarding the organisation of working time in this sector. In this context, Germany developed the Offshore Working Time Ordinance, which meets the special requirements of the offshore sector.

The presentation will cover the scope of the Offshore Working Time Ordinance, it will provide an overview of the main standards applicable to the organisation of working time, and it will present the results of the evaluation of the Ordinance that was completed at the end of 2018.

Health and wellbeing of offshore employees in Denmark

S. Rubio, Esbjerg; D. A. Bygvraa, Esbjerg; O. C. Jorgensen, Esbjerg

Background: The offshore industry is of great importance to Denmark but very little is known about the health and wellbeing of the employees in the industry. It would be relevant to seek insight into offshore professionals working life, challenges and perception of health.
Objective: The aim was to investigate the Danish offshore employees’ perceptions of occupational strain and health. Furthermore, to investigate their coping strategies when dealing with the demands of the offshore work.

Methods: A qualitative approach was chosen with 11 informants (9 semi structured telephone interviews and 5 face to face semi structured interviews). They were conducted with Danish offshore employees from both oil and gas and wind. To give light to the interview topics a literature review was done in PubMed, Google Scholar and Google databases in the period September 2018- January 2019.

Results: All employees generally reported good mental and physical health. However, some also reported stress at work, loneliness, difficulty detaching from work when transitioning from offshore to home, fatigue and sleeping problems all to a varying extent. Furthermore, physical health impairment in relation to offshore work, e.g. loss of hearing, stress, sick-leave and musculoskeletal compliments were mentioned by some participants. Safety, compliance with the rules and lifestyle choices seem to be of concern especially in relation to alcohol consumption. The employees stated different strategies for coping with the job demands however, they highlighted that they were satisfied with their job.

Conclusion: The results offer new insights into the coping strategies of Danish offshore employees however, the study does not allow for firm conclusion whereby further research is needed.

Medical kit for OSR 2 offshore yachts races

J. C. Fimbault, Brest; D. Henaff, Brest; B. Loddé, Brest

Background: Climatic and environmental conditions, the remoteness of the coastline, the isolation on board, the increasingly efficient and fast boats make offshore racing a sporting activity where a special medical follow-up is essential. The medical kit is an essential element. Its composition follows various national and international organization recommendations. If there are several articles dealing with offshore races, there are none for Category 2 races (OSR 2). Distances are shorter, participants are within 200 miles of a shelter, so help can be done more quickly. Out-of-date emergencies can become life-threatening emergencies with hope of survival. These competitions are run by many amateurs, more inclined to be faced with emergencies to which professionals are better trained to respond. For these reasons it seemed appropriate to focus on the re-evaluation of the medical kit of these boats.

Methods: The method used was that of “Professional recommendations by formal consensus of experts” derived from the Rand/UCLA method. After a critical analysis of the literature, a panel of 19 experts having expertise in medicine in maritime environment, was gathered from various medical specialties (cardiologist, internist, intensivist and emergency physician, ENT physician and general practitioner) and from varied medical activities. They had not declared direct conflict of interest.

Results: Out of 12 solicited experts we only have 7 participations. Given the lack of literature, experts have no choice but to rely on their personal experience. We cannot affirm the statistical power of our study. There is therefore no formal consensus. However, experts are unanimous in retaining the entire current OSR 2 medical kit. Experts recommend introducing 21 new items out of 111 from the French recommendations for category B vessel medical kit (COUNCIL DIRECTIVE 92/29/EEC). This corresponds to a near doubling of the current allocation of racing yachts. The opinion of the experts is decided, rarely undecided, but sometimes contrary.
Conclusions: Medical kit for OSR 2 offshore yachts races is an essential element. There is no paper about the subject in this type of race. This finding gives all legitimacy to our study. The proposed medical kit has been doubled compared to the current proposal. The proximity of the nearest port suggests that more equipment for emergency treatment may be useful.
PARALLEL SESSION I-1 -
Joint Session of ISMH15 and German Seaman’s Mission on: Ethics in maritime medicine.

Maritime Medicine is practiced in a global and economically driven environment. It is a novelty in the history of the International Maritime Health Association to discuss ethical issues in cooperation with Deutsche Seemannsmission e.V., a worldwide church based welfare organization for the dignity of seafarer’s. We will discuss confidentiality in medical care, psychological counselling after stressful events, suicide prevention, repatriation for health causes, the role of the maritime physician, health and welfare support programs for seafarers.

Chairs: C. Schlaich, I. Denisenko, R. Jörgens

Stress in seafarers daily work life and in crisis situations. Initiatives for Psychosocial support.

C. Schlaich, Hamburg; M. Ristau, Hamburg

Background: There is a growing awareness about the psycho-social stress on seafarers in the shipping industry. Despite some advances in working standards and in ship modernisations, it remains a special sector:

- Seafarers have reduced possibilities available for stress reduction. This makes them more vulnerable in traumatic events, like accidents, life threatening storms, pirate attacks, death of fellow crew members.
- There are many clichés about seafarers like "they are hard guys", which makes it more difficult to admit stress and to talk openly about stressful incidents.
- Studies have identified separation from families, time pressure, long working days, heat in workplace and insufficient qualification as risk factors for stress (Oldenburg et. al.)
- Welfare organizations are providing resources for stress reduction in seafarers.

Methods: The Seamen’s Mission is called after traumatic incidents for stress management and trains the chaplains for interventions after traumatic incidents. As a regional port chaplain, I had hundreds of conversation with seafarers and other chaplains about seafarers work and life on board and in foreign ports, also I talked to seafarers” families in Germany and on the Philippine and analysed their needs after traumatic incidents.

Results: Seafarers feel a constant stress resulting from their economic and family situation and rooted in the routine work and life situation on board and in foreign ports. There is also a high risk of traumatic incidents. In my experience, the topic of psychosocial stress is still not openly addressing in shipping companies and within the crew. Currently, a trained emergency crisis response service for crew is not routinely available.

Conclusion: More research on psycho-social stress in seafarers is needed to identify stressors and relieving factors and to evaluate coping strategies. More awareness in shipping companies, all agencies, maritime public authorities, as well as in maritime academies and training centres is needed. Response to psycho social traumatic incidents of seafarers has to be organized in an effective way and offered by independent organizations like the welfare organizations mentioned in the MLC, as they are independent from the ship owners but are "insiders" in the world of the seafarers. Support from shipping companies and insurers is needed on this.
Maritime Welfare Facilities - utilization and relevance for the compensation of shipboard stress

H.-J. Jensen, Hamburg; M. Oldenburg, Hamburg

**Background:** Maritime welfare institutions enable crew members of ships to use different recreation facilities ashore during their work assignments aboard. This study analyses the ship’s crew members need and their usage behaviour of maritime welfare facilities that can be visited free of charge while their ship is in port.

**Methods:** A medically trained scientist interviewed 316 seafarers during 22 ship voyages. In addition, interviews were performed in 8 stations of the German Seamens’ Missions.

**Results:** Port stay of the vessels accounted for 43.6% of the entire voyage duration. 279 seafarers (88.3%) stated having had opportunities for shore leave in order to visit maritime welfare facilities. Officers less often stated possibilities for shore leave than ratings (OR 0.40; 95%CI 0.24-0.67). The main reasons for shore leave were to contact family and friends and distraction from the everyday work on board. Short stays in port, a high workload and limited opportunities for reaching the welfare facilities were main obstacles to shore leave. Furthermore, several seafarers complained about poor information on board about the facilities. Among the various welfare institutions, a "very high importance" was attributed to Seamens’ Missions and religious facilities (40% of the non-European seafarers - especially from Asia - and approx. 10% of the Europeans).

**Conclusions:** This study reveals sufficient time periods for seafarers to leave the vessel in port, mainly depending on the number of terminals to be called at. During the vessels’ port stay, a reduced workload for the shipping crew can be achieved by transferring several routine tasks to shoreside personnel. Furthermore, more attention should be paid to the accessibility of the welfare facilities and to better information about their offers. Measures should be taken to facilitate visits to maritime welfare facilities as an important refuge for seafarers.

Potentially traumatic experiences of seafarers

M. Oldenburg, Hamburg; H.-J. Jensen, Hamburg

**Background:** Severe emotional stress or potentially traumatic events can occur in maritime shipping, mainly as a result of ship wrecks, personal accidents, piracy and as part of refugee rescue on the high seas. The aim of the present study is to assess the extent to which seafarers were affected by severe mental stress situations and what possible psychological effects they may have.

**Methods:** A psychologically trained investigator interviewed 323 seafarers during the voyages of 22 German ships about severe mental stress or potentially traumatic events on board (participation rate 88.5%). Furthermore, a psychologist conducted semi-standardized interviews on seafarers' traumatic experiences in 12 shipping companies and in 8 stations of the German Seafarers’ Mission.

**Results:** 116 of the seafarers surveyed on board (35.9%) experienced ship wrecks/ severe accidents and 55 (17.0%) piracy on board. Experiences with stowaways indicated 126 seafarers (39.0%). Repeatedly unintentionally having to think about these events, being reminded or often dreaming of by certain noises, smells, etc., were aftereffects in 97 (83.6%) of the affected seafarers after serious personal accidents on board / ship wrecks and in 42 crew members (76.4%) after threats of piracy. Threat experiences by stowaways had particularly affected non-European seafarers or ratings. According to the interviews with the shipping companies, a total of 14 deaths occurred in the last 3
years in the 12 interviewed shipping companies (due to heart attacks (3 times), severe cancer (3 times), very serious accidents (3 times), suicides (2 times) and 3 times with unknown causes of death). After extreme mental stress on board, 3 shipping companies contacted directly the Seafarers’ Mission for the first psychological support. 3 shipping companies saw no need for psychological support after extreme stress on board.

Conclusions: A serious injury or even the death of a member is a serious psychological stress experience for the other crew members in the closed social system on board. These events are particularly distressing for Filipino seafarers with their strong socio-centric bonds and religious values. To stabilize the Filipino crew members, priestly support is often required. In contrast European crew members focus on psychosocial first aid. As a preventive measure psycho-education of seafarers should be established for coping with extreme mental stress situations.

What have we and can we learn about seafarers’ health at seafarers’ centres around the world?

J. Zuidema, London

Port-based seafarers’ welfare organizations exist in over 400 ports around the world. Though stated goals can differ slightly, these seafarers’ missions typically list the wellbeing of seafarers as their top priority. Using data from member digital and print publications and a survey completed by 40 seafarers’ welfare professionals in North America, this presentation seeks to understand the scope of health and wellness services typically offered to seafarers at port-based seafarers’ centers and some indications of how those services are received and perceived by seafarers. The presentation should provide seafarers’ health professionals one extra tool to understand the current needs.

Repatriation of Seafarers – Is the Dollar more important than the Seafarer?

N. Griffiths, Singapore

The repatriation of ill and injured seafarers is a responsible undertaking. Each seafarer is a human being and due consideration should be given to his illness or injuries in preparing for repatriation. The repatriation follows a formal application to the airline for repatriation once medical fitness has been declared by the treating physician. With the growth of non-medical organisations undertaking repatriations and even ship owners overseeing their own repatriations with minimal if any medical input the quality control is diminished. Are seafarers being put in danger? Are doctors operating without international medical indemnity insurance? Are correspondents and agents undertaking medical repatriations? Is the Dollar more important that the seafarer? We shall look at individual case scenarios.

Keeping seafarers’ health data confidential: is there a need for action?

D. B. Stevenson, New York

Seafarers, like most of us, feel that health information is private and should be protected. But, is it a reasonable expectation for seafarers to have their medical information protected?
There are two critical, and often conflicting, public policies that must be weighed when considering protecting seafarers’ medical information. First, there are ethical and legal requirements for physicians to protect their patients’ medical information. Second, seafarers are required to be medically fit to work on ships.

Confidentiality is a necessity element of the doctor-patient relationship. Doctors have a special relationship with their patients. Patients must be able to trust their doctors. Patients seeking medical help or advice should not be afraid that their medical concerns or conditions will be disclosed to others. If patients think that their personal information will be disclosed to others, they may avoid seeking medical care, or may under-report exposures and symptoms, thereby preventing doctors from accurately diagnosing and treating conditions.

Doctors’ obligation to protect their patients’ privacy is based on both ethical and legal requirements. The concept of “doctor-patient” confidentiality is based on ethics, not law, and has its roots in the Roman era Hippocratic Oath taken by doctors even today. The Hippocratic Oath requires doctors to protect medical information about their patients.

In addition to doctors’ ethical obligations, many countries have enacted laws that to require “doctor-patient confidentiality”. The United States and European countries, for example, have enacted laws that strictly protect medical records from unauthorized disclosure.

While a doctor’s primary obligation is to their patients’ privacy rights, doctors also have public safety obligations. In some circumstances, it can be in the public interest for to disclose patient information if the benefits to society outweigh the patient’s interests. For example, disclosure could be justified to protect individuals or society from risks of serious harm such as from serious communicable diseases or serious crimes. Physicians can ethically disclose confidential information received from patients where there is a serious threat to public health or welfare or to the patients themselves. However, only the minimum relevant information should be disclosed.

Most countries have enacted requirements for doctors to report certain diseases and injuries to the authorities that over-ride doctor-patient confidentiality requirements. In such cases, the duty to protect public health outweighs the duty to protect a patient’s confidentiality. For example, some countries require reporting cases of measles, rabies, anthrax, botulism, sexually transmitted diseases, and tuberculosis. Cases of suspected child or elder abuse and gunshot wounds must be reported to the authorities in many jurisdictions. The requirements for doctors to report conditions should be very limited. When doctors are put in the position of being enforcement officers, it can have long term effects on their ability to treat their patients who will fear seeking treatment for their conditions.

Doctor-patient confidentiality ethical and legal requirements can conflict with requirements that seafarers be medically fit to perform their duties. Public safety policies require that seafarers, like other operators of commercial vehicles, must be medically fit to operate ships.

In keeping with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and the Maritime Labour Convention, 2006, flag state laws require seafarers to have valid medical certificates that are valid for two years.

The medical standards for medical certificates are determined by individual flag states. They are guided by the ILO/WHO Guidelines for Conducting Pre-sea and Periodic Fitness Examinations for Seafarers. These guidelines were updated in 2013 by the ILO’s Guidelines on the medical examinations of seafarers.

Medical certificates do not certify that seafarers are healthy or free from disease. The typical criteria for medical certificates are that the seafarer is not suffering from any medical condition likely to be
aggravated by service at sea or to render the seafarer unfit for service or to endanger the health and safety of other personnel on board; and the seafarer is not taking medication that has side effects that will impair judgment, balance or any other requirements for effective and safe performance of routine and emergency duties on board.

The MLC, 2006 requires that a “duly qualified medical practitioner” must be given full professional independence in exercising medical judgment when conducting medical examinations and issuing medical certificates. Some flag states allow seafarers to choose their own “duly qualified medical practitioner” to examine them and certify their medical fitness, creating obvious ethical and legal issues for doctors who are asked to examine and certify their patients. Medical doctors’ ethical obligation to protect patient confidentiality can prevent them from disclosing their patients’ potentially disqualifying conditions or medications.

Medical certificates rely on seafarers’ disclosing their medical condition and any medications they may be taking. Because disclosing a possible disqualifying condition or medication could jeopardize their careers, seafarers have an incentive to conceal potentially disqualifying conditions or medications.

Medical certificates certify a seafarer’s medical condition at the time they are issued. They are not valid predictors of a seafarer’s future health nor are doctors required to provide interim updates medical certificates.

Flag states’ requirements for medical certificates specify many disqualifying conditions, but there are many other conditions that could make a seafarer unfit to work on a vessel. Medical disability for working on a ship can be very complex and multi-dimensional involving chronic conditions and the effects of their treatments. It can be difficult to objectively measure some conditions that potentially affect a seafarers’ fitness. Physicians must exercise judgement about the nature of a disability, the incidence of an episodic disease, and the likelihood that the condition could affect maritime safety and the seafarers’ own health. In addition, before a physician decides whether a condition disqualifies a seafarer from his or her occupation, the devastating effects of such a determination must be weighed against the risks to the patient and maritime safety.

Maritime doctors routinely care for seafarers whose ability to work on a vessel is compromised by a physical or cognitive condition. How do they balance ethical and confidentiality obligations to their patients with the conflicting obligations of protecting maritime safety?

Maritime doctors must make difficult ethical and legal choices about protecting their patients’ privacy or confidentiality. How can we help them? I propose the following, keeping in mind that the most critical shipping crisis is how to recruit and retain sufficient number of skilled men and women to operate the vessels needed to sustain commerce:

- IMHA could develop guidelines for maritime medical professionals’ ethical obligations to reporting seafarers’ physical and medical conditions that could impair his or her ability to work on a ship. This would include developing validated measures of medical disability and defined thresholds of risk tolerance for seafarers to work on vessels. Guidelines should be based on the following principles:
  - Doctors should advocate for seafarers’ interest and welfare where the primary ethical obligation is to the seafarer;
  - Duty of confidentiality is important but not absolute;
  - An obligation to report information that might seriously and directly impact seafarer’s or public’s safety;
• Reporting should be voluntary and not compulsory; and
• Doctors should be immune from penalties for good faith reporting (or not reporting)

• There should be a firewall between a treating doctor and a certifying doctor. (This would help with doctor-patient confidentiality issues but wouldn’t help with the Still have problem of seafarers concealing their symptoms.)
• There should not be more legal requirements for treating doctors to report their patients’ medical conditions. This would deter seafarers from seeking treatment and could result in untreated and unfit seafarers risking theirs and others’ lives. It is important to encourage patients to be forthright with their doctors to enable them to provide appropriate treatment.
• **There is a need to create an environment where seafarers will disclose potentially disqualifying conditions.** How?
  o Employers and flag states must consider seafarers’ disclosures with compassion and at the same time allow zero tolerance with those who conceal or lie about their conditions.
  o Flag states should consider issuing medical certificates that authorize some employment on vessels. They could place appropriate limitations on types of work, vessel voyages, vessel types, etc. rather that straight-out disqualifications.
  o Employers should provide treatment to seafarers with medical conditions to enable them to return to employment after treatment. They should help find other occupations for those who become medically disqualified (there will be some who should not work on a ship) Recruiting and retaining skilled men and women for seagoing careers remains the biggest challenge in the maritime industry. While we must ensure that seafarers are medically fit to work, we must not disqualify them from unlimited sea service when they can safely continue to work with limitations as to vessel types, positions on vessels, and vessel routes.

Seafarers’ suicide while on board: Time for a prevention strategy

C. Schlaich, Hamburg; M. Schildhauer, Bremen

**Background:** The numbers of suicides on board of a ship is unknown. Globally, suicide attempts and suicide are highly prevalent especially in young men. Many countries commit to a multilevel prevention strategy that includes early detection for persons at risk, public awareness, access to counselling, crisis intervention and mental care, restricting access to the means of suicide and others. Seafarers do not have access to the shore-based services while on sea and no specific suicide prevention program is in place for most seafarers. In the year 2018 the German Seamen Mission in Alexandria got confronted with more than 15 ships on which a suicide occurred. The mission provided ship visits, counselling on board and by e-mail to relieve post-traumatic stress in remaining crew.

Risk factors for suicide are well researched. For ships trading in the Eastern Mediterranean Sea the following risks can be identified: Isolation, violence and abuse onboard, poor communication in an intercultural and hierarchical crew, lengthy separation and lack of communication to friends and family, missing facilities for relaxation, sports and recreation, alcohol abuse, poor economic status, psychomental stress by seeing refugees suffer or die, delivering war material and being confronted.
with the intercultural challenges to cope with Arabic life on board and in ports. There is a low awareness and no education within the crews and shipping companies to cope with depressions, with suicide planning and attempts. Seafarers have poor access to crisis intervention, counselling and mental health care while on board. Also the means of suicide –drowning- can easily be accessed.

**Conclusion:** The prevention of suicide in seafarers needs multilevel interventions. Risk and prevention factors need to be further identified, shipping companies must act to improve stress relieve by recreational facilities on board, limit contract times and ease communication with family, educating ranks and crew on peer counselling and access to crisis intervention will be crucial. Maritime Doctors need to use counselling opportunities while performing pre-embarkation medical exams or while delivering medical care. The German Seaman’s mission currently scales up its efforts for post-crisis intervention and tele-counselling.
PARALLEL SESSION I-2 -
Pre-employment medical examination

Chairs: A. Koch, J. Abesamis

Improving the training of Seafarers’ Doctors: Is it possible on an international scale?

S. Stannard, Bergen on behalf of the Northern European Maritime Authorities Medical Group

**Background:** As presented at ISMH 14, representatives from the maritime authorities of a number of Northern European states meet twice a year to discuss topics of mutual interest. Countries include but are not limited to Norway, The Netherlands, the UK, Germany, Denmark, Finland, Sweden, Luxembourg, the Faroe Islands and Belgium.

**Methods:** A list of learning objectives for the training of Doctors conducting the Pre Employment Medical Examinations (PEME) of seafarers was agreed in 2013. Discussion has been ongoing ever since about the best format for such training and when this training should be delivered.

**Results:** Training methods discussed have included e learning, a formal course, regular seminars, distance learning through other media, e.g. a CD/DVD, shadowing of colleagues and others. The timing of training could be before any medical examinations are carried out, over the first year of the Doctors’ appointment or over a longer period. Participation in a course, seminar or meeting is considered essential but when and how often such an event should be attended or how long each meeting should last is still uncertain. Many practical factors influence the debate including the location of the Doctors (overseas or within national boundaries), national legislation, who pays for the training and other expenses, the income a Doctor receives from a medical examination and how many medical examinations the Doctor performs each year.

**Conclusions:** Standardisation and a high quality training program for seafarers’ Doctors conducting PEMEs will help to improve the standard of the PEME and therefore reduce the risk of illness at sea for the seafarer and the ship owner/insurer. However even within the current group, many issues prevent training being delivered in a standardized form in all countries represented. We welcome discussion on the content and the format of current training programmes and ideas for harmonization from other maritime nations.

PEME: Experiences from the Appellate Body of the Norwegian Maritime Authority 1997-2018

A. M. Horneland, Bergen; H. S. Imsen, Bergen

**Background:** The right of a seafarer who is denied a medical certificate, to appeal the decision, is established in the MLC, 2006 (Standard A1.2, paragraph 5) and in the STCW Code, section A-I/9, paragraph 6. It is further described in the ILO/IMO Guidelines on the medical examination of seafarers, Chapter IX. Appeals procedures. The Norwegian Regulations of 5 June 2014 No. 805 on medical examination of employees on Norwegian ships and mobile offshore units, Section 13-16 describes the responsibilities today of the Norwegian Appellate Body handling such cases. The practice of the Appellate Body has been changed due to change in Regulations in 2001 and 2014, and due to the introduction of a structured approach to PEME risk assessment.
**Methods:** The study is a review of 2209 cases handled at the Appellate Body in the period of 1997-2018. The handling of cases under the existing regulations is compared with the handling of cases under the older regulations. Likewise, the handling of cases before and after the introduction of the structured approach to risk assessment is reviewed.

**Results:** The structured approach implicates considerations that allows for verification and re-examination to a greater extent than older approach. Seafarers’ doctors now have a greater possibility of discretion, as compared to the earlier regulations. Correspondingly, the number of cases at the Appellate Body has been reduced. The diagnoses and decisions of the 2209 cases will be presented, discussed, and evaluated.

**Conclusions:** The change in annual number of cases increased considerably in 2001 corresponding to introduction of new regulations, mainly due to BMI-requirements. We also found that the number of cases went considerably down in 2014, due to seafarers’ doctors being allowed greater discretion, and the removal of the BMI requirement. The new Regulations have other challenges, regarding visual acuity and colour vision testing. The study shows that a structured approach to PEME risk assessment lead to more comprehensive considerations and verifiable decisions. The introduction of a structured approach to risk assessment probably has improved fairness and equity in the case handling at the Appellate Body.

Unfitness to navigation: nosology and incidence rate over 12 years period in France

B. Loddé, Brest; M.-F. Megard, Brest; N. Le Goff, Le Guilvinec; L. Misery, Brest; R. Pougnet, Brest; J.-D. Dewitte, Brest; D. Lucas, Brest; T. Sauvage, Paris

**Objectives:** Firstly, determining the incidence rate of medical unfitness to navigation among French seafarers, secondly knowing about conditions (diseases or accidents) causing such incapacity so as to set up prevention when possible.

**Methods:** An exhaustive observational, descriptive, retrospective epidemiological and nosological study was carried out from the medical coding of files belonging to the EsculapeÒnational base registering all medical data regarding seamen followed up by the French seafarers’ doctors. The increasing rate of permanent medical unfitness to navigation was calculated in relation to the annual number of registered seamen. A 12 year span was referred to, in an attempt to figure out the different socioprofessional categories involved in the incapacity.

**Results:** 2392 local committees came to the conclusion of an incidence rate of under 1% for permanent medical unfitness to navigation between 2005 and 2016. The average age examined in committees was 48. The previous navigation time was 15.5 years. 67% of the seamen undergoing an unfitness had been working in the fishing sector. The main reasons for deciding permanent incapacity were: rheumatological conditions with specifically spine involvement, injuries dating back to accidents or other external causes mostly affecting the upper limbs, mental and behavioural problems with mood disorders and most often addictions, circulatory system diseases, namely coronopathies. The incidence rate of medical unfitness to navigation was seen to increase between 2005 and 2016 but a shift due to the dilution effect was noticed to punctually decrease in 2015.

**Conclusion:** Permanent unfitnesses seldom happen among French professional seamen. Prevention must be focused on musculoskeletal disorders, psychiatric and coronary conditions along with fighting against maritime accidents.
Early seasickness, Sopite-Syndrome and changes in psychic and physical skills after wave-exposure

A. Koch, Kronshagen; S. Sartisohn, Kronshagen; S. Klapa, Kronshagen; B. Grams, Kronshagen; W. Kähler, Kronshagen

**Background:** Seasickness and travel sickness are classic types of motion illness. Modern simulation systems and virtual reality representations can also induce comparable symptoms. There is evidence that the symptoms of early seasickness may vary between beginning nausea and feeling sick and primary signs of withdrawal and tiredness, the so-called Sopite-Syndrome. It was the aim of the study to investigate, if early seasickness also causes impairments in psychic or physical performance, such as vigilance, coordination and strength.

**Methods:** Prospective controlled cohort study in n= 102 participants, who were exposed for 20 minutes to about 1m swell in a life raft in an indoor-pool versus control and sham situation; certain susceptibility to kinetosis was assessed before with an online motion sickness questionnaire. Participants were tested in different groups in the first 30 minutes after exposure with respect to parameters of physiologic, physical and psychic fitness.

**Results:** After 20 minutes exposure to 1m-swell in a life raft one third showed no, one third mild, and one third severe symptoms in the MSAQ-questionnaire. Cortisol significantly and also heart rate increased with highest effect in the subgroup with most severe symptoms. Heart rate variability tended towards stress reaction. Parameters of optic und acoustic vigilance were inconsistent with a trend towards worsening of vigilance, especially when symptomatic. Flicker-Fusion-Frequency tended to decrease when symptomatic. Parameters of coordination and strength tended to decrease, partly significant.

**Conclusion:** Mild symptoms in MSAQ may correspond with the Sopite Syndrome. Seasickness initiates signs of an overall stress reaction, strength and coordinative skills become negative affected. With emerging symptoms there is a trend towards worsening of vigilance. However, while on one hand nausea with stress may keep vigilance high despite feeling sick, and on the other hand primary tiredness and withdrawal without overt nausea in Sopite Syndrome may lead to worsening of psychic or physical performance, the results did not show a clear predictable pattern of expectable impairments in early seasickness. This may be of importance in responsible function aboard.
What shall we do to the drowning sailor? 150 years of maritime resuscitation

T. Carter, Bergen

**Background:** The first edition of the Ship Captain”s Medical Guide (SCMG) was published in 1868. There have been 22 Editions in the last 150 years and the 23rd is in preparation. British ships are required to carry a copy of the guide. The text and illustrations in these guides give unique insights into changing approaches to resuscitation and to their practical application in a setting where drowning is an ever-present threat.

**Methods:** Assessment of text of sequential editions of SCMG and comparison with contemporary medical references.

**Results:** Early editions focus on the use of stimulants with manipulations to draw air into the lungs if these fail. Stimulants fall out of favour and an ever-changing succession of external approaches are recommended, each named after their originator: Silvester, Schaefer, Holger Neilsen etc. The changes are broadly in line with lifesaving practices ashore.

By the 1960”s mouth to mouth and mouth to nose techniques are recommended, supplemented by one or other of the older external methods. By the 1990”s the mouth to mouth and mouth to nose techniques are the only method given. The latest edition will include advice based on current approaches to cardio-pulmonary resuscitation, which place greater emphasis on maintaining the circulation than on aerating the lungs.

**Conclusions:** Changes in recommendations may be the result of better evidence of effectiveness, but the role of dogma and the sensibilities of rescuers about acceptable techniques are also important.

Saving lives by changing from intravenous (IV) to intraosseous (IO) vascular access on board ships.

A. J. Ulven, Bergen

**Background:** Experience shows that it is difficult or impossible to achieve IV access onboard a ship due to unsuccessful attempts or a resistance to try. It is also very difficult to explain and guide the procedure by telephone. The hypothesis is that IO access is a much better alternative. Ships are often out of reach of medical evacuation (medevac) and when serious medical conditions occur in such locations, the crew has to manage on their own using the medical equipment, medicines and skills that are already on board. Vascular access is needed in cases when hypovolemia occurs or is likely to occur and/or when there is a need to supply energy through the infusion of glucose.

**Methods:** Indications and needs for vascular access and the likelihood of successfully establishing an IV vascular access on board a ship are based upon my 10 years of experience from Radio Medico Norway (RMN). The comparisons between IV and IO are based on scientific articles.
**Results:** Conditions that require vascular access are, for example, hypovolemia caused by serious diarrhoea and vomiting, bleeding, severe burns, loss of consciousness, heatstroke, sepsis, serious abdominal pathology and other conditions where fluid intake is difficult or impossible. Vascular access may be the procedure that makes the difference between life and death. There are many different intraosseous devices on the market. Manual devices require most training and are not recommended in this context. Impact driven devices have a risk of injury to the patient or the officer in charge of the treatment. The drill-powered devices are battery operated and work like an ordinary electrical drill that most people will be familiar with from domestic use. An ordinary owner’s manual will be sufficient for most personnel. The different sites for insertion are easily identifiable. It is also very easy for a remote doctor to give additional instructions if needed. Compared to IV access the procedure requires almost no training in advance, almost no refresher training, is user friendlier, is quicker, has a much higher success rate of up to 97%, has few contraindications, few reported complications and requires no additional aseptic precautions.

**Conclusions:** Ships are often out of reach of medevac. In serious medical conditions on board it can be of lifesaving importance to establish effective vascular access. Drill-powered devices to establish IO access are far superior to IV options on board ships.

**Medical kit for single-handed offshore yachts races.**

J.-P. Auffray, Brest; J. C. Fimbault, Brest; J. M. Le Gac, Brest; B. Barberon, Brest

**Background:** The medical kit is the basis of medical support in maritime environment, it is defined by international or national regulations and guidelines. For offshore races, rules and recommendations are proposed by national or international sailing federations. Sailing and racing offshore alone presents specificities that sometimes make it difficult to apply the usual recommendations. The epidemiology of single-handed offshore race is dominated by traumatic risks, medical events are relatively rare because competitors are high level athletes, generally young and subject to complete medical assessments. The scarcity of available scientific data makes it necessary to choose appropriate methods for developing recommendations. The purpose of this work is to propose a medical kit adapted and applicable to these situations.

**Methods:** The method used was that of “Professional recommendations by formal consensus of experts” derived from the Rand/UCLA method. After a critical analysis of the literature, a panel of 19 experts having expertise in medicine in maritime environment was gathered from various medical specialties (cardiologist, internist, intensivist and emergency physician, ENT physician and general practitioner) and from varied medical activities. They had not declared direct conflict of interest.

**Results:** A medical kit proposal has been developed (available in annex). The choice of drugs was based on the analysis of the epidemiology of medical events observed during the last offshore races. The experts’ choice was to reduce the quantity of medication and medical devices in order to limit the risk of confusion of molecules and dosages. Drugs with significant side effects or requiring third party monitoring have been removed. Medical devices designed to do an intervention impossible to perform on oneself have also been eliminated.

**Conclusions:** Solo sailing remains a marginal maritime activity with specific risks. The development of single-handed races requires an adaptation of medical support through the development of a specific medical kit and adapted training. The formalized consensus of experts seems to be an appropriate method for developing recommendations in the field of maritime medicine.
Heart rate variability in shipyard welders

B. Loddé, Brest; C. Ancedy, Brest; F. Guerrero, Brest; A. Le Gall, Brest; J.-P. Auffray, Brest; D. Lucas, Brest; J. Mansourati, Brest

**Background:** Metals and oxides are found in welding fumes and are thought to be responsible for an increased cardiovascular risk among exposed workers. Meta-analyses have shown a significant relation between exposure to welding fumes and myocardial infarction. Heart rate variability (HRV) reflects the quality of the cardiovascular autonomic function. HRV reflect autonomic nervous system balance on heart function.

**Methods:** In 2018, we recruited volunteers in a population of welders in a French shipyard. During 4 hours of working a Holter monitor (Spider flash-Livanova) recorded their heart rate. Heart rate was recorded with an Holter ECG (Livanova Spider) during 4 hours at work. HRV was analysed by a trained cardiologist using specific software. We performed a time domain analysis including the mean normal-to-normal intervals (NN intervals), the standard deviation of NN intervals (SDNN) and the root mean square of successive NN intervals differences (RMSSD). RMSSD correlates to high frequency components reflecting autonomic (parasympathetic) modulation of the HRV. We also did a frequency domain analysis including determination of the Low Frequency (LF), High Frequency (HF) and calculation of the LF/HF ratio.

**Results:** We are able to validate 15 records of 4 hours work. Comparing to reference ranges we observed higher levels of LF, normal HF and elevated LF/HF ratios. In the time domain analysis, we observed normal RMSSD values but lower levels of SDNN and SDANN compared to reference ranges.

**Conclusion:** In our sample group we observed a disruption of autonomic nervous system balance on heart function with an excess of sympathetic system activation and a normal parasympathetic system action. This dysregulation is a risk factor for cardiovascular disease. Further studies on welding fumes, gases and metals containing in are needed.

How welding fume exposure could be reduced in shipyard welders

M. Lehnert, Bochum; A. Lotz, Bochum; T. Weiss, Bochum; T. Brüning, Bochum; B. Pesch, Bochum

**Background:** A substantial proportion of 10.000 employees in the German ship building industry are exposed to welding fume. The major welding technique for joining large and thick steel sheets in vessel building is gas metal arc welding with flux-cored wire (FCAW). This technique had been noticed with high emissions in the WELDOX study. Hence, the identification of determinants and measures for reduction are required for protection of shipyard workers against health hazards from welding fume and for accordance with occupational exposure limits.

**Methods:** In a production for huge machine housings where FCAW was applied we investigated effects of improvements of exhaust ventilation and respiratory protection on the exposure on welders. Twelve welders were examined in 2008 before and in 2011 after protection measures were improved (e.g. torch-integrated exhaust ventilation, mask with purified air supply). Exposure measurements were performed by personal sampling in the breathing zone. Urine and blood
samples were collected across the shift. Metal concentrations were determined in air and biological samples.

**Results:** The geometric mean of respirable particles could be reduced by 84%. Airborne metal compounds were reduced to concentrations below 10% of the initial value with the most striking reduction by the use of helmets with purified air supply. The exposure reduction was confirmed by the reduction of urinary metal concentrations of more than 50% in the case of chromium and nickel. Although biologically regulated, manganese concentration in blood declined from 12.8 to 8.9µg/L.

**Conclusions:** A distinct reduction in the exposure of welders in the daily routine is possible by improved exhaust ventilation and welding helmets with purified air supply. Effects can be confirmed by biomonitoring. More information about the effects and distinct potential of single technical measures and behaviour are required.


---

**Exposure of seafarers to solar UV radiation**

G. Meyer, Hamburg; C. Felten, Hamburg

**Background:** In Germany, the number of skin cancer diseases, which is caused by ultraviolet radiation (UV radiation) of sunlight, increases considerably. The exposure to solar UV radiation can be effected outdoors during a professional activity. But reliable data about the level of UV radiation exposure are missing. In the project "Determination of the exposure of seafarers to UV radiation", the actual exposure has been identified under realistic working conditions. The objective was to create a task-related exposure matrix.

**Methods:** Seafarers in merchant shipping and fishing industry are exposed to varying levels of solar UV radiation during work on deck. The UV exposure depends on the route of the vessel, season, time of the day and weather conditions. Therefore, four measurement voyages were conducted on typical international shipping routes on which the seafarers are subject to high levels of UV radiation exposure. The individual UV radiation exposure was determined over several weeks and in a number of climate zones. General UV radiation exposure levels on deck were also measured.

**Results:** As expected, solar UV radiation increases with decreasing latitude. The individual measurements showed the highest exposure levels on the head and on the shoulders of the examined persons. Compared to other occupational groups in the German transport industry, seafarers are exposed to a high level of solar UV radiation during work on deck. Depending on the shipping route, values between 7 and 10 SED per day were determined.

**Conclusions:** The project has succeeded in producing a sound and cohesive body of data. Interpretation of the measured values enables conclusions regarding the daily UV radiation exposure dose. The data can be used for the appropriate processing of cases of occupational diseases and for the development of tailor-made prevention measures.
Noise and Vibration Exposure On Board Container Vessels – Results of a Field Study

M. Vierdt, Hamburg; T. Oestereich, Hamburg; K. Schröder, Hamburg; C. Felten, Hamburg; J. Hedtmann, Hamburg

**Background:** Crews of sea ships are exposed to a number of health hazards, such as noise and vibration. Noise and vibration measurements were made at different operating states in various ship locations and for different jobs aboard. The Main objective was to identify dangerous noise sources beyond the well-known noise in the engine room. In addition vibration measurements were made at various locations in order to compare observed values with occupational exposure limits.

**Methods:** Within the scope of a maritime measurement project BG Verkehr experts examined the noise and vibration exposure on board seven container ships in the North Sea / Baltic Sea Region. Measurements were made at different operating modes (at sea, inland waterways and in the harbor). Noise levels (A-weighted averaged sound levels) were measured according to the "Technical Rules of the Noise and Vibration Safety and Health Regulations" (Technische Regeln zur Lärm- und Vibrations-Arbeitsschutzverordnung, TRLV), based upon the EU-directive noise, employing sound level meters for stationary measurements and noise dose meters for mobile measurements. The vibration measurements were made for the most part referring to DIN ISO 6954 at the same locations where stationary noise measurements took place.

**Results:** Noise levels in the machine room were ranking at the top, up to 110 dB(A). However, working on deck (lash, inspection rounds near reefer cooling systems, repair works) may also lead to daily exposures beyond 85 dB(A). The measured average vibration values at the stationary measurement points were all below the reference limits as specified in DIN ISO 6954. Short term vibration peaks may occur during maneuvering in the harbor or hard braking maneuvers.

**Conclusions:** The results show that not only in the machine room, but also on deck higher noise levels from different sources may lead to hearing impairments. This confirms the need for an individual risk assessment regarding noise exposure on board container vessels.
Chemical hazards due to fumigation of freight containers and cargo on bulk ships

R. Djurhuus, Bergen; M. Bråtveit, Bergen

**Background:** Fumigation of freight containers and bulk cargo is carried out to prevent deterioration of goods by pests and spread of unwanted organisms during long-distance carriage by sea. The fumigants are highly toxic to humans, and residual pesticides may still be present when the cargo is unloaded at the destination, representing a potential health risk to dock workers, custom officers, ship crew and workers at warehouses receiving fumigated freight containers. In addition, fumigated cargo holds on bulk ships may leak pesticides while at sea, implying a health risk to the crew on board.

**Methods:** A comprehensive literature survey was conducted as part of an EU-OSHA project including sources such as PubMed, Web of Science and Google Scholar.

**Results:** The literature survey indicated that methyl bromide and phosphine are the major fumigants in use today. A number of intoxications of humans have been reported including several fatalities on board bulk cargo ships. However, many incidents lack adequate documentation, and researchers, health personnel, regulatory bodies and trade unions have suggested that there is a considerable underreporting of the problem, in particular concerning fumigated freight containers. The survey also revealed frequent lack of proper labelling of fumigated freight containers and absence of adequate risk assessments prior to unloading. International and national regulations provide procedures and recommendations regarding proper handling of fumigated cargo, but enforcement of the regulations seems weak.

**Conclusions:** Specific procedures for risk assessments and control measures related to fumigated cargo and containers should be developed to prevent adverse health effects among workers and ship crew. These procedures should include all relevant steps in the transport chain such as the fumigation process before departure, degasification as well as opening and unloading the cargo or containers. Compliance with such procedures should be mandatory and enforced by relevant authorities.

The assessment of atmospheric exposure in a shipyard

B. Loddé, Brest; V. Clamagirand, Rennes; P. Capellmann, Brest; M. L. Parod, Brest; E. Jouve, Rennes; G. Mauguen, Rennes; D. Lucas., Brest; D. Jegaden, Brest

**Background:** Naval Submarines are regularly refitted with maintenance processes. During those ship repairs, welding activities with various methods and metals are performed were done. Since 2017, the International Agency for Research on Cancer (IARC) has classified welding fumes, as well as hexavalent chromium as group 1 carcinogen (i.e. carcinogenic to humans). Onboard, most of the welding tasks are carried out were processed in confined spaces. In this study, we want to assess levels of exposure to welding fumes and hexavalent chromium in specific welding tasks.
Methods: For air sampling, pumps were placed on put in welders’ shoulders. Atmospheric concentrations for metals with hexavalent chromium and welding fumes were measured. The measurements were analyzed in a national accredited chemical laboratory.

Results: During 9 working days 156 individual and 32 environmental air samples were analyzed. For Boilermakers, 47% of welding fumes and hexavalent chromium concentrations were above the French Occupational Recommended Levels (ORLs). For inox coated electrode welding, all samples were higher than the French ORLs. In ballast, 33% of environmental concentrations for welding fumes were also above the French ORLs.

Conclusions: Depending on the processes and metals used, welders in ship repairing are exposed to high levels of welding fumes and hexavalent chromium. But also, other workers are still co-exposed to those carcinogenic compounds. New Welding techniques less emissive and increased ventilation have to be promoted and implemented.

Cancer after Production and Use of Asbestos in the Seaport and City of Hamburg

C. Terschuiren, Hamburg; R. Herold, Hamburg; S. Müller-Bagehl, Hamburg; F. Müller-Bagehl, Hamburg; S. Weidemann, Hamburg; G. Korinth, Hamburg; V. Harth, Hamburg

Background: Asbestos was imported on a large scale via the port of Hamburg and further processed by the local industry until it was banned from use. Employees in asbestos handling and the processing industry (e.g. in shipyards) were highly exposed. Asbestos was processed into asbestos cement, brake and clutch linings, floor coverings, textiles, construction products, road surfaces, insulations or filter materials. Due to the increase of malignant lung diseases, asbestos was banned in Germany from 1993. With a latency period of up to 40-60 years, a peak in occupational tumors can be expected in the coming decades despite this ban.

Methods: Historical data on exposure and diseases of employees formerly working at the seaport or production sites in Hamburg were collected from the documentation (1982 to 1992) in the medical archives of the occupational health and safety office of the authority for health and consumer protection. The exposure data were determined from files on occupational disease recognition procedures of the statutory accident insurance institutions. Each documented case of asbestos-related illness (like cancer) was ascertained in a database with e.g. information on lifelong occupations and activities, and type, duration and level of asbestos exposure. Second tumors were also documented in the database.

Results: Data records of 2593 persons (2389 men, 204 women) were available for evaluation. The most frequent asbestos-related recognized occupational diseases were asbestosis (n = 1091), cancer (n = 509), pleural plaques (n = 468), and "minimal asbestosis" (n = 27). There were 1053 cases of cancer among all persons, including 556 cases of lung cancer. For 1582 out of 1887 persons (83.2%) it is known that they were smokers, with an average number of pack years of 34.4 years. In 404 out of 757 cases (53.4%), death was a consequence of the occupational disease, the average age at the time of death was 65.1 years. Further results will be presented on stratification by occupation, so that the results for maritime professions can be considered in particular.

Conclusions: Medical archives of occupational health and safety offices are suitable as data sources for scientific studies for the retrospective evaluation of historical occupational hazards, especially to monitor for the trend of asbestos-related diseases and the peak due to retrospective exposure before the ban.
Infectious disease mortality in British merchant seamen since 1900: from causes to controls

T. Carter, Bergen; S. Roberts, Swansea

**Background:** Infectious diseases are an ever-present risk to seafarers. Living conditions at sea, exposure to exotic infections in port and the seafarers’ lifestyle may all contribute to this risk.

**Methods:** Trends in mortality rates from infectious disease in seamen employed in British merchant shipping have been compared with those in the British Navy and to those among the general male working-age British onshore population.

**Results:** There are some differences in the quality of the available mortality data sources for the three population groups but comparison of trends shows consistent patterns, with a progressive decline in mortality from 1900 and negligible deaths after 1960 in all of the groups. However comparison of these trends shows some diseases where there is an excess of mortality for naval personnel as compared with the onshore population and others where mortality in merchant seamen is well in excess of both rates in the Navy and onshore. There is also a slower decline in mortality from acute infectious diseases in merchant seamen. In addition mortality rates in seafarers contracted for work from Asia (Lascars) are, for many infections, considerably above those for seamen on standard British merchant shipping contracts.

**Conclusions:** Throughout the period of study merchant seafarers were at excess risk of death from infectious disease. More rapid adoption of preventative measures could have reduced these risks.

Hospital contacts in Danish seafarers compared to other trades: a register-based study in 2002-2016

K. Herttua, Esbjerg

**Background:** Seafaring is a very specific occupational environment and seafarers are exposed to many health risks. On the other hand, regular medical examinations are obligatory to get permission for working onboard. Because of lacking evidence, we sought to estimate relative risk of hospital contacts due to main causes among seafarers compared to a relevant trade and to identify their long-term changes in Denmark.

**Methods:** The participants in this retrospective, register-based cohort study were all seafarers and all individuals from a relevant and comparable trade aged 18-64 year at the baseline and residing in Denmark. Three consecutive cohorts with baselines in 2002, 2007 and 2012 were linked to records on hospital contacts from the Danish National Hospital Register. The participants in each cohort were followed-up for five years for all-cause hospitalization and for the five main diagnostic categories of hospitalization. Age-standardized incidence rates for hospitalization were calculated separately for men and women and are expressed as the annual number of cases per 10,000 persons in each five-year cohort. For every individual within each cohort, only the first hospitalization for the given diagnostic category was included and the individual was then removed from the risk population (as in the case of death). We did not exclude individuals' subsequent hospitalizations for other diagnostic
categories. We calculated proportional hazard ratios with 95% confidence intervals from Cox regression models to assess relative differences in all-cause hospitalization and in the five main diagnostic categories of hospitalization between seafarers and individuals from a relevant trade. We adjusted these models for age, education, social class and income.

**Results and conclusions:** Denmark and other Nordic countries as well are particularly favorable target for this kind of studies, as they are under a recording system which is considered to be virtually all-comprehensive. The project started in January 2019. Results from analyses on hospital contacts among Danish seafarers in 2002-2016 are expected to be ready for presentation in June 2019. Results will have direct implication for health policy of seafarers.

**Establishing a Norwegian Registry of Maritime Health**

J. Sommerfelt-Pettersen, Bergen; J. M. Haga, Bergen

**Background:** Life expectancy for workers in the maritime sector, such as seafarers and fishers, is lower than for workers on shore. The background for the increased health risk at sea is largely unknown.

**Methods:** The Norwegian Centre for Maritime- and Diving Medicine is currently working to establish a Registry of Maritime Health. The registry will include clinical data on all seafarers on Norwegian ships, listed the Norwegian National Registry and the Norwegian International Registry, submitted by seafarers’ doctors authorised by the Norwegian Maritime Authority.

**Results:** This project will provide data on seafarers’ hazardous exposures, sociodemographic risk factors, traumas and illnesses. The data may be linked to national registries on healthcare consumption, welfare and benefits services provision and to the Cause of Death Registry.

**Conclusions:** Seafarers is the Norwegian group of workers with the highest occupational health risk for illness and early death. Why this is the case is unknown.

**Incidence of diseases and injuries on board ships**

K. Logounov, Saint Petersburg

**Background:** The incidence and prevalence of diseases and injuries on board ships is one of the basics in rational healthcare for seafarers. You need to know it in order to understand the risks, and to figure out the ways to manage these risks, and to compel ship's medical chest recommendations, and to profile guidelines for medical examinations of seafarers, and to sketch out training programs, and to plan RCC activities, and to do thousand more things in Maritime Health.

**Methods:** We’ve analyzed the morbidity and injuries on board vessels of one big shipping company through subscription calls to the medical hotline for several years. And we compared the results with similar data in free access non-subscription consultations.

**Results:** About 2,5 thousand calls accounted for 20 thousand person-years of observation (surveyed group). It makes about 2-3 medical emergencies per ocean going vessel per year. For several reasons, we believe that this is the upper limit of the incidence rate.

Mutual ratio of the incidence rates implies three groups of health disorders to be the most significant. They are Diseases of the digestive system (ICD-10 Chapter XI), 17%, Injury, poisoning and
certain other consequences of external causes (Chapter XIX), 15%, and Diseases of the musculoskeletal system and connective tissue (Chapter XIII), 11%. This is different from the rates in free access non-subscription consultations, in which Chapter XIX disorders give 20% of calls, Chapter XI ranks third and gives 11%, and second place is taken by Diseases of the genitourinary system, 14% (Chapter XIV). The last rank fourth with 9% in subscribed consultations. Diseases of the circulatory system (Chapter IX) constitute 7% of the total number of health events on board ships, and Mental and behavioral disorders (Chapter V) account for about 5%.

**Conclusion:** Though injuries rank among the top three medical diagnoses, the great most of medical emergencies on board ships are not related to trauma. This is particularly surprising, given the extensive practice of pre-screening of seafarers and the potential dangers of life at sea. Data on incidence rates of diseases and injuries in radio medical advice calls may help to unhusk real morbidity in seafarers, which is of special interest to P&I Clubs, Maritime Schools and Training Centers, Manning Companies, Government and Flag State Agencies, and to Ship-owners.
PARALLEL SESSION II-2 – Safeguarding Health & Safety on board

The Impact of the MLC 2006 and Health and Safety on Board – Results from a Pilot Study

M. Fotteler, Neu-Ulm; O. C. Jensen, Esbjerg; D. A. Bygvraa, Esbjerg

Background. Seafarers are exposed to unique and often hazardous conditions that can negatively impact physical and mental health. The Maritime Labour Convention 2006 (MLC2006) entered into force in 2013 and comprises the first set of comprehensive standards for better working and living conditions of seafarers. In five titles, it regulates aspects such as wages, contracts, food, medical care and social security. A pilot study was conducted to investigate the impact of the MLC2006 as perceived by seafarers. This abstract presents results on health and safety.

Methods: The Yale Study of Seafarer Health and Wellbeing was chosen and permission for use was obtained from the Yale Maritime Research Center. An online questionnaire was posted in two Facebook groups for seafarers in February 2018. A consent form was obtained by each respondent. 55, mostly Danish seafarers answered. Additionally, a focus group interview was conducted with four Danish officers.

Results: Almost half of the respondents (N=27, 49.1%) stated that the MLC2006 improved their conditions only a little or not at all. The focus group agreed, that the MLC2006 did not bring improvements but mostly increased paperwork. Safety was a major concern for almost half and only 22% (N=12) reported that their safety system always works. Most injuries (71%) and sicknesses (57.6%) happened more than one year ago and the majority had the parameters blood pressure, blood sugar and dental health examined within the last two years. 40% (N=22) woke up fresh and rested most or all of the time during the previous two weeks. Almost one third reported suffering from stress and pressure. The focus group confirmed this, emphasizing difficulties with low manning and compliance with the MLC’s rest hour requirements. 50.9% (N= 28) stated that their workplace was either rather or very much competitive. 67.3% (N=37) think their workplace is rather or very much rigid and rule-based.

Conclusion: Many Danish seafarers do not see a major improvement through the MLC2006. Problems connected to health and safety, such as safety training, long work hours, low manning, food and social difficulties have not been adequately addressed. The focus group acknowledged an increase in safety awareness, which the MLC2006 might have indirectly contributed to. This pilot study can only give indications and the impact of the MLC2006, especially for ships flying flags from other states than Denmark, must be further investigated.

Occupational risk perception, stressors and stress of fishermen

T. Ghailan, Tanger; O. Laraqui, Tanger; C. Laraqui, Tanger; N. Manar, Tanger; F. Deschamps, Tanger; S. Laraqui, Tanger

Background: The aim of this survey was to assess the stress in fishermen by analysing its relationship with sociodemographic and professional characteristics, by evaluating work stressors, and by estimating psychosomatic symptoms.
**Materials and methods:** This cross-sectional survey involved a representative sample of 828 artisanal and coastal fishermen. All participants were men and had a regular activity for at least 2 years. We used an individual questionnaire inspired by those of the National Institute for Research and Security of France and of the Karasek’s Job Content Questionnaire.

**Results:** The prevalence of self-reported stress was 53.9%. The average age was 36.7 ± 8.7 years, it was higher among stressed than non-stressed. The prevalence of stress was higher in subjects with dependents (69.1%) versus 30.9% without dependents, and among those living alone (61%) versus 47.5% among those living in couple. The prevalence of harmful habits was 68.5% for tobacco smoking or snuff, 36.8% for cannabis smoking, 35.4% for alcohol consumption, 8.6% for other psychotropic substances and medications, and 21.4% for antalgic drugs. These toxic habits were significantly higher in stressed individuals. Thirty-three point seven per cent had self-reported chronic pathologies (40.5% among stressed vs. 25.7% non-stressed). Thirty-four per cent were overweight (38.3% among stressed vs. 28.8% non-stressed), and 14% obese (19.3% among stressed vs. 7.6% non-stressed). The average daily working hours were 11.2 h (12.8 h among stressed subjects vs. 10.5 h non-stressed). Psychological demand was higher in stressed subjects, while decisional latitude and social support were lower. Psychosomatic symptoms were higher among stressed than non-stressed. The main suggestions of the fishermen were to improve income, social welfare, health insurance, safety on board, quality of lifestyle, sport and leisure activities, information and awareness campaigns of occupational stress, and fight against addictive behaviours.

**Conclusions:** Fishermen were at a high risk of chronic stress with its health consequences. Health promotion and education initiatives should be conducted to raise fishermens’ awareness of the dangers of occupational stressors.

Key words: fisheries, occupational, stress, health risk

**Effects on the WIB OSHMS program for improving safety and health of seamen**

S. Hisamune, Yokohama City

**Background:** Concerns are growing about safety and health of seamen working on vessels, as they are exposed to high risks at work. Their accident rate in 2016, 7.2 per 1000 workers, was five times higher than that in industries. In order to mitigate the risks of seamen, we developed the Work Improvement on Board (WIB) OSHMS program by applying participatory action-oriented training (PAOT) methods.

**Methods:** We analyzed which features of the WIB OSHMS program would be most effective for facilitating the planning and implementation of practical improvements on vessels. This is because the implementation of the WIB program leading to actual improvements on vessels corresponds to the Plan – Do – Check – In Act (PDCA) cycle required in organizing the OSHMS. In fact the steps taken in the WIB OSHMS program taken in the WIB program correspond to setting goals learned from good practices (Plan), implementing on the basis of group assessment of existing conditions by means of action checklist (Check), and continual action by further repeating and sustaining the WIB-based activities for stepwise improvement (Act) only a piece of paper. This relevance to the OSHMS can be ensured by recording and revering the WIS program activates as follows. (1) Occupational safety and health policy. (2) Organizer. (3) Planning and implementation (4) Recording the outcomes (5) Continual Improvement.

**Results:** The impact of the WIB OSHMS program on promoting primary prevention by seamen and fishermen was discussed. The participating crews could propose readily applicable improvements of their vessels within short time. To study the effectiveness of the WIB OSHMS program, we analysed
10 companies to introduce WIB OSHMS program. One fishery company can reduce 30% days of work accident.

Conclusions: The implementation of the WIB OSHMS program can be regarded as covering the essential elements of the Occupational Safety and Health Management Systems (OSHMS). They include simplified forms of risk assessment similar to OSHMS implementation. While they are not initiated as an OSHMS model, they are based on basic primary prevention methodologies presented in a simple manner for small-scale workplaces. We propose the wide use of WIB methods in occupational safety and health management systems on board in Japan and other countries.

New Hire and Existing Crew Medical Repatriations: Does Experience Matter? A Five-year Study

A. R. Abaya, Makati; R. F. Sarmiento, Manila; S. Roldan, Makati; M. J. Milan, Makati; L. Adre, Makati

BACKGROUND: Seafaring is one of the most labour-intensive and dangerous professions. While safety procedures are standardized and pre-deployment trainings are rigorous, accidents and injuries still befall the seafarers all over the world. We conducted a retrospective study in an attempt to determine whether experience plays a role in minimizing injury and repatriations.

METHOD: We reviewed the repatriation data of various Filipino seafarers who sailed from 2014-2018. We collected (following National Data Privacy Law protocols) and analysed data from a de-identified database provided by the legal and claims departments from a single manning agency deploying seafarers for multiple shipping companies. We got the total number of deployments and separated the injury rate and other medical issues using WHO ICD-10 classification between the 32,227 seafarers deployed from the new hires group (NH) and the 76,695 deployed from the existing crews (EC) group. We compared the incidence of injuries of the EC and the NH groups in relation to the total number of deployments. We used the Fisher’s exact test (p-value < 0.05) to determine if there was a significant relationship. We also analysed the time frame to see the number of days on board when accidents, injuries, and other medical issues generally occurred.

RESULTS: There were 454 NH and 1,954 EC seafarers repatriated from 2014-2018. We found that there was a significant relationship between the experience of deployed seafarers and whether a crew member gets repatriated (Fisher’s exact test value < 0.00001 at p <0.05). Because of this significant relationship, we computed the odds ratio and found that the odds that a deployed seafarer gets repatriated were 0.58 times higher for the NH than the EC. Analysis of the time frames showed the prevalences of injuries and other medical conditions and again compared the differences between NH and EC groups.

CONCLUSIONS: We found that the level of experience played a critical role in terms of lowering the incidence of repatriations due to injury and other medical conditions. The reasons for this discrepancy are discussed. The time graph demonstrates the need for seafarers to be continually reminded of the dangers of not being fully concentrated during the early phase of the contract through refresher training courses while aboard the ship regardless of experience.
29th Scientific Symposium of the German Maritime Health Association (DGMM) – Maritime Rescue

Chairs: M. Stuhr, V. Harth

Emergency Transport of the Sick, Injured or Wounded on Board German Navy Vessels: Today and Tomorrow [Rettungsmittel für den Verwundetentransport an Bord von Marineschiffen heute und morgen]

H. Werr, Kronshagen; U. van Laak, Kronshagen; K. Kober, Kronshagen; A. Toedtmann, Kronshagen; A. Lindner, Kronshagen

The "Rettungsmittel-Labor" (Rescue Lab) is a small unit within the German Institute of Naval Medicine. Its research is focused on questions related to survival at sea, emergency medical equipment, and patient treatment strategies. This unit works in collaboration with the departments for occupational medicine, diving medicine, medical ergonomics and maritime psychology, in addition to other experts, to address these issues.

To tackle recent concerns that have arisen regarding the transport of the sick, injured or wounded, the research done here includes studies and tests conducted in the field, mainly aboard warships, as well as solutions developed under simulated laboratory conditions.

On the occasion of the 15th International Symposium on Maritime Health & Environment (ISMH15), this institute would like to present several of its projects that seem to be relevant from a medical and safety technology perspective. Particularly of relevance is a special restraint system constructed to perform high angle or vertical transport using conventional stretchers. Also under development, is a patient transport and survival sleeve that provides stretcher patients with personal immersion protection.

Trials have also shown that so called "half static" kernmantle ropes, as used in alpine sports and in adherence with EN 1891, can also be excellent rescue devices on board of seagoing vessels. Lastly, a mobile patient transport training simulation unit has also been designed in order to test various methods as well as improve staff training.
PLENARY SESSION IV - Cruise Medicine

Chairs: K. Seidenstücker, N. Nicolic

Cruise medicine - a special challenge!

B. Petutschnigg, Hamburg; B. Vahlbruch, Hamburg; for the Working Group Cruise Medicine of the DGMM

Background: Approximately 20 new cruise ships are put into service each year. Worldwide there are about 400 cruise ships of different sizes and passenger numbers. Many millions of passengers populate these ships. This number also increases the chances of passengers with chronic illnesses boarding. This number also increases the number of emergency situations on board. The on-board hospitals of cruise ships are usually staffed by at least two doctors of different disciplines and thus with different professional experience.

Methods: The German Society for Maritime Medicine has founded a working group with the task to create a curriculum, which requirements have to be fulfilled in order to standardize the qualification of the on-board physicians as well as the equipment of the on-board hospitals. In addition to medical training, interdisciplinary qualifications will be required. As the on-board physicians present themselves as high-ranking ship officers, they will also have to complete additional safety-related technical training. The qualified nursing staff will also have to obtain further qualifications for the function on board. The fascination of cruise ship medicine is based on the experience that state-of-the-art medicine is carried out at a very high level in a very small space by a very small team. The passengers rely on it, and this is offered to them when booking in the travel agency in such a way that they can also be helped professionally in the event of an accident or illness. Experienced and active ship's doctors are members of this working group with the task of preparing this curriculum.

Results: The working group has now met three times, further dates have been agreed, fields of work have been created.

Conclusions: In order not to turn the dream of a ship's doctor into a nightmare, the initiative of the German Society for Maritime Medicine is to be welcomed in its entirety. This will make it safer and more uniform for on-board physicians to prepare for their assignment, and passengers will be able to rely on uniform care on board.
Cruise Medicine - what does the customers expect?

J. Tülsner, Hohen Neuendorf; A. Hermenau, Hamburg; P. Walther, Hamburg

Cruise ships do guarantee a medical service onboard for customers and crew. With the continuous growth of the cruise industry, questions from the field of Maritime Medicine are also becoming a focus of interest. The ageing of western societies, digitalisation and increasing diversification within the cruise industry are becoming relevant. All this has to be reflected in kind, extend and options of medical services provided on board. In 2018 one thousand German Cruise guest have been asked in an online survey about their experience and expectations with regards to medical services on Cruise vessels.

Whilst the majority of responders have been satisfied with their experience in case they needed medical support they do have expectations and wishes with regards to wellness-opportunities, the usage of digital solutions and the general information about onboard options. This presentation will provide an overview of the results and possible options for adjustment and improvement.
CONNECTING THE MARITIME HEALTH SCIENCE COMMUNITY - International Maritime Health (IMH)

Chairs: M. Grubman-Nowak, K. Seidenstücker 11.30 – 12.00 am

International Maritime Health (IMH) – new goals for the scientific future

M. Jeżewska, Gdynia; A. M. Horneland, Bergen; M. Grubman-Nowak, Gdynia

No matter how experienced, well-informed and wise a professional could be, his or her competence will be of little value to others unless it is shared, either on an individual basis – or better – made available to all professionals and the public. The need for building scientific knowledge in the field of maritime medicine is striking.

The scientific journal IMH is the only indexed, scientific journal in English in the professional field of maritime medicine. It is also the official scientific journal of the International Maritime Health Association since 2009. A brief history from the beginning in 1939 until today will be given as a background. The importance of having this platform for publication in maritime medicine will be emphasized, and the changes from 2018 where the International Maritime Health Foundation (IMHF) took over the responsibility for the journal will be mentioned, with reference to a separate presentation of the IMHF.

Based on the experience of publishing the IMH, we will discuss the challenges for scientific publishing in maritime health in the future, with focus on the need for encouraging young professionals to do scientific work and publish it, and the need for experienced reviewers, and how to increase the journals impact, with description of the journals impact factor and indexing.

The presentation will inform about types of articles that the journal accepts, like original articles, review papers, case studies, reports, pilot studies, letters to the Editor, comments, announcements and others. Furthermore a description will be given of the focus areas of the journal: on maritime medicine, tropical medicine, naval medicine, hyperbaric and diving medicine, travel medicine, maritime psychology, maritime toxicology, ship and port hygiene and sanitation, health challenges in the fisheries and health promotion at sea.

The way forward will be discussed, with emphasis to international cooperation as the fundament of development, how scientific publishing fit into education, training, clinical work and development and the reciprocal dependency between them. The presentation will also discuss ways of publication as well as other ways of sharing scientific results and building knowledge in the field of maritime medicine.

Best IMH scientific article of the year 2018

M. Jeżewska, Gdynia; A. M. Horneeland, Bergen; M. Grubman-Nowak, Gdynia

Background: The International Maritime Health Foundation has established the "Best IMH Scientific Article of the Year" commencing with the year 2018.

The winner: The winning article will be displayed in full text on the poster, together with a presentation of the author. The winner is introduced each year in the Issue No 1 of the IMH and at the IMHF website.
Nominees on the short list: The nominated articles will be demonstrated with abstracts, together with a short presentation of the authors.

Rules: The rules for the award will be described in detail. The "IMH Scientific Article of the Year..." recognizes the best and most relevant peer-reviewed, scientific work in maritime medicine and adjacent fields, published in the prior calendar year in the IMH. Articles may present, analyse, and comment on new data, or may synthesize and analyse data that have already been collected. The winner will be presented together with the short list of the nominees. The winning article will be presented together with the abstracts of nominated articles. The Committee and rules will be outlined, with the invitation to anyone to nominate for year 2019. Relevant information will be given.

Committee: The members of the committee, and how they work will be presented. The members are: Henrik Hansen, Nebojsa Nikolic, Eilif Dahl, Marcus Oldenburg, Brice Loddé.

Nomination: An invitation to nominate candidates for the year 2019 will be given, with the deadline for nomination, and contact information to the committee.

International Maritime Health Foundation: possibilities for further development in maritime medicine

A. M. Horneland, Bergen; M. Jeżewska, Gdynia; M. Grubman-Nowak, Gdynia

Background: The experience with the publishing of the scientific journal International Maritime Health since its very beginning in 1949, and its development since 2009, led to the discussions of how to take this journal into the future, with regards to a secure and reliable financial basis, as well the scientific development and impact.

Methods: The development and process, from options and ideas until establishment of a foundation will be shortly described. The founders of the IMHF will be presented:

- The Polish Society on Maritime, Tropical and Travel Medicine
- Haukeland University Hospital, Department of Occupational Medicine
- Norwegian Centre for Maritime and Diving Medicine; Norwegian Association for Maritime Medicine

Results: The establishment of International Maritime Health Foundation: A brief overview will be given regarding the organisation, structure, objectives and goals of the IMHF to act for the development of science, to increase and disseminate knowledge of maritime medicine and adjacent fields, such as: naval medicine, underwater and hyperbaric medicine, diving medicine, occupational medicine, travel medicine, tropical medicine and maritime psychology as well as supporting and initiating scientific and research activity to the extent stated above, as an input for contribution of improvement of safety, hygiene at work and health of seafarers and other persons who work at sea worldwide

Conclusions: International Cooperation: The synergetic effects of working together towards common goals will be emphasised, with examples of common projects and options. Emphasis will be given to the cooperation with IMHA on the publishing of the journal "International Maritime Health" (IMH) with reference to the separate presentation of the IMH. Also the need for cooperation on individual basis for authors, reviewers and readers will be mentioned.
Initiatives: New possibilities in publishing, as continuous publishing, will be discussed, together with the cooperation on organising of events via electronic means. Universities, academies, organisations, associations, societies and companies sharing the goals and objectives of the IMHF, will be invited to such cooperation.
PARALLEL SESSION III-1 - Digitalization in Maritime Medicine I

Chair: A. Tveten

Can two-way augmented reality over satellite contribute to telemedicine at sea?

W. Boon von Ochssee, Rotterdam; T. Slijkhuis, Delft; R. Huigen, Rotterdam

BACKGROUND: Telemedicine allows a medical doctor to support the treatment of a patient at a distance. Two-Way Augmented Reality technology (TWAR)\(^1\) merges the reality of a caretaker (ship's officer) at sea and a doctor on land, bringing the doctor virtually 'next' to the ship's officer. This study aimed to assess: 1) can TWAR improve remote care at sea, 2) if the commonly available satellite connection on a ship can support TWAR capability.

METHODS: As part of a thesis for the TU-Delft, 27 caretakers and medical doctors (end-users) took part in a series of (filmed) functional tests using medical skills from STCW\(^2\) training. They evaluated their experiences quantitatively in questionnaires (NASA-TLX\(^3\)) and qualitatively through interview questions. Technical researchers and medical doctors reviewed the material of 27 events to create 81 evaluations of TWAR. The research followed an agile approach. Every additional test implemented improvements based on end-user feedback from previous tests. The test set-up used mobile devices (tablets). Separately, with support of the European Space Agency, 4 staged technical tests were performed to validate the ability of commonly available satellite connections on a ship, to handle TWAR traffic. The end-to-end simulation tests used AR-glasses (Vuzix\(^TM\)) to evaluate TWAR.

RESULTS: The 81 evaluations indicated added value of TWAR for both simple medical scenarios (e.g. injection) and more complex medical scenarios (e.g. stitching). Many end-users report, and our observations show, that the value of TWAR is in receiving detailed visual instructions and confirmation from the doctor on performing medical skills. The caretakers report that they experience visual confirmation on actions required, increasing their confidence to act. Our technical tests show that functional performance of TWAR requires a minimum symmetrical satellite connection bandwidth of 128 kb/s for L-band and 256 kb/s for Ku/Ka-band. To use the full potential of TWAR, higher symmetrical bandwidth (512 kb/s minimum) is required.

CONCLUSIONS: In case of medical emergencies, TWAR can, through detailed visual guidance and confirmation, increase confidence and add value to telemedicine at sea. Currently, commonly available mobile devices and satellite connections, optimised for TWAR, can support the required data transfer.

1 TWAR is patented technology owned by MMA
2 STCW = Standards for Training, Certification and Watchkeeping
3 NASA-TLX = NASA Task Load Index

Implementation of Artificial Intelligent (AI) Systems for seafarer’s Health Assistance

G. Battineni, Camerino; F. Amenta, Camerino; G. Nittari, Camerino; G. Pallotta, Camerino

Introduction: In general, Requests for medical assistance from ships to a specialized medical Centre ashore. Unfortunately, Maritime telemedical consultations have some inherent limitations. One consists in the fact that the vast majority of people asking for medical advice to a TMAS do not have proper medical training. The communication of symptoms or specific clinical situations can,
therefore, be confusing or misleading in case of absence of objective information and may result in a low-quality medical assistance deliverable on board ships.

Materials and Methods: Sample of 270,000 teleconsultations of 45,691 patient’'s medical data from International Medical Radio Center (CIRM) assistance from 2000 to 2018 had considered. A technological infrastructure a server with excellent performance capabilities, computers for data collection and elaboration and specific programs for identification of keywords to be used for elaborating the medical data into an artificial intelligence system. Telemedicine assistants will make data collection and transfer from the user interface to the memory of the intelligent network.

Results: Collection of medical data from the repository of CIRM and analysis will include the collection of medical data of CIRM. The expert system we intend to develop consists in an easy-to-manage software that guides proper presentation of requests of telemedicine assistance from crewmembers who have no medical knowledge. Present status of high demand in the medical service for seafarers encouraging possibility for creating a new medical expert system with the evolvement of previous issues. This new expert system proposed by CIRM team can provide more direct health assistance between doctors and seafarers – more comfortable, faster and long-term health and service planning. Another possibility of this project can be an orientation towards expanding health facilities or forming an International Maritime Communication with the intention to attract more patients from the whole world. This intelligent guide has developed on the use of AI, as it is one of the most renowned science and engineering technology making smart machines, extraordinarily intelligent computer programs

Conclusion: In precise, we proposing the development of the quick interactive guide, developed based on real cases of assistance to sailing seafarers using as a source of information the large repository which had available at CIRM.

A model to improve medical assistance on board ships - Radio Medical contacts of respiratory issues

S. Gerdoe-Kristensen, Esbjerg; K. Herttua, Esbjerg; J. Vork, Esbjerg

Background: Knowledge about the conditions where people need medical assistance on board ships is limited. Radio Medical Denmark, a maritime telemedical assistance service, provides medical assistance and decides whether a person needs medical assistance on shore. To provide the best medical assistance an understanding of the settings is necessary. This study looks into cases of respiratory issues in order to get an understanding of key points relevant to Radio Medical Denmark contact. Thereby getting a better background to improve practice.

Methods: A pilot study to investigate methodological approach to analyze medical conditions on board. A casuistic approach combined with principles from the concept of journey mapping. Journey mapping is often used to deliver better user experiences. Here, the purpose is to map medical assistance on board vessels from a medical point of view with the aim of improving medical assistance. The itinerary may include health checks, medical education of crew and use of medication. Cases are identified from Radio Medical Denmark records for a retrospective analyse. By choosing cases of respiratory diagnosis resulting in deviation or evacuation there is a limited number of cases suitable as a pilot study including testing of a method. With journey mapping we are getting a visualization of the journey of a passenger or crew when focusing on respiratory diseases.

Results: Deviation of a ship to get a person to a doctor on shore are more likely to take place than evacuation regarding respiratory diagnosis. In 2018 several deviations and none evacuations took
The respiratory diagnosis are not very specific and includes upper respiratory tract infection, lower respiratory tract infection and asthma. Mapping of a medical journey visualize the setting of medical assistance. With this method we are able to point out where to improve medical assistance on board ships in this case regarding respiratory issues.

Conclusions: A suggestion of a method to analyse health issues on board. The mapping of a medical ship journey, with the case of respiratory issues, gives a useful information to estimate needs of medical improvement. Furthermore it will provide awareness about which data would be relevant to a more complete analyse but are not accessible at the moment. Hopefully, the method can be further developed and used for further analysis. With the intention to provide knowledge that can be used for improvements.
PARALLEL SESSION III-2 - Chronic disease in Maritime Medicine

Chairs: D. A. Bygvraa, A. Koch

A qualitative study on health risks of Iranian seafarers working on ocean going tankers.

F. Baygi, Esbjerg; O. Jensen, Esbjerg; F. Shidfar, Tehran

Background: Seafaring is a highly physically demanding profession in a risky environment due to job related health risks. The purpose of the study is to describe health risks of Iranian seafarers working on tankers.

Materials and methods: In one of the Iranian ocean-going tankers, a qualitative content analysis with inductive approach was performed in 2016. Subjects were 17 male seafarers. They were selected by purposive sampling, which continued until data saturation. Data were gathered using semi-structured questionnaires via in-depth-interviews. All interviews were transcribed into computer files. Analysis was done based on conventional content analysis approach.

Results: Mean job history and age of the informants were 11.9 ± 7.2 and 35.8 ± 9.3 years, respectively. Two main themes emerged during analysis of data and categories were created. The themes were (1) health risks at the ship; (2) high risk ranks at the ship. Unhealthy eating and physical diseases were considered as subthemes for the first theme. In subjects” opinion, use of frozen food, having low access to fruits and vegetables, the captains unwillingness for purchasing provision, the lack of knowledge regarding healthy eating were the main reasons for unhealthy eating. Also, the informants mentioned skin conditions, gastrointestinal problems, respiratory disorders, cardiovascular diseases, obesity and high blood pressure as challenges regarding physical diseases. From informants” standpoint, engine staff, captain and key officers had higher risk than other ranks at the ship. Stroke, infertility, visual disorders and deafness were mentioned as the main health problems for engine side. Stress, sleep disorders, and loneliness were mentioned as main health related problems for captain and key officers.

Conclusions: The need for addressing nutrition at sea was acknowledged by seafarers. Also, it seems that revision of some regulations regarding seafarers” medical examination could be warranted.

The prevalence of Metabolic Syndrome and its components according to BMI among Filipino Seafarers

R. Erese, Manila; V. Erese, Manila; G. Pile, Manila; C. Oca, Manila

Background: The occurrence of the metabolic syndrome (MetS), or its individual components taken separately, has been reported in literature to increase an individual"s risk of developing cardiovascular and metabolic disease, as well as mortality. Southeast Asian countries, including the Philippines, are currently plagued with the obesity epidemic and its associated metabolic disorders. Seafaring is considered a vulnerable occupation, increasing the worker"s risk of developing obesity, and consequently, MetS. Little is known about the pervasiveness of this condition in this specific occupational group. This study aims to determine the prevalence of MetS and its individual components among the different weight categories of Filipino Seafarers.
**Methods:** This is a cross sectional study of Filipino seafarers seen at a hospital-based seafarers’ medical clinic for their prescribed medical fitness examination from October 2017 to September 2018. The sample was stratified according to weight, utilizing the BMI risk classification adopted and recommended by the Philippine Association for the Study of Overweight and Obesity (PASOO). Demographic, anthropometric, clinical and laboratory data were collected as required for determining the prevalence of MetS, based on the harmonized IDF/AHA/NHLBI 2009 criteria.

**Results:** Data on 260 male seafarers with ages ranging from 19-63 years were analysed. Based on the functional classification recommended by PASOO, the prevalence of obesity (BMI ≥ 25 kg/m²) was 51%. The overall prevalence of MetS was 14% for the entire sample. The syndrome was noted in 23% of obese, 7% of overweight and 1.4% of normal weight seafarers. For the individual components of MetS, abdominal obesity was a common occurrence at (31%), followed by hypertension (30%), reduced HDL (19%), insulin resistance (19%) and elevated triglycerides (17%).

**Conclusion:** Obesity and the metabolic syndrome, as well as its components, are common among male Filipino seafarers. BMI cut-off points should be validated in this population, and body fat composition analysis should be considered during periodic medical examinations to accurately assess risk. Longitudinal studies are needed in order to develop long-term health and education programs.

**Prevalence of metabolic syndrome in Filipino seafarers: a “k” line experience**

M. Luisa Sanchez, Pasay City

**Keyword(s):** Metabolic syndrome, hypertension, diabetes mellitus, BMI, pre-employment medical examination

A seafarer to be able to perform his duties must be equipped not only with adequate training and skills but more importantly a sound mind and body. Metabolic Syndrome is a cluster of metabolic conditions that increases the risk for cardiovascular disease and diabetes mellitus.

The objective of this study is to determine prevalence of Metabolic Syndrome and its component risk factors among Filipino seafarers undergoing pre-employment medical examination at K Line Clinic in 2017. This is a retrospective record review. Documents were then retrieved and epidemiologic data recovered.

The International Diabetes Federation criteria was followed such as central obesity (equated to a body mass index/BMI of 30kg/m²) and any two of the following: elevated blood pressure/hypertension, elevated blood glucose/diabetes mellitus and dyslipidemia were used to identify the condition.

The data presented 5333 seafarers screened prior to embarkation in 2017 where prevalence of Metabolic Syndrome was found to be 5%. Elevated blood pressure was found in 61.8% of the crew, elevated triglycerides in 21%, elevated fasting blood sugar in 14.2%, and low high density lipoprotein cholesterol in 3%. Metabolic syndrome has a low prevalence among Filipino seafarers of K Line and with elevated blood pressure as the most common component. The data can provide a benchmark for future studies and may also be a microcosmic representative of what may be the picture in the macrocosm.

The prevention strategies must be intensified and promotion of health among seafarers emphasized including appropriate intervention programs.
Tendency of Diseases among Seamen during the six years and program for improving health of seamen

S. Hisamune, Yokohama; K. Kogi, Tokyo

**Background:** Compared to workers on land, seamen working on the ocean are given only limited disease treatment. The aim of this paper is to clarify the actual condition of diseases among such seamen in effort to improve measures that promote their health.

**Methods:** In addition to death, diseases and injuries among seamen that require more than three days off must reported by ship owners to the Ministry of Land, Infrastructure and Transport in accordance with law. In this report, the seamen is prescribed by the same law. The number of reported case was 3609 in the six years period 2011 to 2016. The reported diseases were classified into 18 kinds of disease codes in accordance with ICD (International statistical Classification of Diseases and Related Health Program).

**Result:** Seamen’s occupations consist of officers and range. The proportions of each disease in relation to the two of work in both of groups were as follows. There were a total of 2,233 diseases reported in trading vessel group, which 362 cases of captain, 881 cases of mate, 635 case of engineer, 13 case of radio operator and 297 cases of others. The most prevalent (17.2%) were disorders in the digestive system, followed by 15.7% of the respiratory system, 14.2% of musculoskeletal system, 13.7% of the circulatory system and 11.3% of neoplasm on trading vessel. There were a total of 1,376 diseases reported in fishing boat vessel group, which 130 cases of captain, 782 cases of mate, 289 case of engineer, 46 case of radio operator and 55 cases of chief fisherman. The most prevalent (20.3%) were disorders in musculoskeletal system, followed by 19.3% of the digestive system, 16.4% of the circulatory system, 9.2% of neoplasm and 7.2% of the respiratory system on fishing boat.

**Conclusion:** As the first step to take appropriate measures for promoting seamen’s health and decreeing their disease, we analysed the seamen’s disease data reported to the Ministry of Land, Infrastructure and Transport during six period. The seamen’s disease incidence decreased in any type group, but it remained high fishing boat group throughout the period.
PARALLEL SESSION IV-1 - Medical training onboard and ashore

Chair: R. Watzl, B. Petutschnigg

Vessel specific On-board training: connecting elementary and medical first aid with medical care.

K. O. Jensen, Nordby; R. Rygaard, Nordby

**Background:** Front Personnel on passenger ships covers a broad range of jobs onboard, with very different background, but all have the mandatory elementary first aid course in common. This diverse group faces severe medical problems, which they do not feel; they are properly prepared and trained for, as there is no formal training on how this group works together with the person in charge of medical care, and to which extent can/may they assist the medical care person, once he arrives at the scene. Over the years, The Danish Maritime Authority has received many requests to do on-board training of front personnel. The requests from the industry usually involves:

- Make practical, hands-on, on-board training, that involves all type of staff - together
- Focus on most likely types of accidents/illness and crew experience.
- Give them practical knowledge on legal aspects
- Boost their confidence in their ability to make a difference.

**Methods:** We designed a 10 hour course, for passenger ships, which met the above requirements. The medical frame of the course is always ABCDE, as the internationally recognised method of approach to an accident or disease. The educational frame of the course is based on skills. Approximately 80 % of time spent during the course, participants were active with their hand and/or communicating. The courses were conducted onboard, while sailing. Key words of training:

- ABCDE
- Hygiene
- How to control bleeding
- CPR for all ages
- Hypothermia
- Minor wounds
- Symptoms from diseases (diabetes, convulsion, abdominal pain, asthma )
- Communications with person in charge of medical care.

**Results:** Statements from the participants:

- More confidence in acute cases where treatment is initiated by themselves.
- When they know what to expect from the person in charge when he arrives, they are motivated, and have the courage to display leadership and initiate treatment.
- They feel they have the knowledge and skills to communicate with patient, relatives and bystanders, as they know the next step in the process.
Conclusion: Training front personnel in first aid, in their own environment, based on their own prior experience seems very effective. Training together with the person in charge of medical care promotes the idea of a continuous process – initiated by the front personnel.

The clinical preparation for the duties as a ship’s doctor - The field of conflict military to civil

A. Westerfeld, Hamburg

Introduction: A ship's doctor is a doctor who ensures medical care on board civil and military vessels and is responsible for hygiene and medical safety regulations. According to the Maritime Labour Convention, ships with more than 100 persons on board and journeys of more than three days must have a ship's doctor on board. The qualifications of a ship's doctor are regulated by national law.

Challenge: The challenge for the ship's surgeon is that he has to cover a wide range of general medical care. In contrast to the resident colleagues he does not have the possibility of a timely presentation to a specialist. On the civilian cruises there is a wide range of tourists on board. Cruises are becoming more and more affordable for a wide audience, so the number of infants, adolescents and pregnant women and elderly patients with various pre-existing conditions is increasing over the years. A medical examination prior to departure is not required. In the military sector, the crew is selected and intensively medically evaluated. The peculiarity lies here with the tasks of the crews in the normal service, as well as employment. The safeguarding of German borders and interests by force of arms requires that in case of emergency a large amount of injured people is generated. These have to be triaged and staggered in the case of limited resources equal to a mass casualty case. Medical measures must be delegated to assistants and patients must receive intensive care over a longer period of time.

Civil-military training: To complete these tasks, a comprehensive training is the prerequisite for employment as a ship's doctor. In the civil field, after completing a degree in medicine, you are required to work for several years in at least one acute discipline as well as experience in emergency medicine. In addition, sound language skills in English and seaworthiness are useful. The exact requirements for qualification as a ship's doctor are determined by each individual flag state. For the activity on seagoing ships under German flag, a registration as ship's doctor with the professional association for transport and traffic economy is necessary.

Conclusion: Also, maritime medicine in the civil and military sector must be adapted to the changed clinical conditions. The time with a comprehensive body of personnel extensively trained and educated is coming to an end.

Teaching ‘Medical Care On Board Ships’ in the 21st Century – A New Approach

R. Watzl, Kingston TAS; C. Strauss, Kingston TAS; J. Ayton, Hobart

Background: Three years ago, doctors from the Polar Medicine Unit (PMU) of Australia's Antarctic Program (AAP) were asked to review and partake in the delivery of the Australian Maritime Safety Authority (AMSA) approved 'Medical Care On Board Ships' (MCOBS) course offered through the University of Tasmania's Australian Maritime College (AMC). This course meets the requirements of STCW Reg VI/4 and Code Section A-VI/4, Table A-VI/4-2. The Australian Maritime College is Australia's premier maritime education facility. The Polar Medicine Unit of the AAP specialises in Antarctic, Remote and Maritime Medicine and has provided medical support to Antarctic shipping
since the late 1960s. The PMU has extensive experience in teaching advanced medical skills to lay personnel.

**Methods:** A review of the 2000 IMO Model Course 1.15, AMC course syllabus and the 'International Medical Guide for Ships' was undertaken. The existing course timetable was optimized by improved integration of paramedic, nursing and medical teaching sessions. Practical skill sets required were clearly delineated. Detailed updated lesson plans were then written and all teaching content documented. A standardized DRSABCDE approach to the sick or injured patient was adopted throughout. The routine use of tele-medical advice is emphasized. Content delivery has been divided into hands-on skills training, scenario based teaching, case studies, group discussions, role playing, online teaching and standard lecture format.

**Results:** This is a work in progress. Eighteen courses have been delivered to date. Optimisation of the timetable has allowed removal of after-hours (night) teaching sessions. One year ago the PMU was asked to also deliver content traditionally delivered by the nursing school. The PMU's unique experience and skill set has helped deliver an optimised and contemporary approach to medical care on board ships.

**Conclusions:** An improved course format results in improved course delivery and improved learning outcomes. A 21st century approach to the delivery of 'Medical Care On Board Ships' teaching allows moving some content online thus potentially reducing face-to-face contact time. Minimisation of traditional lecture format better engages students and improves learning outcomes. Teaching a standardized approach improves the shipboard medical care provider's comfort zone. Routine use of tele-medical advice further improves safety and patient outcomes.

**30 hours in the ICU – a special challenge – a case report from Mein Schiff 4 TUI CRUISES**

B. Petutschnigg, Hamburg; F. Heblich, Kiel; K. Albrecht, Hamburg

**Background:** In February 2017 Mein Schiff 4 was en route from Roatan / Honduras to Puerto Limon / Costa Rica. Approximately 1 hour after departure (22:00) an emergency call came from a cabin on deck 10. A heavily overweight patient with respiratory distress had to be transported to the hospital immediately. A treatment for this patient in the small cabin was nearly impossible. Shortly after arrival, the patient decompensated both respiratory and cardiac.

**Methods:** A crash intubation was the consequence with the initiation of the necessary intensive medical therapy. The primal plan to return to Roatan and disembark the patient failed because no hospital in Roatan and surroundings wanted to take over this intensive care patient. No disembarkation without the promise of a takeover! Also on the route to Costa Rica no port with a corresponding hospital could be found. In the discussion with the captain what to do the route was planned to sail the whole night, the next day (sea day) and the following night until 08:00 o'clock in the morning, until the arrival in Puerto Limon, should be driven through. Disembarkation by helicopter was not possible due to weather conditions. The captain was only able to make the decision to go to the planned port "full speed ahead", which at 02:00 the next day succeeded. During this time - 30 hours - the patient had to be cared for on our intensive care unit according to all the rules of intensive medicine. The anaesthesia management, the ventilation management, the careful handling of the medication resources, the personnel management, the organization of the team for these 30 hours were the special challenges.
Furthermore, the guests on the ship had to be made aware that the ship was now arriving at the next port more quickly than planned. As is usual in such situations, the onboard hospital contacted the responsible doctors and rescue units ashore beforehand. Fortunately, they were able to receive and accompany the guests in a professional manner.

Results: The patient was handed over to the medical flight ambulance in stable condition to be flown to a hospital in the capital of Puerto Rico. He had to be treated on an intensive medical care unit for about 14 days and could be flown (fit for flight) to his European home country with the medical flight ambulance after a short period on the normal ward and reaching airworthiness.

Conclusions: In order not to turn the dream of a ship's doctor into a nightmare, the initiative of the German Society for Maritime Medicine is to be welcomed in its entirety. This will make it safer and more uniform for on-board physicians to prepare for their assignment, and passengers will be able to rely on uniform care on board.

Further training of the medical team at TUI Cruises

B. Petutschnigg, Hamburg

Background: TUI Cruises' fleet currently comprises 7 ships, the most recent of which was christened in Lisbon at the beginning of February 2019. All ships have an on-board hospital, on-board pharmacy, intensive care unit, surgery room/Op, sickroom and optionally a secondary hospital. These on-board hospitals are staffed by a total of 2 doctors and 3 nurses, with 1 on-duty team (1 doctor and 1 nurse) alternating every 24 hours.

The doctors (always also the female form is addressed) are specialists for general medicine, anaesthesia, surgery, internal medicine, orthopaedics and accident surgery (alphabetically). In addition to their training, the Nurses also have experience in intensive care and/or surgery. The on-board hospitals are managed by the Medical Department in Hamburg. The Senior Doc leads the hospital team on its behalf. Senior Doc's are doctors who have completed several assignments as Junior Docs, who have proven themselves both professionally and organizationally in a special way, and who have shown excellent leadership qualities.

Methods: Each team member on board tries to bring existing structures, organizational procedures, regulations in consensus to his landside experience. The good result, however, can only be passed on to the other ships with great difficulty. Also special, beyond the medical routine, illness and emergency situations. The declared goal was therefore to pass on all these experiences to all colleagues. For example, the Medical Department installed symposia "From the practice - for the practice" for the entire hospital team. All colleagues and nurses who are not on board at the time can take part. Each symposium has a motto, the procedures with presentations (guidelines, casuistry, special topic) and also practical exercises (e.g. emergency interventions, equipment knowledge) are given.

Results: These symposia will be held every 3 days in spring and autumn, starting in November 2016. For the colleagues on land these dates have become fixed points in the calendar.

Conclusions: The installation of these symposia has proved extremely successful and will be continued. The professional exchange of experience, getting to know new colleagues before their first ascent and collegial discussions make these symposia a special service provided by TUI CRUISES to its hospital teams.
PARALLEL SESSION IV-2 - Digitalization in Maritime Medicine II

Chairs: F. Amenta, M. Braun

Maritime Telemedical Assistance Service at the UCMMiT in Gdynia. Analysis of 5 years of activity

J. Szafran-Dobrowolska, Gdynia; M. Renke, Gdynia; W. Wołyniec, Gdynia; M. Grubman-Nowak, Gdynia

**Background:** TMAS service in Poland was established in 2012, based on the convention of International Labour Organization from 1960s and its duties are carried out 24/7 by physicians from the University Center of Maritime and Tropical Medicine in Gdynia (UCMMiT). The aim of the work was to determine the reasons for medical officers’ reporting for help from the TMAS physician and to create a database of the most common diagnoses and recommendations.

**Methods:** In the presented work, we analysed TMAS advices for the number of patients, causes of contact; recommended evacuations and specialist consultations in the period from October 2012 to the end of 2017.

**Results:** In the five year period, UCMMiT physicians gave 186 TMAS consultations, recommending evacuation in over 20% of cases. Most often, we have been dealing with infectious diseases and injuries. Particularly noteworthy are also diseases of the cardiovascular system (CVD), which were the fourth reason for TMAS applications and first cause of recommended evacuations.

**Conclusion:** In regard how often we had to deal with infectious diseases, we consider that particular attention should be paid to the prevention of infections and education in the field of STD. Equally important is the regular training of the crew in the field of safety on the ship to avoid injuries and promoting a lifestyle change for seafarers to prevent CVD. The obtained data show that TMAS service physicians face various medical problems therefore providing proper medical assistance requires close multidisciplinary cooperation.

Telemedicine for the German navy – a new approach for 24/7 medical assistance around the world

M. Braun, Hamburg; M. Nier, Hamburg; A. Westerfeld, Hamburg; J. Holtz, Hamburg; R. Schäfer, Hamburg

Telemedical assistance has been used in the German Navy for a long time. The German Naval Medical Institute (GNMI) Kronshagen has been providing telemedicine for essential operations around the world for many years, including to regions with low medical standards. The provision of assistance in diagnosis and treatment, as well as concerns regarding employability for naval missions, were the main reasons for establishing specialized telemedical assistance in the Navy. As the German Armed Forces Military Medical Hospital (GAFMMH) Kronshagen had been closed several years ago, a new partner for clinical medical advice needed to be found.

In 2014 the decision was made to relocate the GNMI to Hamburg, next door to the GAFMMH. To enhance telemedical assistance for units of the German Navy the components were installed in the emergency room of the hospital to ensure a fast yet professional response. Even before the GNMI and its capabilities will be relocated within the next years, the GAFMMH Hamburg has begun, in 2016, to provide 24/7 clinical medical advice for all naval units. The telemedical advice covers different specializations, including gynaecology and tropical medicine, with the help of other armed
forces institutions such as the GAFMMH Westerstede. Requests regarding hyperbaric medicine or maritime medicine, i.e., Caisson disease or ship sanitation, are still treated by the GNMI with its own telemedical facilities. Medical advice can be requested via telephone, email, fax, or telemedical workstations.

By offering different ways of communication, all naval units get the chance to offer the best understanding of the case to the medical officers. X-rays, ECG-prints, or laboratory results can be transmitted, as well as whole MRI scans or live ultrasound scans. Telemedical workstations allow direct contact between the patient, the medical officer on board, and the medical expert in Hamburg by special encoded VOIP-services. Since 2016, over 60 clinical requests have been treated. X-ray findings are treated in particular, as the department for radiology of the GAFMMH Hamburg has been named as a reference center for X-ray examinations and findings on board the German Navy units. This presentation about telemedical assistance will give an overview of its execution, the number of cases it has dealt with, and its challenges - as well as covering the procedures after the repatriation of marines to the GAFMMH Hamburg.

Telemedical Maritime Assistance Service – Case reports from the Military Hospital Hamburg

M. Nier, Hamburg

**Background:** Telemedical Maritime Assistance Service (TMAS) is very important for seafarers and can be crucial for the optimal medical treatment on board of naval ships. In 2016, the Military Hospital in Hamburg started its TMAS for the German Navy to expand this service provided so far only by the Maritime Medical Institute in Kronshagen. The aim of this lecture is to present the TMAS of the Military Hospital in Hamburg using some extraordinary cases from TMAS consultations.

**Methods:** The data obtained from consultations of the TMAS of the Military Hospital in Hamburg between July 2016 and present.

**Results:** The TMAS recorded 59 medical files from July 2016 to June 2018. Most of these medical consultations concerned injuries and orthopedic disorders, dermatologic diseases, and radiological diagnostics. In 64.4%, the TMAS was consulted by doctors on board of naval ships and in 35.6% by other medical personnel on naval ships without a doctor on board. The consultations took place in 67.8% within the daytime and 32.2% at night.

**Conclusions:** The TMAS of the Military Hospital in Hamburg can improve the medical treatment on board of German naval ships whether they have a doctor on board or not. The medical advice provided by specialists around the clock could reduce the number of medical evacuations, what should be analyzed in future studies.

Advanced telemedicine solutions for improving medical assistance at sea

F. Amenta, Camerino; F. Sibilio, Roma; M. Di Canio, Roma

**Background:** Provision of adequate medical assistance in case of diseases or accidents on board ships is still a challenge. The lack of onboard healthcare staff, the limited medical knowledge of onboard personnel, and limited medical supplies make seafarers in a disadvantageous condition compared to people living ashore. In case of pathologies or accidents, people on board ships may ask the advice of a Telemedical Maritime Assistance Service (TMAS). The proper use of modern telecommunication
and remote medical care technologies can help to improve assistance in favour of seafarers at sea. This work summarizes the results of medical assistance delivered to container ships of the CMA CGM provided with a telemedicine corner compared to the same type ships not equipped with telemedical devices and asking telemedical assistance to the International Radiomedical Centre (CIRM).

**Methods:** Due to an agreement between the shipping company CMA CGM and CIRM, 30 porta containers had installed a telemedicine corner equipped with Infrared Thermometer, High Quality Camera, Electronic phonendoscope, Blood pressure monitor, Palmar Electrocardiogram, Spirometer, Finger saturimeter and Glucometer. Devices were managed by a software named "Easy CIRM". The system allows people to prepare detailed requests of assistance containing symptom-guided information of patient clinical conditions. Analysis involved the CMA CGM ships equipped with telemedical devices and for comparison a similar number of container ships with no telemedicine facilities and assisted for comparable diagnoses between 2016 to 2018.

**Results:** Analysis included 210 cases of pathologies assisted on board of CMA CGM ships with telemedical devices and a comparable number of ships without these facilities. Pathologies considered affected the gastrointestinal, cardiovascular, respiratory and nervous system and skin disorders. Patients assisted on board of ships with telemedical devices improved by the 83.2% and fully recovered by the 48.8% versus the 49.2% and 27.5% respectively of those assisted with a conventional assistance approach. Diversions avoided were the 73.7% for ships with telemedical facilities versus the 43.7% for vessels without these facilities.

**Conclusions:** The availability of telemedical devices on board ships remarkably improved the outcome of medical assistance on board and therefore can represent an added value for health protection and medical care of people working at sea.
Fatal monotony: Increased daytime sleepiness on board

R. Stark, Hamburg

**Background:** Intolerance of monotony, i.e. the tendency to make errors or even fall asleep during monotonous activities, can be life threatening in certain occupational settings. This also applies the maritime sector, where reduced performance as a result of fatigue carries serious risks: Fatigue is considered an important causal factor in many incidents of collision, grounding and other maritime accidents.

**Methods:** The study used a literature search. The following questions were investigated:

- What are the dangers of sleepiness in the maritime sector?
- How can sleepiness be objectified?
- Which solutions to drowsiness are already available in the navy?

**Results:** Excessive fatigue is estimated to account for 25% of maritime accidents. Much like road traffic accidents, maritime accidents often occur in the early morning hours and thus coincide with a dip in the circadian rhythm with regard to attention and cognitive performance. In a survey among crew members of a U.S. Navy aircraft carrier (N = 767) on sleep duration, consumption of caffeinated beverages, daytime sleepiness, fatigue and musculoskeletal (MSK) symptoms, crew members reported an average of 6.12 hours of sleep per day at sea, while 31.8% were affected by daytime sleepiness (!) and 9% complained of increased fatigue.

The German Sleep Society recommends a series of tests to objectify daytime sleepiness. As examples of testing methods pupillography and the Quatember-Maly psychometric vigilance test are demonstrated. In the shipping industry, practical guidelines have been developed to assist interested parties (naval architects/ship designers, owners/operators, masters, officers, other crew members and training institutions) to better understand and manage the issue of fatigue (IMO, *Guidance on fatigue mitigation and management* (2001). Another method to reduce drowsiness is "iREST" (Interactive Resilience Enhancing Sleep Tactics). It is about a further developed by the University of Pittsburgh Pilot project for US Marines with the aim of reducing drowsiness aboard warships. By means of a contemporary multifunctional "smartphone app" the young Soldier should be sensitized in terms of the importance of a restful sleep.

**Conclusions:** For the commander as well as for the ship crew, it is important to be aware of the dangers of drowsiness and to be able to effectively counteract them if necessary. There are already a number of established measures, and further strategies are being tested.
Sleepiness of day workers and watchkeepers on board at high seas: a cross-sectional study

M. Oldenburg, Hamburg; H.-J. Jensen, Hamburg

**Background:** This cross-sectional study is aiming to estimate the prevalence of sleepiness on duty among day workers and watchkeepers during work on the high seas.

**Methods:** During 18 voyages on 18 different container ships, daytime sleepiness and efficiency of sleep of a total of 198 seafarers were analysed by pupillometry (in a cross-shift design) and by SenseWear® wrist activity monitor.

**Results:** The watchkeepers showed significantly shorter sleep periods than day workers (5.5 h vs. 5.8 h). The average efficiency of sleep was 69.6% and significantly lower among watchkeepers (OR 0.48; 95% CI 0.26-0.88). 396 pupillometric examinations were carried out and revealed 88 study members (22.2%) with a pupillary unrest index (rPUI) in a range characterized as "unfit for duty" and 110 seafarers (27.8%) categorized as "particular attention required". The average rPUI was similar between day workers and watchkeepers. Within the group of nautical officers serving watch shifts, a daytime sleepiness (PUI≥ 1.2) was most often objectified after a shift from 00:00-04:00h and 04:00-08:00h.

The Epworth Sleepiness Scale revealed recent daytime sleepiness in 70 seafarers which was similarly often stated by day workers and watchkeepers. Based on the Stanford Sleepiness Scale (SSS), a measurable cross-shift increase in the SSS value during the examined shift was observed, especially among watchkeepers. The subjective perception of the current daytime sleepiness only showed a weak correlation with the PUI measured objectively (r= 0.185; p= 0.009). The amount of time already spent on the vessel at the time of the present examination was significantly associated with the rPUI.

**Conclusions:** Sleep periods of both the day workers and the watchkeepers aboard vessels were alarmingly short and sleep efficiency was low. Sleepiness on duty is similarly prevalent among day workers and watchkeepers and seems to depend partly on the cumulative working period on the vessels. Preventive measures to counteract fatigue (e.g. by compliance with the obligatory rest and sleep times) need to be taken by the shipping industry.

A decision support system for optimal crew scheduling considering fatigue and crew well-being

A. Rizvanolli, Hamburg; C. Jahn, Hamburg; O. John, Hamburg

The increased capacities of merchant ships in the last decades as well as tighter port frequencies are the main reasons for a higher workload onboard ships. The size and composition of ship crews, the levels of their qualification and training are the main factors for securing their ability to control and handle situations in a safe way. Furthermore, a lack of qualified crew scheduling ability in daily ship operation may result in a lack of workload control in combination with fatigue issues, which in turn can lead to major accidents.

In this work the problem of determining optimal crew demand by calculating work schedules under consideration of different legislative and safety requirements is formally specified and a model as well as solution methods for solving real-world data instances are presented. The problem is classified as a scheduling one and belongs to the class of NP-hard problems from a complexity
Theoretical point of view. A task-based approach is used to specify the main inputs as the workload, seafarers’ qualifications and the voyage specific dependencies. Company specific requirements as well as complex legislative regulations for rest hours are modelled based on their importance as hard or soft constraints in order to guarantee a good and robust mapping of the real world problem. Heuristic methods with smart decomposition of the feasible region and problem specific sorting methods are implemented and used for the problem solution. Solution methods are designed by performance and enable fast calculation of schedules directly on board giving the ship commands the possibility to react to changes in voyage with appropriate updated work schedules, avoid fatigue and guarantee a safe ship operation.

This paper contains a detailed description of how the decision support system (DSS) is used to analyse scenarios and discusses several criteria, which can be applied in the evaluation of sufficient crew. The model is parameterized in such a way that different strategic decisions with immediate impact on seafarers’ well-being e.g. watch keeping patterns can be varied and tested easily. The DSS has been validated for the merchant ship domain and could be used for further safety-critical systems in maritime domain.

Mental Fatigue at Sea: A Bird’s-Eye View on Causes and Countermeasures

S. Röttger, Kronshagen

Background: In the year 2017, the U.S. 7th fleet sustained three collisions and one grounding with overall 17 fatalities. Increased levels of fatigue were identified as contributing factor. Analyses of maritime accidents in the civil sector suggest that between 16% - 33% involve increased levels of sleepiness and fatigue.

Methods: Eighty-one papers, book chapters and reports related to fatigue and fatigue management were reviewed, with a focus on, but not limited to, maritime conditions. The objective was to identify factors that can cause sleepiness and fatigue as well as measures to counteract these effects.

Results: According to May & Baldwin (2009), fatigue countermeasures must be selected with regard to the mechanisms that induce fatigue. These mechanisms differ between sleep-related and task related fatigue. Sleep-related fatigue at sea is caused mainly by shift-work and insufficient resting conditions. Task-related fatigue is caused by sustained active work as well as monotonous passive tasks (e.g. monitoring). A third kind of fatigue is proposed, which is of special significance in seafaring: Environment-related fatigue. Causes are, for example, ship movements, deprivation from daylight, restricted opportunities for physical activity, unfavourable dietary composition and timing of meals, and heat.

Countermeasures against sleep-related fatigue are improvements of the watch standing schedules, manning levels, habitability of crew accommodation and introduction of naps. While active task-related fatigue can be reduced by breaks and rest periods, passive task-related fatigue can best be met by improvements in task design or by task switching. Improvements in interior lighting, physical exercise, dietary provisions and air-conditioning have been evidenced to be effective in fatigue reduction. Stimulant medication to increase alertness for a limited time has been successfully tested, too.

Conclusions: Literature review yields a plethora of successfully tested and potentially promising countermeasures to reduce fatigue in seafaring, but they have to be carefully selected and designed in order to ensure effectiveness and to prevent side-effects. In addition, establishing them calls for the investment of resources – money and personnel on the organizational level, time and effort on
the individual level. The challenge is to select a set of fatigue-management measures that is accepted and supported by ship owners and ship’s crews alike.
PARALLEL SESSION V-1 - Psychosocial aspects of pre-employment medical examinations

Chairs: A. Gäßler, K. Seidenstücker

Segmenting Filipino Merchant Marine Ratings’ Stressors and Coping Strategies: A Q Methodology

C. Mendoza, Manila; S. Ong-Salvador, Manila; J. Santos, Manila; M. Minerva Calimag, Manila

Background: Seafarers’ mental health has been a cause of concern in recent years, as it has been associated with significant morbidity, inefficiency and accidents on board, not to mention cost to the owners. Seafarers are at high risk for stress and the effect of these on his mental and physical health are largely dependent on the way he handles the stressors.

General Objective: To identify, categorize and evaluate the opinions of Filipino merchant marine ratings regarding their perceived stressors and the coping strategies they employ while on board vessels.

Methods: Thirty seven (37) Filipino merchant marine ratings undergoing Pre-employment Medical Examination (PEME) in selected clinics of Maritime Clinics & Doctors’ Association of the Philippines (MARCDOC) members were chosen by purposive sampling. They were surveyed and asked to rank-order 25 opinion statements on stressors and coping mechanisms drawn from review of literatures and theoretical frameworks on coping. At the end of the Q sorting, they were interviewed to elucidate their most agree and most disagree statements. The rank-ordered sorts were subjected to by-person factor analysis with varimax rotation using the PQ Method version 2.35, a program specifically designed to the requirements of Q methodology studies. The resulting factors were interpreted using the inductive approach.

Results: Four (4) factors were generated namely: 1) Focus on health; 2) Focus on others for help; 3) Focus on the thoughts associated with the stressor; and 4) Focus on strategizing to improve self. There is consensus on praying and seeking God's help in times of stress and they were all anchored on reality.

Conclusion: The perceived stressors of merchant marine ratings are diverse and so are their ways of coping but they all draw strength from a God who is merciful and loving.

Profiling of Filipino Merchant Marine Officers According to their Stressors and Coping Mechanisms

C. Mendoza, Manila; S. Ong-Salvador, Manila; J. Santos, Manila; M. Minerva Calimag, Manila

Background: Seafaring has been recognized as a highly stressful occupation. Most studies have dealt with stress in general with only a few studies specifically on officers. Cognizant of the added stress of managing the ship and the crew, this study was conceptualized to understand the stressors and coping mechanisms of merchant marine officers.

Objective: To identify, categorize and evaluate the opinions of Filipino merchant marine officers as to their perceived stressors and the coping mechanisms they employ while on board vessels.

Methods: Using purposive or convenience sampling, 30 Filipino merchant marine officers undergoing Pre-employment Medical Examination (PEME) in selected clinics of members of the Maritime Clinics...
& Doctors' Association of the Philippines (MARCDOC) were surveyed and asked to rank-order 25 opinion statements on stressors and coping mechanisms. At the end of the Q sorting, they were interviewed to elucidate their most agree and most disagree statements. The results were subjected to by-person factor analysis with varimax rotation using the PQ Method version 2.35, a program specifically designed to the requirements of Q methodology studies.

**Results:** Three (3) typologies were generated namely: 1) Instrumental Social Support Seeking Officer; 2) Unrelenting Problem-Focused but Resilient Officer and 3) Self- affirmed Officer. All are alcohol-averse and accept stresses as part of their job and view them as a way to mature and become a better person. Factors 1 and 3 are also God-centered.

**Conclusion:** Burdened by the responsibilities on the ship and their crew and longing for their family, the Filipino officers have acquired balanced coping mechanisms grounded on a deep faith in God and a positive attitude towards stresses. They could be the best mentors to help their subordinates cope with the stressful life at sea.

**A workshop on: ”Insights into Mental Health of Seafarers”**

R. Singh Khuman, Mumbai

Recent statistics show an alarming trend in the number events linked with mental health incidents among seafarers. Statistics put seafarers as the 2nd most likely population to commit suicide. Despite the widespread nature of mental illness nearly 2-3rds of those affected do not seek treatment. The fear and stigma affected around mental health issues often lead to people not seeking assistance.

The truth is that we are all at risk of being affected by mental health issues such as anxiety, depression etc. Responsibilities at work brings stress which is a normal phenomenon in today’s world. All individuals react differently, which is why it is important to identify the concerns, accept the impact environmental factors have on us and to take proactive measures to deal with them. Identifying the healthcare resources that should be used effectively to identify, diagnose and assist people just like done with all other illnesses is an urgent need.

The work shop would like to focus on simple steps which can lead to bring in a major change to how we approach mental health. This would be including the Psychometric screening conducted as part of the Pre-Employment Medical examinations. We will also discuss on the impact of Clinical Psychometric screening at a Pre-employment stage and the importance of measuring stress on board routinely.

**The Doctor as Facilitator – The Pre-employment medical examination in context.**

N. Griffiths, Singapore

President Rodrigo Duterte of the Philippines has stated that he wants as many seafarers as possible who are qualified and found fit to be at sea, to be at sea, and those who are not fit, to be made fit.

This presentation looks at the pre-employment medical examination and the role of the examining doctor as facilitator. What are the aims of the P&I clubs enhanced PEME, and how do we follow through on the Presidential dictum? The pre-employment medical examination forms part of the risk analysis process. It focuses on maximising outcome for the benefit of both crew and ship owners.
This presentation will balance the examination in accordance with the principles of biomedical ethics as defined in accordance Beauchamp and Childress. We will look at how seafarers can be made fit for their role as defined in the ILO Guide to the Medical Examination of Seafarers.

Mental Illness at Sea – Legal Issues - Learning from actual cases.

N. Griffiths, Singapore

Mental illness in a single crew member can disrupt the smooth working of a vessel. This presentation will consider three actual cases and look at causation, exacerbation factors, perceived dangers and the management and containment issues related to major psychotic episodes aboard ship.

With ships operating at minimum safe crew, there are no additional crew to look after a crew member who become mentally ill and requires constant supervision. Psychosis as we are aware is cyclical and the question arises as to how the crew member was employed and the difficulties in diagnosing mental illness in the pre-employment medical examination. This presentation will consider three case studies and look at jurisdictional issues that demand consideration in managing events around episodes of mental illness at sea. We will look how each case was managed. We shall considers also the effects on other crew members, the ship is an institution and one needs consider the constructs and additional demands that this imposes in the work place and the need for extra vigilance in the pre-employment medical examination.
Digital tools - how can they improve healthcare at sea?

J. Tülsner, Hohen Neuendorf

Digitalisation already started to change nearly all areas of our life. Various applications refer to medicine and wellbeing shoreside. The shipping industry widely uses digital tools to improve efficiency e.g. by tracking and optimising fuel consumption, port operations or maintenance activities. Very few solutions are available and used to improve the health services at sea.

MLC requires a health service for seafarers adequate to workers ashore. Limitations to get this entirely realised are self-evident. Digital solutions will enhance tele-medical future by inclusion of online video, transmission of vitals, documentation and availability of individual related data at sea. Ways are under investigation and found to reduce bandwidth needed and to comply with all relevant rules for protection of privacy.

This presentation will provide an overview and some new digital solutions those will influence available options and reality in care-taking for humans at sea.

Development of an informatics system for handling ship’s pharmacy

F. Amenta, Camerin; G. Nittari, Camerino; Ravjyot Singh Khuman, Camerino

The International Labour Organization (ILO) Maritime Labour Convention 2006 stipulates that all ships shall carry a medicine chest, medical equipment and a medical guide. The Flag State of the vessel determines the standards that the vessel must adhere to.

The National Laws and regulations as a minimum provide for the following requirements:

(a) all ships shall carry a medicine chest, medical equipment and a medical guide, the specifics of which shall be prescribed and subject to regular inspection by the competent authority; the national requirements shall consider the type of ship, the number of persons on board and the nature, destination and duration of voyages and relevant national and international recommended medical standards;

(b) ships which do not carry a medical doctor shall be required to have either at least one seafarer on board who oversees medical care and administering medicine as part of their regular duties.

Over the years the Medical Chest of various Flag states have evolved to cover the growing need of medicines required onboard. Ship owners and Ship Management companies are normally managing fleets of various flag states making it a herculean task of building a compliant, standardized medical scale for their fleets. In addition, the multinational fleets is the challenge of multi-national crew, who are all used to and trained for dealing with medicines differently. For this reason, we decided to do a detailed comparison of the medical scales of some of the leading Flag States and prepare an efficient
simple comparative tool "CTOOLS-Rx" to assist Fleet Managers in managing medical scales of various Flag States.

Further we (Telepharmatec) have worked with CIRM Foundation to analyse the trend of medicines prescribed when ships contact for Tele Medical Assistance. A universal, standardized medical scale has been proposed keeping in mind the requirements of all the flag stages. We have further used our technology to create a simple, efficient application that streamlines medical chest management onboard and provides for an enhanced personalized tele-pharmacy service to track compliance and smart restocking & disposal protocols. These all bring in cost savings, compliant handling and effective execution for the Ship owners and management companies.

Repatriation Risk Assessment: Applying Machine Learning in Maritime Health PEMEs

A. R. Abaya, Makati; R. F. Sarmiento, Manila; J. Wong, Makati; S. Roldan, Makati; J. G. Jose, Makati; A. Jose, Makati

Introduction: Vast amounts of data on repatriation of seafaring crew due to injury and other medical conditions are collected daily and stored electronically. These could have great potential for use in surveillance, medical evaluation, and risk assessment. Machine learning algorithms in health have been shown to assist medical practitioners in more accurately identifying and classifying cases as well as providing recommendations for treatment and management. In this study, we aimed to develop a machine learning algorithm to predict the risk of repatriation among seafarers.

Methods: After cleaning the data which included adding time-series variables and filling in the null values, we developed a machine learning method for predicting repatriation based on a CatBoost Classifier called gradient boosted decision tree algorithm. We used data from 2012-2013 as the training set, evaluated the classifier using the 2014 data as validation set, and used the 2015 data as the test set. This comprised our repatriation risk assessment (RRA) database. Finally, an application was developed to automatically extract pre-employment medical examination data and have these sent to the RRA database for calculation of the risk repatriation index. Continuing annual review of the data is to be performed to check sensitivity and specificity of the algorithm.

Results: We found that 29 out of 17,419 cases were predicted to be repatriated with 26 of those being identified out of 313 actual repatriated cases (sensitivity = 8%). With 26 cases out of the 29 true repatriated cases correctly identified, our model showed a positive predictive value of 89.65%.

Conclusions: This may be an added tool for pre-employment physicians, who are in charge of providing medical clearance to potential seafaring crew, to consider the RRA score of the patient in determining and identifying risk factors of the applicant prior to boarding the ship. Physicians may be able to more quickly identify modifiable risk factors of seafaring crew that will keep them fit, healthy, and safe while on board the ship. And as continuing machine learning is reviewed and corrected, better predictive outcomes can be achieved.

Prevention of Malaria in seafaring- time for a paradigm shift?

C. Schlaich, Hamburg; K.-P. Faesecke, Hamburg

Introduction: Malaria is a potentially fatal occupational disease in seafarers. Seafarers cannot avoid travelling to malarious areas and often lack access to adequate diagnosis and treatment. While Malaria is a well-researched and generally preventable and curable disease there is a multitude of
barriers for seafarers in the use of preventative measures: There is a lack of knowledge in seafarers and officers, simple measures to avoid mosquito bites are not available or are not used, such as keeping the air-condition running, closing doors and windows, avoiding deck work during dawn, use of repellents and room spraying, use of mosquito nets and long-sleeve cloths. Chemoprophylaxis often is not be on board in sufficient numbers, or was purchased from unsafe sources, or is not appropriate (e.g. Chloroquine), the same is true with medication for treatment. Even if medication is on board, seafarers may not use it for fears of side effects. Also there are uncertainties by shipmasters and companies what the appropriate actions in medium and low-risk ports are. The role of stand-by treatment and point of care malaria testing is often unclear.

**Methods and results:** As occupational health physicians we are regularly contacted for advice on Malaria in seafaring. In 2017 we received 68 requests from 5 different global shipping companies: The main topics were: Risk assessment for malaria concerning certain ports (N=51), purchasing and use of Chemoprophylaxis (n=11), interpretation of test-results from port doctors and hospitals (n=3), advice on treatment (n=3). One company decided to purchase point of care malaria tests for their fleet. Two cases of malaria were confirmed, in both cases there was no chemoprophylaxis taken. No death secondary to Malaria were reported to physicians.

**Conclusion:** The true risk of Malaria for seafarers is not well defined. Current risk maps are targeted to shore based travelers and may under- or overestimate the risk of seafarers. Surveillance data on Malaria for port and coastal areas are rare. Given the high rate of non-adherence to chemoprophylaxis, the role of point-of-care testing and stand-by treatment must be re-evaluated. It is suggested that IMHA founds an advisory board on Malaria to assist the global shipping industry and avoid fatalities from Malaria in seafarers.
Mental Health promotion program in the workplace with focus on transport

F. Baygi, Esbjerg; D. Andrioti Bygvraa, Esbjerg; O. Jensen, Esbjerg; D. Lucas, Brest

Public health care systems are far too focused on secondary prevention with treatment of mental illness and prevention, for example in terms of stress management courses, psycho-therapy and minor tranquilisers which is far too narrow. An integrated multiphased primary prevention strategy to create a mental health culture is needed. Transport workers often operate under stressful working conditions, long-work hours, lack of good sleep, healthy diet and physical exercises, that contribute to fatigue, impaired well-being, mental ill-health, stress and chronic diseases. An application to Horizon 2020 included 12 countries, 16 universities (organisations and schools) est. budget 3.7 million, Target groups: seafarers, truck drivers, dock-, rail-and airline workers.

Objectives:
Create, implement and evaluate a research based mental health culture promotion program with acute mental health function, training programs and social support groups.

- Determination of existing researches and training programs
- Study the knowledge, skills and needs for specific training among the youngest workers in order to create and implement effective and relevant training.
- Study the scope, the severity and the root causes of the mental health problems in the training centres, at work and in the company administrative units.
- Focus on the students and the youngest workers” needs for training and work organising being aware of the gender perspectives.
- Develop, implement and evaluate the mental health promotion training programs for vocational school centres, the companies' administrative units evaluated by follow-up studies in control- and intervention settings.
- Inspire the students to create supporting social private network via non-stigmatising social media
- Produce training materials and scientific evidence to be used by the companies, the students and the workers
- Develop proposals for new mental health policies, legislations and regulations

Methods:

- Multidisciplinary training and research methodology with quantitative and qualitative research methods
- Use existing and validated mental health culture promotion programs and produce new programs for specific sectors

Expected impact:

- Significant less sickness absence and suicides
- Benefit for the workers” health including benefit for the company economy.
• Policies developed for improved mental health culture based on the research.
• The training programs are ready to be continued at the end of the project.

Women seafarers’ health needs and expectations
C. Vedsted, Esbjerg; D. Andrioti Bygvraa, Esbjerg; O. C. Jensen, Esbjerg

**Background:** The maritime industry is facing a shortage of seafarers due to growth and therefore tries to attract women seafarers for having more human resources. The specific characteristics of the industry make it less attractive as a career option for women. A number of issues including their health and wellbeing, dealing with women needs and expectations in their working environment would help to identify related gaps and create relevant policies for the industry. However, very little evidence has been made on women seafarers and their needs. The aim of the study was to investigate how Danish women seafarers’ needs and health issues are met.

**Methods:** A qualitative method approach was considered with questions based on the scientific literature about women seafarers’ health and motivation. A total of 11 Danish women seafarers participated in semi-structured qualitative telephone interviews in November and December 2018. The interviews were conducted through an interview guide including an informed consent. The informants were recruited through the author’s network, where an invitation letter was sent out to all informants. The majority of the women seafarers worked as officers. Nearly half of the women seafarers worked on passenger ships, and the rest were distributed on container ships, oil tankers, RO RO ships and a guard ship.

**Results:** In general, the women seafarers perceived themselves as having a very good health. The women seafarers were handling the demands on their job very well and were having a rather lot encouraging and supportive working culture. Most of the respondents were eating healthy onboard but never did physical activity. However, most of the informants had problems with sleep or stress. Nearly over half of the women seafarers had experienced unwanted sexual behavior. Having separate washing rooms could make them feel more secure. Additional concerns were related to job insecurity, making mistakes, the composition of crew members onboard, and the bad access to healthy food. Being away from their families was a reason of concern, which could be explained by the gender mentality and traditions. However, they emphasized that they did not want to be treated differently than men.

**Conclusions:** An attractive working environment with job security, encouraging and supported culture could be an efficient way to attract more women in the seafaring profession.

Women seafarers: specificities related to maritime work and pregnancy
E. Bost, Lorient

**Background:** Women are underrepresented in the professional maritime world, for many reasons, historical, cultural, or related to the organization of family life. A difficulty specific to the job for the woman seafarer is related to pregnancy, long considered a factor of unfitness to navigation. Pregnancy in the maritime environment exposes the female seafarer to many occupational risks. These risks are highly variable depending on the function employed, the type of navigation and the distance to health: physical, chemical, organizational and psycho-social risks. Since 2015, pregnancy is no longer a factor of incapacity, the state of pregnancy now subject to a specialized assessment taking into account all occupational risks.
Methods: Within the Seafarer's Health Service, based on temporary incapacity records pronounced for pregnancy between 2012 and 2018, we carried out a retrospective study to evaluate the impact of the disappearance of systematic incapacity, on the gestational age at which the women seafarers stopped their professional activity.

Results: Although the 2015 decree did not change the gestational age at the time of the work stoppage, on average 2.5 months, this study allowed us to illustrate the difficulties for the seafarer to reconcile work and family life.

Conclusion: By becoming a mother, women are often forced to abandon the sea, or at least to change their professional lives. This state of affairs is found on the ground but in the maritime world, few areas for improvement seem possible, thus continuing a certain inequality.

Re:fresh: A Health and Wellness Study of Indian Seafarers Onboard Ocean-going Ships

R. Hayes Mejia, Bergen; A. Stray, Bergen

Background: The importance of having seafarers that are competent, healthy, motivated and fulfilled is pivotal in the context of safe, efficient and sustainable shipping. There is a growing interest in seafarers’ health and wellbeing both due to an intensified awareness of seafarers’ rights under the Maritime Labour Convention (MLC), 2006, as well as ballooning medical- and health expenditures often related to the increase of lifestyle related illnesses.

Method: The Re:fresh survey was conducted 2018 in nine major shipping companies assessing the health and wellbeing of 3,712 (98.40% CI) Indian seafarers through a holistic approach where physical, psychological, social and religious aspects were considered. Re:fresh is a self-assessed anonymous survey questionnaire delivered online to seafarers both onboard and ashore. All models and scales used in the survey are based on best practice models. Physical measurements such as blood pressure, weight, height and waist circumference were taken on the 534 seafarers surveyed while at home (in-office).

Results: The social and psychological aspects were found to play a significant role in the health and wellbeing of the Indian seafarer, with high levels of happiness, high employee satisfaction, and relatively high levels of loyalty. At the same time, stress and anxiety levels were high. 13% feel lonely, 36% do not have co-workers they feel they can talk to and 9% feel bullied. The companies with the highest level of loyalty (eNPS), had the least repatriated seafarers. Physically, majority were either overweight or obese according to both BMI (85%) and WHtR (65%), and 85% have elevated blood pressure levels. Most smokers (18%) started smoking during their present employment (0-5 yrs.).

Conclusions: The combination of excess weight and high blood pressure puts the Indian seafarer at risk of developing non-communicable diseases such as diabetes and cardiovascular diseases. The results from Re:fresh confirm that there is a need for health promotion and disease prevention initiatives within the shipping industry. By identifying the main health risk factors through a holistic approach on a group level, the shipping company is able to implement directed workplace health promotion and disease prevention programs based on these findings. This will translate to increased efficiency, lower cost and most importantly safer ships, in accordance with the MLC”s objective and purpose
Cross comparative analysis of some European on-board medical chest and medical equipment

J.-C. Brunet, Le Havre

**Background:** The EU directive 92/29/EEC on the minimum safety and health requirements for improved medical treatment to promote a better medical assistance on board vessels has been transposed differently into each EU national law, in particular when it comes to maritime transport in deep sea trade. Henceforth, the question is to know if it is possible to establish a medical chest that most closely matches the reality of on board medical events at sea.

**Method:** An initial cross comparison analysis of on board medical chest and medical equipment of nine EU countries was carried out with the French one. It was followed by a research (from trusted sources) on drug product monograph of some of the molecules on board deep sea ships, plus an overview of independent sources by the French SSGM (French National Occupational Health Department for Seafarers) and the French maritime Tele-Medical Assistance Service (TMAS).

**Results:** The medical chest imposed on board French vessels differs considerably when it comes to the choice and number of molecules compared to the other countries' regulations. This is particularly true for the drugs belonging to the fields of psychiatry, cardiology and gastroenterology. According to independent scientific publications, some of the studied molecules have proven to have an unfavourable benefit/risk ratio.

**Conclusion:** It is the French SSGM responsibility to establish the rules for on board medical chest. In order to do so, seeking the sole advice of the French TMAS is not enough. Must be taken into account the expert opinion delivered by independent medico-pharmaceutical journals, free from any outside commercial influence.

Impacts of the implementation of the Maritime Medicine Ordinance in Germany

J. Abel, Hamburg; P. Langenbuch, Hamburg

**Background:** In August 2014, the Maritime Medicine Ordinance (MariMedV) was implemented as mandatory basis for assessing the medical fitness of seafarers in Germany. The ordinance fully implements the "ILO guidelines on the medical examination of seafarers" as well as the STCW requirements. In addition, a body mass index (BMI) of > 40kg / m² (class III obesity) was defined as an exclusion criterion for seafarers. In order to assess the effect of the implementation of the MariMedV, medical fitness examination results of three years before and after 2014 were analysed.

**Methods:** The results of the medical fitness examinations are documented centrally in compliance with the data protection regulations. In anonymised form, data on age, occupational service and the main reason for unfitness can be evaluated.

**Results:** From 2011 to 2013 (period I), 62677 seafarers were examined, of which 2065 (3.3%) were unfit for service at sea. In the years 2015 to 2017 (period II) of 47481 seafarers, 1146 (2.4%) were
unfit. Approximately 90% of unfit seafarers were attributed to the 10 most common reasons for unfitness. In both of the periods studied, insufficient vision acuity was the main cause of unfitness, followed by cardiovascular diseases.

In period I insufficient colour vision, metabolic diseases, alcoholism and other forms of addiction as well as orthopedic diseases were the next common causes for unfitness, while in period II psychiatric disorders and obesity were also among the main causes. Addictions and metabolic diseases, on the other hand, rarely led to unfitness in period II.

**Conclusions:** Following the implementation of the MariMedV, approved physicians can assess the fitness for sea service of seafarers with chronic diseases within a defined margin of discretion. This is particularly noticeable with metabolic diseases. Nevertheless, metabolic diseases such as diabetes mellitus are still a serious problem for seafarers. Psychiatric disorders, which only accounted for 4% of unfit seafarers in period I, caused 12% of unfitness in period II, thus becoming increasingly relevant.

Despite of a margin of discretion, diseases of the cardiovascular system are still among the main causes of unfitness for service at sea. As a consequence, we should continue to work to detect and treat these diseases at an early stage or to prevent them in advance through targeted prevention programs.

**Evaluation of the medical refresher courses**

J. Abel, Hamburg; A. Ewen, Hamburg; P. Langenbuch, Hamburg

**Background:** In 2014 the responsibility for the accreditation of training courses and the monitoring of the providers by Maritime Medicine Regulations (MariMedV) was transferred from the Federal States to the Federal Government. This task is administered by the Maritime Medical Service of BG Verkehr.

Before the introduction of the MariMedV, no comparable evaluation procedure had been conducted by the States' authorities. Therefore, no results for the period before 2014 are listed or available.

**Method:** The participants of medical refresher courses are presented with an evaluation sheet by the provider at the end of the course. The completed standardised forms are transmitted to the Maritime Medical Service and analysed. From 2015 till 2018, a total of 211 medical refresher courses were conducted and evaluated in various places in Germany.

**Outcome:** A high level of competence of the teachers is a key component for an effective knowledge transfer. The participants rated the competence of the teachers with 99% as "very good" or "good".

The respondents evaluated the distribution of topics with reference to maritime navigation with 92% as "very good" or "good". Evidently, the teaching contents specified in MariMedV are imparted with a high level of practical reference by the providers. The standard of last year's training courses was rated with "good" or "very good" by 97% of the participants. With these evaluations, the navigational officers confirm the high quality of the training. The participants felt capable to assure medical care to the extent required on board, with 91% of the answers being "good" or "very good".

**Discussion:** For the first time, the quality of medical refresher courses of all providers is analysed and documented in a standardised way. The evaluation shows that the training courses in Germany are conducted with a high standard of teaching. The participants rated the courses from 2015 till 2018 on average with the grade 1.5. The optimal support of navigational officers as laypersons in a medical emergency is our main concern. With the introduction of MariMedV, detailed legal provisions for the
medical training of ship's officers were established in Germany. The implementation of these regulations has proven its worth. It would be desirable if navigational officers of other flag states could profit from this system of proven quality training.

Establishing uniformity of inspection among inspectors issuing IHR Ship Sanitation certificates

T. Veenstra, Bilthoven; J. Broekhuijsen, Bilthoven

**Background:** Ship Sanitation Certificates (SSC) based on the International Health Regulations (2005) are issued by inspectors of nine autonomous regional health authorities, covering 16 sea-harbours in The Netherlands. Uniformity of issuing procedures is important, but not easy to achieve. International developments ask for adjustment of procedures and up-to-date knowledge. The Netherlands chooses to coordinate this from a national level.

**Methods:** In the past five years, various steps have been undertaken as a result of new developments. Important occasions were implementation of the EU SHIPSAN ACT Information System (SIS), improving the monitoring of vectors during the Zika epidemic, and inspection of the ballast water management system when international legislation came in force in 2017. The National Institute for Public Health and the environment (RIVM) established a group of delegated inspectors to combine expertise from inspectors with renewed knowledge from national experts. Together with policy advisors from RIVM, a team was composed to monitor developments, maintain international contacts, implement changes and to train public health professionals.

**Results:** RIVM organized two annual meetings with all inspectors where their experiences were combined with information from the team. This also advanced contact between regional inspectors and national team, which established a national help desk for inspectors enabling them to request for telephonic assistance during inspections. The described strategy has enabled implementation of changes in a six month period.

To perpetuate the implemented policy and stimulate further consistence in issuing practice, an intervision program was initiated where inspectors would attend a colleague from another regional health authority during an inspection. Observed differences in the inspection were reported to the national team, which used the findings in the national meetings and in the training of new inspectors.

**Conclusions:** The national approach to uniform inspections and implement changes has been proven successful. Yet, the issuing of SSC certificates remains a specific and demanding task. We will continue improving our methods of interaction with inspectors and of supporting their task. Increasing international exchange of experiences, supported by the implementation of the EU SHIPSAN ACT Information System (SIS), is expected to be useful for this in the following years.

Training Needs Assessment Among Public Health Staff at European Designated Ports

D. de Rooij, Amsterdam; E. Belfroid, Bilthoven; J. de Boer, Utrecht; C. Swaan, Bilthoven; B. Mouchtouri, Thessaly; C. Hadjichristodoulou, Thessaly; A. Timen, Amsterdam

**Background:** International infection prevention and control are of major and growing concern. The International Health Regulations (2005) state required core capacities for designated points of entry. Competent staff regarding these capacities is needed. In order to identify priorities for training and
education, we assessed specific training needs among public health staff at designated ports in Europe.

**Methods:** An online questionnaire was disseminated among public health staff working at national, regional and local level of designated ports in 27 European countries. The questionnaire covered the IHR Annex 1B core capacity requirements which were converted into 8 topics (health risks; safe environment; routine inspection; ill travellers; the public health emergency contingency plan; recommended measures; affected persons; affected animal) and 30 subtopics. Using a four-point Likert-scale, the importance and the training needs were assessed. These could be scored as high (3), moderate (2), low (1) or no (0). Furthermore, preferred training methodology and previously received training in the last three years were assessed.

**Results:** We received completed questionnaires from 25 designated ports (national level n=7, regional level n=8, port level n=11), representing 15 countries (response rate 56%). The highest training needs were reported for control measures (e.g. disinsection, deratting and decontamination) (mean score=2,12); the use of protective equipment (2,09); the safe use of spaces for assessment, care or quarantine of travellers (2,09); vector control (2,04); and triage (2,04). In general, respondents from the national level reported higher training needs than respondents at regional level, and both higher than at local level. Preference on training type was fairly uniform, with highest overall score for presentations. Most often, respondents reported previous training on routine ship inspections (44%), whereas only 12% had received training in dealing with affected animals and 24% on control measures.

**Conclusion:** The results of this study provide insight in the priorities for the development of training and education activities. These can be used for development of relevant future training programs. Different training need intensity and content were identified among different working levels, emphasising the need to better target education activities. *This study was funded by the European Union’s Health Programme (2014-2020).*
PLENARY SESSION V - Telemedical maritime assistance service and digitalization

Chairs: M. Burkert, R. Verbist

Liability of TMAS doctors. Responsible for treatment, or merely an advisor?

A. Tveten, Bergen

**Background:** The captain is the medical responsible person on board. On shore, a doctor prescribing treatment will be the one responsible. However, when the Captain calls a TMAS doctor for advice, what are the liabilities of the doctor?

This became the issue when a patient deceased after a Captain had been in contact with Radio Medico Norway (RMN). A claim was forwarded in accordance with the Norwegian "Act on patient Injury Compensation". The following process raised a number of questions of the liabilities of a TMAS doctor.

**Results:** The first question was whether the doctor or the captain is liable for what happens on board the ship. One could argue from maritime laws that the Captain is overall responsible, and that the doctor’s role is merely as an adviser. On the opposite, the doctor being the most skilled professional, could be responsible for everything that happens. After a preliminary discussion, NPE decided to process the claim. By this the NPE states that the doctor, at least to a certain extent, is liable for the advice given. During the following process, several questions were raised about the RMN practice and what the doctor was liable for. These were questions like:

1. The patient's condition at first contact could possibly worsen, and diagnostics comparable to onshore services was not available, should the patient therefore been evacuated?
2. RMN does not use medical indexes commonly used in onshore practice, assessing the need for hospital treatment. Is this malpractice?
3. RMN did not receive feedback on concrete requests about the patient's symptoms. Is it the responsibility of the TMAS to follow up on lack of feedback?
4. The ship was asked to observe the patient. Is this a reasonable request, compared to the level of education and training they got from STCW?

**Conclusions:** These and other questions were discussed processing the claim. If not complete, the process made it more clear what the responsibilities and liability of the Norwegian TMAS is. The case showed, that there is a difference in being obliged to provide medical advice and assistance to all ships, and being liable for the advice given. It is not merely a question of responsibility, but also a question if the doctor or TMAS services are liable for their advice. Nations will review this differently and therefore all TMAS providers should answer these questions. For the users this is even more important, and therefore liability of the services should also be known to them.
The seafarers "Health Passport": An integrated electronic health record (EHR) for a global maritime industry

F. Amenta, Camerino; G. Nittari, Camerino; G. Pallotta, Camerino; R. Singh Khuman, Camerino; A. Arcese, Roma

OBJECTIVE: Seafarers are a unique population that undergo periodic medical examinations that are well defined, as part of their employment requirement. These medical examinations are carried out by approved/appointed medical doctors who certify the seafarer Fit for duty at sea or provide medical recommendations. However, these have become an annual event, and in majority cases, the long-term health and fitness of the candidate are not taken into consideration while performing the medical examination. One of the primary reasons for this is the disconnect between data points and the ones for whom this data is essential. There is an urgent need to develop a simple and effective tool that would integrate the medical records of the seafarer throughout his life cycle as a seafarer.

METHODS AND RESULTS: The Seafarer Health Passport is an advanced, integrated e-Health and e-Wellness application that encourages the individual to become more accountable and aware of their fitness and well-being by maintaining a:

- **Personal Profile**
  - Blood Group, Allergies, Chronic Ailments
  - Prescriptions / Medications
  - Medical Reports synced from Maritime Pre-employment medical examinations
  - Medical Reports uploaded by individual
  - Emergency Contacts

- **Fitness Vitals** *(like)*
  - Height, Weight & BMI
  - Blood Pressure, Pulse, Blood Glucose etc.

- **Health Awareness on topics of interest**

- **Wellness Habits** *(like)*
  - Sleep Patterns
  - Water Intake
  - Alcohol Habits
  - Smoking Habits
  - Mood Diary

- **The Fitness Project**
  - Set one's own fitness goal, Measure one's fitness level
  - A personalised workout routine tracked and reviewed by a fitness specialist

- **Mental Health & Wellbeing Survey**
  - Simple questionnaires to gauge emotional and clinical scales and provide the information as required.
CONCLUSIONS: The above information becomes extremely critical during medical emergencies. Doctors providing remote assistance can promptly review the medical history and draw inferences from the logs to ascertain if there is a direct correlation with the incident. Furthermore, the doctor can guide the seafarer on maintaining a healthy lifestyle within his health and fitness levels.

E-healthy ship - Health Management on board
D. Dengler, J. Heidrich, S. Langer-Böhmer, S. Mache, F. Neumann, N. Westerhoff, B.C. Zyriax, V. Harth, M. Oldenburg

Background: e-healthy ship is an interdisciplinary, EU-funded project to improve health management on vessels without doctors on board. Occupational safety issues, health prevention, the management of medical everyday problems and emergencies as well are of unchanged importance on board of merchant ships. The progressive digitization of processes on board and the exchange of real-time information with institutions ashore ("Maritime 4.0") are changing the maritime economy and also bear potential, to further improve health aspects for the multinational crews.

Methods: Innovative IT-technology is being developed by an interdisciplinary team (scientists in occupational and maritime medicine and oecotrophology, software developers and shipping companies) and will be used for documentation and handling of health related issues aboard and for digital training.

The team proceeds as follows:

- analysis and surveys of seafarers needs and habits on board of four vessels (e.g. on physical and mental health issues, nutritional and fitness conditions, lifestyle aspects and sleep),
- design of the structure of the project’s e-health platform,
- development of medical supplements for an established software used in the shipping industry (e.g. medicine chest, telemedicine, medical record),
- development of an e-learning platform for all seafarers, that will be available on various devices,
- design of content,
- introduction of the platforms on board ships including usability tests.

Results: Software used for the management of fleets and ships today will also be helpful for handling health issues on board in the future. It will support nautical officers responsible for medical care of crew members. The e-learning platform for all seafarers will be an open source product including health prevention measures for each individual and the setting as well.

Conclusions: Based on the findings, an interdisciplinary concept for e-health management on board of merchant vessels will be designed.
Poster Walks

Poster Walk I-a - Lung

Lung function change in hyperbaric chamber inside attendants

P. Poolpol, Bangkok; P. Sithisarankul, Bangkok; T. Rattananupong, Bangkok

**Introduction:** Hyperbaric oxygen therapy is one of new trends of additional treatment especially for non-diving-related diseases in Thailand. Hyperbaric inside attendants have to work under hyperbaric environment to provide medical care for patients in the hyperbaric chamber. This study aims to investigate longitudinal change on lung function in hyperbaric inside attendants and the relationship with hyperbaric exposure.

**Methodology:** This is a retrospective longitudinal study exploring the adverse long-term effects to the lungs in hyperbaric inside attendants. All inside attendants who worked in the public hospitals or medical centers with multiplace hyperbaric chamber in Thailand were included. To be considered for inclusion in the study, inside attendants were required to have at least two follow-up lung function tests and minimum one-year interval at baseline from annually periodic examination. Lung function of hyperbaric inside attendants were compared against reference values of the Thai population.

**Results:** There were 51 subjects with 9.26 years mean period of follow-up. The hyperbaric inside attendants showed a significantly decrease in measured lung function in average forced expiratory volume in one second (FEV₁), forced expiratory flow at 25-75% of FVC (FEF₂₅-₇₅%) and FEV₁/FVC ratio over time. The annual reduction in FEV₁, FEF₂₅-₇₅% and FEV₁/FVC ratio were 22.52 ml per year, 44.92 ml/sec per year and 0.48% per year, respectively. The study showed significant differences in annual changes in FVC, FEF₂₅-₇₅% and FEV₁/FVC ratio between hyperbaric inside attendants and the lung function predicted values for the Thais. However, the results revealed no differences of annual change in FEV₁ from predicted values. The average working depths, average working hours and total working hours as hyperbaric inside attendants were related with the changes of lung function.

**Conclusions:** Working in a hyperbaric environment does affect the lung function of hyperbaric inside attendants. In addition to fitness to work implementation, periodic lung function evaluation should be encouraged to monitor further possible harm to the attendants.

**Effect of Hyperbaric Environment on Pulmonary Function in Professional Divers**

P. Poolpol, Bangkok; P. Sithisarankul, Bangkok

Diving may cause a number of adverse effects on health. Divers should strictly follow the rules to ensure their safety and avoid any possible adverse outcomes. The in-water hyperbaric environment directly affects partial pressure of the breathing gas, which results in changes of body systems, in particular respiratory system. Professional divers who work under hyperbaric conditions for a lengthy period may experience substantial effect to change their lung function. Pre-placement and periodic health examinations are essential to evaluate their readiness to work. Recent evidences about changes of lung function in Forced Vital Capacity (FVC) and Forced Expiratory Volume in 1st second (FEV₁) are still inconclusive. Nevertheless, most studies demonstrate a slight depletion, 2% over 5 years, in FEV₁/FVC ratio (FEV₁%) which might suggest air trapping in divers’ lungs. Furthermore, maximum mid-expiratory flow (FEF₂₅-₇₅%) significantly decreases between 23 to 146 ml/year, which reflects possibility of small airway diseases in divers. The findings raise the concern of increasing risks of pulmonary barotrauma in divers.
A review on nutrition and decompression sickness in recreational SCUBA divers

N. Sai-ngern, Bangkok; I. Trevallion, Edinburgh

The popularity of Self-Contained Underwater Breathing Apparatus (SCUBA) diving in the past decades has seen the number of newly certified divers around the world increasing every year. Multiple studies have been conducted through research centers across the world in order to establish safe diving practices, with the aim to avoid the rare, but potentially fatal, complication of Decompression Sickness (DCS) or Caisson Disease.

The known risk factors have been regulated and controlled for safe diving practices with the aim of preventing DCS. The symptoms of DCS are not specific and precise investigations are yet to be discovered therefore making the condition difficult to diagnose. Symptoms include joint pain, tingling, numbness, fatigue, dizziness, difficulty concentrating and in severe cases, bowel and bladder dysfunction, paralysis and sudden death.

Up until now, the only definite diagnostic method for DCS is by improvement of symptoms after recompression treatment in a hyperbaric chamber, which is a time dependent and expensive treatment. Since SCUBA diving is often conducted in remote areas with limited access to medical facilities equipped with a hyperbaric oxygen chamber, it is sensible to practice prevention rather than cure.

Recent research has demonstrated the potential prophylactic effects of antioxidants, such as vitamin C and vitamin E, and dark chocolate ingestion against oxidative stress and its associated complications after hyperbaric exposure, which may help to prevent DCS. Further studies with a larger diver population are required to confirm the findings and determine optimal dosage and consumption levels. Other antioxidants and nutrition may prove to be as effective and should be explored. The findings may also lead to a new standard of pre-dive recommendations for DCS prevention.

Examination of Fitness for Recreational Diving on Passenger Ships

J. J. Grannemann, Bielefeld

Background: There are strict recommendations for the examination of recreational divers, published in national guidelines by national societies for diving medicine.

As we observe an increasing number of recreational divers in general and especially "ad hoc divers", who spontaneously decide to participate in diving classes onboard of cruiseships it is essential for the medical staff working onboard to have knowledge of standards of diving examinations especially for passengers with preexisting conditions who are interested in diving and are in need of a diving examination. Good knowledge of the correct examinations as well as contraindications for recreational diving is essential. Not all recommendations of national societies for particular examinations can be followed on board a cruise ship due to the limitation of examination methods on board.

Methods: The German Society for Diving and Hyperbaric medicine GTÜM (Gesellschaft für Tauch- und Überdruckmedizin) recommends in addition to a full clinical examination (following the Examination Sheet for Recreational Divers) a lung function test and ECG. For divers older than 40 years a stress ECG is mandatory. If there are pre-existing conditions specific further examinations might be necessary.
**Results:** Every ships doctor who might face Examinations of Fitness for Recreational Diving on Passenger Ships should be familiar with the current recommendations of the national societies for diving medicine to perform a responsible and well-founded examination. The doctor should be familiar with the basics of diving physics to evaluate the characteristics of underwater reactions of physiological systems of the human body. As well he should have knowledge of the contraindications for scuba diving. As the examination and the requested knowledge is extensive, a specific training and the availability of specialist literature is desirable.

**Conclusions:** If a passenger as well as a crewmember requests an examination for recreational diving on board a cruise ship, we strongly recommend to maintain the recommended standard for an examination for recreational divers according to GTÜM. If a recommended examination for the requested certificate is not available onboard we recommend to desist from giving the certificate for Fitness for Recreational Diving to maintain the safety of the diver as well as to prevent legal effects fort he doctor in case of diving accidents.

---

**Emergency medical evacuation in the offshore oil and gas industry**

T. Sae-Jia, Bangkok; P. Sithisarankul, Bangkok

Emergency medical evacuations in the offshore oil and gas industry are very costly and risky. Studies in the past have found that the main cause of emergency medical evacuation was mainly injuries to the hands and eyes. At present, it is found that evacuations are more likely due to illnesses rather than injuries. The most common illnesses that need evacuations are gastrointestinal diseases, dental problems, and cardiovascular diseases, respectively. Age-wise, young workers have been evacuated due to occupational injuries while older workers are more often evacuated due to illnesses. In Thailand, there have been no studies on the causes and costs of emergency medical evacuation in the offshore oil and gas industry.

---

**Firefighters on board – physical demands on various ship**

F. Heblich, Kiel

**Background:** Firefighters onboard of ships are said to need excellent physical fitness that is as good as for those ashore. But studies, measuring the metabolic demands of firefighters using their usual equipment including the respirator mask, are rare even ashore.

**Methods:** Firefighters of four different types of ships (small freighter, sail training vessel, offshore supply vessel and cruise ships) wearing their usual SCBA and protective clothing were equipped with a mobile spiroergometry device adapted to their respirator mask measuring VO$_2$, VCO$_2$, VE and heart rate. 33 male subjects participated in 6 different training scenarios from simple search tasks up to rescue missions with heaving of dummies or stretchers with additional weights of 80 kg.

**Results:** All 33 subject fulfilled their tasks successfully. Duration of the trials ranged from 6 to 20 minutes (mean ± SD 12.2 ± 4.4), maximum heart rate from 163 to 195/min (180.3 ± 11.3). VO$_{2peak}$ was 2499 ± 573 ml/min, VE was 70 ± 15.2 liters.

**Conclusions:** In this study we were able to show firefighters’ metabolic demands on different ships and during various but typical tasks on board of ships. Maximum heart rate (own study, n=405), VO$_{2peak}$ and VE (n=181) during the tasks onboard were increased in a way similar to those of firefighters ashore, depending on the tasks. Heart rates during the rescue missions often reached or
even exceeded the theoretical personal heart rates, although the usual psychological strain of real-life firefighting could not be added. The moderate VO_{2peak} and VE show the performance of the participating firefighters. Although their heart rates show the demanding strain of the training tasks, they control their breathing to save the air of the SCBA.
Poster Walk I-b - Mental Health

Challenges and coping strategies among women of offshore wind workers living the 14/14 schedule

J. Mette, Hamburg; V. Harth, Hamburg; S. Robelski, Hamburg; M. Kirchhöfer, Hamburg; S. Mache, Hamburg

**Background:** The 14/14 schedule is a characteristic work time profile among workers in the German offshore wind branch. Living this schedule means spending 14 days offshore in turn with 14 days of spare time at home. It can be assumed that this lifestyle affects both offshore workers and their families. Prior research carried out in offshore industries and related branches characterized by intermittent absences suggests that the partners staying at home experience a unique set of demands on their own. In order to extend existing results regarding the psychosocial adaptation of "offshore couples", the present study focussed on the perspective of the female partners of offshore wind workers. Study objectives were threefold: 1) examination of the perceived features of living the 14/14 schedule, 2) exploration of women's coping strategies, 3) investigation of their views on reconciliation of offshore work and partnership/family life.

**Method:** In order to offer an in-depth perspective on the topic, semi-structured telephone interviews with 14 female partners of offshore workers were conducted. Data was analysed in an iterative process according to Mayring's qualitative content analysis.

**Results:** The women described several costs and benefits associated with their living situation, such as spending important events without the partner, but also feeling empowered by coping with everyday challenges. Particular challenges were encountered by families with children due to responsibilities in childcare and parenting. Coping strategies to facilitate the psychosocial adaptation included support seeking behaviours as well as pursuing an active lifestyle. The importance of new communication technologies to stay in regular contact was stated. Furthermore, women highlighted the meaning of their own work activities when their partners were away. All in all, the women offered a differentiated perspective on their lives, being characterized by three distinct phases (single life, life as a couple, transition phase). In terms of reconciliation of offshore work and family life, only few company offers were reported.

**Conclusion:** The present study sheds light on the demands experienced by women of offshore workers and on their coping strategies. While the women themselves reported to apply a range of strategies for psychosocial adaptation, support offered by offshore companies for reconciliation of work and family life was identified as a field of action in need of improvement.

Socio-psychological stress in the professional activities of seafarers

E. Pyadlo, Odessa

**Introduction:** In adaptation, simultaneously and in conjunction, a multifunctional and multidirectional formation of a sailor’s trajectory of life occurs. Its internal picture is a peculiar "slice" of adaptation, which characterizes the quality of a humans life and his adaptation capabilities at different levels: "body - individual - subject - personality - individuality".
Objective: to assess the impact of life events on the formation of socio-psychological stress and find connection between illness and stress, psychological, physical and somatic conditions, and a seafarer’s quality of life.

Methods: To identify risk factors for morbidity and psychoemotional maladjustment "The social readjustment rating scale" (Holmes T. H., Rahe R. H.; 1967), which associates stress’ power with a particular event in a seafarers’ life was used. Life events were ranked by stressful influence over the last year - from a maximum of 100 points (N 1 "The Death of a Spouse").

Results: The most relevant for the last 12 months, there were two opposing trends - a long run and a long vacation (57%), accompanied by regular changes in financial status (31%) and deterioration in business (22%). The most widespread responses include the uncertainty of the direction and timing of a run (24%), forced work not in the specialty (19%), and stressful objective life circumstances e.g. the death of a relative, illness of family members (18%). However, if events such as the death of a spouse / relatives, divorce, etc., are rare, then one statement about conflicts with crew members (1%); complete denial of aggression or threat to one’s address, physical discomfort during the run and difficulties of sexual order (0% each) raise certain doubts about the sincerity of the surveyed sailors.

Conclusions:

1. Significant problems in seafarers’ lives are experiences related to employment, terms and direction of the run, financial difficulties - 6 of these statements occupy the top ranks (from 32% to 19% of respondents).

2. Work overload: high personal responsibility for the choice of the shipping company, terms and direction of the run; informational and psychoemotional overloads; high labor intensity, contract duration; the threat of professional and linguistic incompetence.

3. Stress in the run is caused by socio-psychological discomfort in a foreign crew; dependence on the shipowner, Master and crewing agency; ruining of one’s life and professional plans.

Stress and strain among merchant seafarers depending on the three voyage episodes

M. Oldenburg, Hamburg; H.-J. Jensen, Hamburg

Background: A sea voyage is characterized by a variety of work requirements for the ship's crew, basically reflected in three voyage episodes: port stay, river passage and sea passage. The primary aim of this study was to compare stress and strain amongst a sample of merchant seafarers across these three voyage episodes.

Methods: In a cross-sectional maritime field study, 323 sailors on 22 container ships were biometrically surveyed and asked to complete a questionnaire. In addition, a survey of energy consumption and heart rate (variability) was carried out in parallel by 236 participants with the SenseWear® armband monitor and the RS 800 polar watch.

Results: Port stay and sea passage each accounted for the largest proportion of the ship’s journeys, each at around 40%. The study participants rated port stay with 37.8% as the voyage episode with the highest strain, followed by the river passage (24.8%) and then the sea passage (13.0%). The working time during the sea passage was on average shorter than during port stay or the river
passage (p<0.001) – as a result, seafarers had more spare time to spend on leisure and sleep. Total energy turnover and, by trend, work energy turnover were notably at the lowest during the sea passage. In particular, the crew had a significantly lower heart rate during the sea passage than during the other two voyage episodes (p=0.001). Furthermore, there was no difference in the seafarers’ heart rate variability between the voyage episodes.

**Conclusions:** In the present study, it becomes clear that an accumulation of psychophysical stress takes place during port stay and leads to a subjectively and objectively higher strain level. In contrast, seafarers are more likely to recover during the sea passage. This knowledge should be used to offer ship’s crews targeted health measures, in particular during the sea passage.

**Psychophysical stress and strain of maritime pilots in Germany: A cross-sectional study**

M. Oldenburg, Hamburg; F. Barbarewicz, Hamburg; V. Harth, Hamburg; H.-J. Jensen, Hamburg

**Background:** Maritime pilots work in a deployment system (rotation system) with unpredictable work assignments under high levels of physical and mental stress. The aim of this study is to analyse current stress and strain in maritime pilots.

**Methods:** Initially, all German pilots were interviewed with an online questionnaire about their living and working situation (response rate 43%). Subsequently, a medical and psychological examination of a random sample was carried out with pilots working in a 4-month rotation system compared with those working in a 1-week system. Most of the measurements took place at the beginning and the end of continuous work assignments each lasting several weeks (pre vs post-rotation). The questionnaires RESTQ-work 27, Resilience Scale RS-13 and Berlin Questionnaire were used as well as a sleeping diary. Furthermore, cardiovascular parameters (during rest and under ergometric stress), activity and blood parameters, urine stress hormones, and the pupillary unrest index were surveyed.

**Results:** 60 pilots were recorded with an average age of 48.7 years (SD 8.3 years). Among the parameters collected, there were no significant differences between pre and post-rotation examinations. Pilots with a 4-month rotation system experienced a much higher subjective strain level in RESTQ work-27 (OR 10.12 (95% CI 1.21-84.59)). According to the sleep diaries of the pilots working in a 4-month rotation system, reduced levels were found concerning the pre and post-rotation subjective performance level (p = 0.042 and 0.029), subjective sleep duration (p = 0.032) and current subjective feeling post-rotation (p = 0.036). Objectively measured arterial hypertension was significantly more frequent among pilots working 4 months at a time (OR 21.41 (95% CI 1.26-364.05)). In addition, elevated levels of total cholesterol, triglycerides and uric acid were more common among this group of pilots (p = 0.038, p = 0.033 and p = 0.038). In particular, the risk of hypertriglyceridemia was increased (OR 4.41 (95% CI 1.15-16.91)).

**Conclusions:** Maritime pilotage represents a very straining profession that has been studied very little up to this point. The present results indicate that 4-month rotation systems lead to higher levels of subjective and objective strain than 1-week rotation systems. Interventions are therefore recommended; especially a change in the rotation system should be considered.
Poster Walk II-a - Training & Education

Learning process from eLearning tasks to simulation

N. Rantalaiho-Kulo, Turku; A. Lundberg, Mariehamn

**Background:** The main goals in this project Onboard Med during 10/2016 - 6/2019 are to harmonise and develop courses of skills in maritime emergency management, medical treatment and occupational safety. The learning materials are suitable for distance learning. Pre-materials will be given to participants before contact lessons (e.g. lessons, laboratory lessons and workshops). These pre-materials can be pre-tasks, reading materials, discussions in e-platform etc. When the participants have read the pre-materials, they are ready to participate into simulation and contact lessons. Participants can show their skills in what they have learned from pre-materials; learning skills in practice and also learn more during the simulation and debriefing discussions in classroom with teachers and other participants. In simulations, participants can practice real life scenarios in as authentic environments and in demonstrated situation. All in practice under guidance from a teacher and without putting patient safety and their own safety in any danger at all.

**Methods:** The different participants in countries in project have piloted some part of courses together with the other partner countries. The target groups were nursing and marine students, shipnurses and medical officers in different passenger/cargo vessels. The target groups got first pre-material for preparation, then workshops onboard/institution and finally simulation onboard with simulated patient (actor patient) in authentic environment under supervision of a teacher. The topics in simulation scenarios were based on survey from shipnurses, medical officers and literature review.

**Results:** The learning process should be create logically based on target groups learning needs. The feedback were collected from different participants. When participants were prepared with the pretasks and then practiced in authentic environment with real patient or simulation mankins, it was more rewarding for learning process among participants.

**Conclusions:** The teaching methods in maritime subjects differs in different countries. The participants are individuals as a learners/teachers too. The maritime environment is so international and global, that we should practice more together via Elearning and simulations. After eLearning and simulation in different environments together there will be a innovative goal for the future among mariners to make their work environment more safety with the content of this courses.

Applying technology to maritime health and security training

J. Hübschmann Pettit, Nordby; Z. Djuranovic, Nordby; L. Steen, Nordby

**Background:** The Centre of Maritime Health, which is a part of the Danish Maritime Authority, is always looking for opportunities to modernize the provided forms of education for medical officers. Within the context of modernization we have many ideas pertaining to virtual- and particularly augmented reality. Whilst considering the manner in which to implement AR/VR in our educational material, we concluded that a test must be conducted. The intention of the test project was to create a cultural map of Fanoe, which allows any course participant to plan places to visit. Whilst the implementation is not strictly related to the medical education, it serves as a base for clarifying the caveats that may arise upon utilizing the digital toolbox of the modern era.
**Methods:** In order to properly develop a testing platform for AR/VR we reached out to a local school, which offers courses and education in AR/VR. The school helped to facilitate a cooperation between us and two students, that both had experience and interest in said fields. The project has been developed through user group research, custom creation of 3D models and texture editing. The approach to the subject was through action research, an iterative process in which we strive to change something while simultaneously conducting research and using that research to improve on. The process of development was heavily focused on building a visually pleasing- and easy to navigate experience, while eliminating performance issues, which can cause a sensation of vertigo in the user.

**Results:** After successfully conducting a period of development, we now have a functional VR experience that can show course attendants interesting locations around Fanoe. The main benefit being able to test whether the implementation of VR/AR is viable with our course participants.

**Conclusions:** By using the project we have been able to determine that it is definitely viable to implement VR/AR in various elements of our education. As the foundation for tests and further modernizing of our educational offerings, we believe that the product is definitely relevant. Furthermore we are able to properly map out caveats pertaining to introducing VR/AR in a segment that would not otherwise utilize such technology.

**Blended learning - a practical, beneficial and flexible solution**

T. Leth, Nordby, Fano; H. P. Hansen, Nordby, Fano; K. O. Jensen, Nordby

**Background:** An initiative to test blended learning on non EU- officers in Medical Care has been carried out by the Danish Maritime Authority. The goal was to test a combination between e-learning and in-house training and see if the result would give the same success as previous courses for non EU-officers. For years, the DMA has required a 4-day supplementary course for non-EU officers mustering Danish Flagged vessels. By setting up an e-learning program prior to an in-house refresher course, the participants and companies can save 1 day on the supplementary course. Reduction of the in-house training also minimizes costs and creates a more flexible situation for companies arranging seats on future refresher courses.

**Methods:** As a part of the theory on the supplementary course, four e-learning modules were developed. The theory, which by experience caused difficulties for non-EU officers. An online platform with an easy and intuitive accessibility was used. The content of the four modules was formulated in the sense of blended learning. With the same content as previous supplementary courses, the combination of e-learning and in-house training (3-day refresher course) gave the same results. The e-learning part was estimated to last approximately 6 hours. Colleagues in the DMA have tested the e-learning part followed by up to 40 non-EU officers representing six different nationalities with backgrounds in Medical Care.

**Results:** E-learning combined with in-house refresher courses were tested in the period from June 1-December 1, 2018. Very positive evaluations were given and especially the interaction between theory, the assignments and platform tools were commended. The e-learning program was very intuitive and easy accessible. In a few cases being on-line was difficult. The test persons provided us with important input for corrections through the evaluations. Test persons as well as instructors agree that the e-learning is a solid foundation on which to proceed with the refresher course, as it gives a good understanding of what is means to be the person in charge of Medical Care.

**Conclusion:** The e-learning developed in combination with an in-house refresher course has proven intuitive and easy accessibility and generated the wanted results. The course participants are
motivated by e-learning prior to in-house training. The companies experience lower costs per course participant and attain more flexible course arrangements.

Training of medical ship doctors in psychological stress of multicultural crews on cruise ships

H.-J. Jensen, Hamburg

**Background:** Ship’s physicians on board cruise ships are responsible both for the treatment of passengers and crew members. This large and heterogeneous crew usually comes from over 40 nations and comprises very different occupational groups (nautical and technical personnel, hotel, operating and security personnel, etc.). Crew member’s working days are characterized by high psychosocial stress. Especially the long and often irregular working days are perceived as demanding. Non-European crew members are on board for 9 months or longer. The separation from the family and other close-knit social relationships at home constitute a main stressor for crew members.

**Methods:** A ship-specific curriculum was developed, tested and used for training ship's physicians on board cruise ships. The curriculum was developed on the basis of interviews with crew members of cruise ships, ship doctors, seaman's missions and shipping companies as well as observations of behavior on board. Furthermore, accident analyses of cruise ships were carried out and investigation reports were evaluated. The curriculum was tested in seminars on maritime emergency medicine and ship's doctor training.

**Results:** In a 10-day ship's doctor course on board cruise ships, training contents were conveyed in one day on psychological stress situations and intercultural behavior patterns of crew members regarding the significance for the medical activity. Aspects of ethno-medicine in connection with a culturally determined conception of disease and understanding of disease were also dealt with. The training contents were conveyed in connection with the medical demand on board on the basis of case analyses and worst case scenarios such as fire on board, evacuation, refugee rescue etc.

**Conclusions:** The special stress situations and corresponding living conditions for the crew members on board with their long deployment durations could be communicated and made aware to the course participants. For the prospective ship's doctors it was also important to recognize that diagnosis and therapy should not only take into account cultural values and religious affiliation, but above all the socio-economic situation of the crew member. The consideration of cultural differences in communication and contact with crew members was seen as another important aspect of the job profile of ships´ doctors.

Management of Cardiac Arrest and CPR onboard passenger ships

J. J. Grannemann, Bielefeld

**Background:** CPR (cardiopulmonary resuscitation) following cardiac arrest is a rare emergency onboard cruise ships. According to current data one cardiac arrest occurs every 6 months. Management of such a life threatening emergency situation is demanding and essential for the outcome of the patient.

**Methods:** Every cruise ship due to international standards should be equipped with emergency equipment such as AED, manual defibrillator and monitors. The medical team should be trained in ACLS.
**Results:** In case cardiac arrest occurs medical team should be informed immediately via the cruise companies’ specific announcement modalities. Until arrival of the medical team BLS should be performed by present crew members. If possible the scene should be evacuated and closed for the public for reasons of privacy of the patient. The captain and further key officers according to the cruise companies’ standards should be informed. After arrival medical team takes over the patient treatment which should be performed according to international guidelines such as ACLS. If the patient shows a return of spontaneous circulation the means of initial intensive care of the ships hospital should be used. The patient should be disembarked for further examinations and treatment as soon as possible. If a patient does not survive cardiac arrest the body should be treated and evacuated according to cruise companies’ guidelines and ship’s flag and international guidelines.

**Conclusions:** Regular trainings shoreside and onboard with the medical team should be performed to maintain a high quality CPR in case of cardiac arrest. As holidays on cruise ships become more and more popular also to the elderly and passengers with cardiovascular diseases every medical team should be well trained in advanced cardiac life support. Also training in first response to a cardiac arrest for non-medical crew should be performed regularly to increase the chance survival for patients with cardiac arrest.
International Maritime Health Foundation – a new platform for building science in maritime medicine

A.M. Horneland, Bergen; M. Jeżewska, Gdynia; M. Grubman-Nowak, Gdynia

Background: The International Maritime Health Foundation (IMHF), publisher of the scientific journal International Maritime Health (IMH), was established in 2018, and will be presented on a poster with key information on: Organisation and structure: A non-profit foundation under Polish Law with international operations. Founders and legal bodies representatives will be presented.

Objectives:

- to act for the development of science,
- to increase and disseminate knowledge of maritime medicine and adjacent fields, such as: naval medicine, underwater and hyperbaric medicine, diving medicine, occupational medicine, travel medicine, tropical medicine and maritime psychology as well as
- supporting and initiating scientific and research activity to the extent stated above, as an input for contribution of improvement of safety, hygiene at work and health of seafarers and other persons who work at sea worldwide.

Activities to pursue objectives: The IMH Foundation pursues its objectives through:

- inspiring and supporting scientific researches and studies on maritime medicine and adjacent fields, referred to in §5 above, as well as developing, editing, publishing, promoting and disseminating scientific journal in this regard, under the name International Maritime Health;
- spreading information and knowledge and facilitating discussions worldwide to the extent compatible with the IMH Foundation’s objectives;
- attracting people to professions related with maritime medicine and adjacent fields, referred to in §5 above;
- participating in organising seminars, events, workshops, conferences and scientific conventions worldwide in order to increase knowledge on maritime medicine and adjacent fields, referred to in §5 above;
- cooperating with national and international institutions and organisations with the same or similar interests, including seeking endorsement of this cooperation as the valuable scientific forum worldwide.

Building of evidence in maritime medicine: We will underline the importance of building evidence in maritime medicine through studies and publication. Possibilities for cooperation between national and international scientific organisations will be discussed and invitation to cooperation given.

Relation between IMHA and the IMHF:
History on cooperation from agreement of 2009, endorsement of the journal as the official scientific journal of IMHA, possibilities for the future cooperation.

Contact information to the IMHF: will be included.
The Textbook of Maritime Health: Third edition. Knowledge is power and should therefore be shared

S. Stannard, Bergen

Background: The Textbook of Maritime Medicine is an internet based publication, first produced in 2009, with 19 chapters written by experts in the field of maritime medicine. It was the initiative of the Norwegian Centre of Maritime Medicine and edited by Aksel Schreiner. Since then, it has been used by many thousands around the world, and this interest, in addition to the many supportive comments received, led to the decision to revise the book and produce the second edition. This was edited by Tim Carter and published in 2013 with over 30 chapters.

The aim of the Textbook is to provide a comprehensive source of information and advice on topics relating to the health of seafarers and others who spend time at sea, and to be a point of reference for all maritime health professionals including doctors, nurses, psychologists, occupational health advisors and others. The book may also be used by other health professionals seeking information in the specific field of maritime medicine and by people within the maritime sector who are seeking information regarding matters relating to health. In addition, we hope that it will be used to support training courses in maritime health and as a learning aid for self-directed distance learning as required by some courses.

Methods: Since the publication of the second edition, there have been changes in the practices and priorities within maritime health, as well as changes in the way that users access such sources of information. With these in mind, the new, third edition will be retitled the ‘Textbook of Maritime Health’ and will be in a format that is more compatible with access on tablets and smartphones. It will place a greater emphasis on a risk-based approach to health management and on the contributions of psychology, ergonomics and the behavioural sciences to maritime health. The proposed new structure consists of a number of volumes, each divided into chapters, likely to number over 50 in total. We have commissioned contributions from experienced professionals from a range of disciplines with expertise in the maritime and allied industries. Some have contributed to previous editions, and they are joined by a large number of new contributors to reflect the change in emphasis of the new edition.

Results: Most contributions have been received and the processes of review and editing are in progress.

Conclusions: We aim to publish the next edition of the Textbook of Maritime Health early in 2020.

Toxic Jellyfish in Thailand

H. Premmaneesakul, Bangkok; P. Sithisarankul, Bangkok

Jellyfish stings are common in Thailand. Stings can range from mild skin irritation to severe systemic symptoms resulting in death. Jellyfish envenomation is becoming an important public health concern. The lethal box jellyfish and bluebottle jellyfish are found on the Gulf of Thailand and Andaman coasts, but there are still misconception and mismanagement of these types of severe stings. Prevention and awareness of jellyfish stings are important, as well as knowledge and first aid management of severe envenomation. Educational programs should be provided to locals including school children, teachers, hotel and tour operators, and medical staff. This will greatly reduce the morbidity and mortality associated with fatal stings.
Adaptive Resilience Management in the Port – Presentation of an Interdisciplinary Research Project

J. de Boer, Hamburg; M.S. Bakir, Greifswald; E. Henning, Greifswald; J. Heuser, Greifswald; A. Klein, Greifswald; A.C. Kordsmeyer, Hamburg; T. von Münster, Hamburg; M. Oldenburg, Hamburg; M. Dirksen-Fischer, Hamburg; L. Ehlers, Hamburg; M. Kalkowski, Hamburg; M. Krassa, Hamburg; A. Plenge-Bönig, Hamburg; H. J. Jensen, Hamburg; V. Harth, Hamburg; A. Ekkernkamp, Greifswald

Background: The cruise industry is facing a constantly growth of infectious diseases reaching the extent of mass causality incidences (MCIs). A MCI is characterised by an occurrence of injured or infected people overwhelming the capacity of the local rescue system. Therefore, actual research is focussing on civil security and the development of procedures coping with such events in the recent years. The most important interface between the ship and the landscape is the port with its critical infrastructure. To prepare responding staff for such events specific emergency plans and trainings should be in place.

Funded by the Federal Ministry of Education and Research (BMBF) the project, "Adaptive Resilience Management in the Port" (ARMIHN) addresses this topic. The aim of the project is to improve the resilience and capability in case of a MCI with a high number of extremely infectious patients due to the development of an emergency plan and a training concept for rescue workers and relevant stakeholders in the port.

Methods: The main task will be the analyses of damage scenarios due to an infectiological emergency with numerous stakeholders. Regarding these results possible effects on the population will be estimated. Based on this, a suitable adaptive emergency concept with a corresponding training concept will be developed taking communication patterns of relevant stakeholders into account. The concepts will be tested for feasibility and coherence through simulation exercises. The training and emergency concept will be finally evaluated in a full exercise in terms of practicality.

Results: The study includes all stakeholders in the rescue chain of a MCI with infected people in the Port of Hamburg, Germany. The simulations contribute to more resilient structures in Port of Hamburg areas. For this purpose, concepts for coping with this major emergency and an adaptive training concept are created.

Conclusion: The study demonstrates improvements for on-site resilience and ability to deal with a high number of infectious patients. The results can be transferred to comparable infrastructures to cope with a MCI with infected people in the port area.

Challenges to periodic drinking water analysis in cargo ships

C. Schlaich, Hamburg; K.-P. Faesecke, Hamburg

Introduction: The maintenance of safe and high-quality drinking water requires constant awareness by the ship master and crew in the following areas: - safe loading of water - production of high quality water on board - routine monitoring of the water quality - interpretation of test results and understating when and what corrective action is necessary.

Methods and Results: As occupational company physicians we were consulted in 24 occasions on drinking water analysis results (2017 – 2018). This concerned 20 ships. The analysis were performed by 19 different laboratories. On all ships water was produced from seawater. 19 reports named the source of the sample, in 5 reports the location of the sample was not given. The number of parameters for analysis ranged between 3 and 61 (mean 29). The main deficiencies were: Abnormal heterotrophic platelet count (n=8), ph out of range = 3, organic and inorganic contaminants (n=2),
Legionella count elevated (n=1), E. coli positive (n=1). Conclusion: A stepped approach for drinking water analysis is needed to avoid under- and overtesting. For annual testing in ships producing their own drinking water, we suggest to limit the analysis on the following parameters: Escheria coli, Enterococci, Total coliforme bacteria, HPC (at 20°C or 22°C), HPC (at 36°C or 37°C), ph, Temperature hot/ cold water, Conductivity. Sampling and analysis must be done by accredited laboratories. Additional analysis may be necessary under special circumstances, e.g., if water temperature of cold water is above 25°C or hot water below 55°C (legionella spp). In new vessel organic and inorganic contaminants should be tested. If bunkering from sources of questionable quality: frequent control of microbiological parameters, chlorine, organic and inorganic contaminants is necessary. Apart from this, immediate action is needed if water is cloudy or smells or tastes differently.

**Conclusion:** Occupational health physician play an important role to assess the risk of laboratory drinking water results to avoid overreaction but also harm to health.
Ergonomics onboard

N. Rantalaiho-Kulo, Turku; S. Kivelä, Turku

**Background:** The main goals in this OnboardMed-project (10/2016-6/2019), is harmonise and develop courses of skills in maritime emergency management, medical treatment and occupational safety and to provide students with better matching skills to answers to growing demands of working life. In this part occupational safety, one specific part is ergonomics onboard. Based on literature ergonomics will make sure that some human requirements for safe work are really met. When You will get a workplace evaluation or risk assessment, and education in ergonomic practices, it will decrease the occupational injuries.

**Methods:** In nursing institutions this topic, Ergonomics is basic thing, but based on surveys and interview, in maritime institutions is not so common at all. There is lack of education in maritime institution in this topic. So it was a really motivating to have a possibility for piloting this ergonomics material in cargo vessels with medical officers and in maritime institution with mariner students too. First pretask and reading material for preparation. Then workshops, where the participants practices some patient transfer situation in ergonomic way. For example, how to transfer the patient down from the upper bed in cabin onboard, safely and ergonomically.

**Results:** The participants told, in both target groups, that they have not had training in ergonomics in STCW-courses. This was a new for them. They were happy to to join these practices. And actually they would like to have practice more patient transfer scenarios with ergonomy aspects.

**Conclusions:** There are many ergonomics-related risk factors onboard based on literature. For example force, vibration, noise, repetitive movements, cold/high temperatures etc. The combination of these risk factors may cause a greater risk of injury onboard. More education in this topic is needed onboard, in cargo and in passenger vessels too. The target groups were shipnurses and medical officers in this piloting part. One proposal from the crew was that this practice should be organize to the whole crew, not only ship nurses and medical officers. This will happen in future.

Study of temporary disability for marine complex workers, engaged on a shift work

A. Panuta, Odessa

**Background:** The shift method of work in the fleet is often associated with hazardous environmental conditions, the impossibility of combining positions, limited ability to perform work for a temporarily disabled employee. Therefore, in the maritime sector, underestimating temporary disability can lead to disastrous consequences - crushes, accidents with human victims.

**Purpose:** To increase the efficiency of the analysis of temporary disability among the workers of the marine complex.

**Materials and methods:** 1098 cases of temporary disability of employees of the fleet and the marine industry complex were studied for the period from 01/01/2016 to 30/11/2016.
Results: Among diseases with temporary disability, respiratory diseases ranked first - 731 cases or 66.5% of all cases, among which acute respiratory diseases were the main cause (703 cases/64% of all cases). The disability period was 5442 days, or 7.4 days/case. The second place was occupied by injuries - 104 cases or 9.5% of all cases. Of these, 2 cases were reported as injuries with serious complications. The disability was 3088 days or 29.6 days/case. The third reason - diseases of the musculoskeletal system - 88 cases or 8%. The period of disability was 875 days or 10 days/case. Next were cardiovascular diseases - 41 cases or 3.7% of all cases. Disability period was 853 days or 20.8 days/case. All other causes (diseases of the urogenital system, gastrointestinal tract, tuberculosis, neoplasms, pregnancy, etc.) totaled up to 13% of cases, not more than 1% for each. Based on the statistics, for each case of industrial injuries with serious complications, should be 100-120 cases of injuries with temporary disability for at least 1 day. Thus, for 2 registered cases of occupational injuries for the relevant period, there were up to 240 cases of injuries with temporary disability, which were not registered.

Conclusions:

1. The main causes of temporary disability in the fleet are acute conditions caused by exogenous factors (trauma, respiratory infections).
2. The analysis of temporary disability shows signs of concealment of industrial injuries, which follows from the discrepancy between the ratio of the number of serious and minor injuries at work.
3. Inaccurate registration of industrial injuries increases the risk of accidents in the fleet, limits the ability to perform work in a timely manner and leads to over-exertion of employees who are forced to tacitly perform the duties of temporarily disabled stuff.

Overweight among seafarers working on board merchant ships (2nd price ISMH15-Poster Award)

F. Amenta, Camerino; G. Nittari, Camerino; D. Tomassoni, Camerino

Background: Obesity and overweight represent a relevant risk factor for seafarer’s health. The frequency and distribution of overweight and obesity among seafarers working on board of Italian flagships were studied. The analysis was made on occupational medicine files collected, in the frame of health surveillance inspections, between 2013 and 2016 from Centro Internazionale Radio Medico (CIRM).

Methods: The data of nationality, age, weight, height, blood glucose and blood pressure values obtained from 1,155 seafarers were analysed. Body mass index (BMI) values were calculated and compared with data reported for the general population of the same nationality of seafarers examined.

Results: BMI values revealed a tendency to overweight, whereas blood glucose and systolic blood pressure values were in general in the normal range. Approximately 40% of subjects investigated were overweight, and more than 10% of them were obese. Underweight was noticeable only in 1.22% of crewmembers and 0.34% of officers. 0.52% of the subjects investigated was diabetic, and 2.68% were hypertensive. Seafarers, regardless of their nationality and rank, showed a greater tendency to overweight and obesity compared with the general population of the same ethnicity.

Conclusions: Due to the occurrence of overweight and obesity among seafarers, campaigns for promoting awareness of the phenomenon and on the danger of these conditions for health should be improved. Specific initiatives to avoid the assumption of junk food and the organisation of
adequate spaces, times and programs for physical exercise sessions on board should be offered for keeping seafarers healthier.

How to carry healthy exercise habits on board – and maintain them

T. Lützhoft, Nordby; K. Ostermark Jensen, Nordby; K. Nielsen, Nordby

**Background**: Many ships have well equipped gyms, and many companies have health policies for their employees. However, reality is, many seafarers find it difficult to carry their normal on-shore physical activity on-board, and even more difficult to maintain a physically active life as the journey progresses in time. Centre of Maritime Health Service on Fanø, has approximate 1000 participants per year on Medical Care Courses. Based on statements from our participants, we know that on-board gyms are rarely used and seafarers put on weight and go out of shape over time. The hours following work are designated to sleep, meals, and personal chores like washing clothes and communicating with relatives. It is hard to change clothes, go down to the gym and exercise for 45 minutes, shower and then experience post physical activity sleeping difficulty. It is too much trouble, and it kills motivation. At our Center we tried to start a behavioural change to take with you; at home and on-board. We simply applied nudging principles with focus on easy accessible exercises and rewards.

**Methods**: We placed 9 different exercises in physically unexpected spaces, clearly visible for the participants during daily activities on the premises. Exercises are in corridors, corners, repos and dining area. All exercises are available in a folder.

Criteria for choosing equipment:

- Exercise should be easy to carry out
- All parts of the body should be activated using the sum of equipment
- Equipment should be clearly visible and readily useable during working day
- Equipment should be easily removable, cheap and non-spacy

All participants had the option of a personal scoreboard. Scores could be posted on a common scoreboard in the dining area, clearly visible for all.

**Results**:

- The immediately reaction was increased wellbeing, focus on work during the day, a sense of community, common challenges and fun
- For some, it was a first time ever to do exercises during a working day
- Enjoyment seems to go beyond the initial novelty

**Conclusion**: Nudging is a well-documented method to help change human behavior. Making tools/exercises easily accessible everywhere in a person"s daily life creates the opportunity to initiate changes in physical activity during the working day. As the project is new, we do not know the long term effects, but we hope to inspire people to realise that exercises can be part of daily life without a well-equipped gym – simply place exercises/tools, physically apart and clearly visible.
The new paradigm of the professional health competence formation in the maritime cadets

L. Shafran, Odessa; V. Golikova, Odessa; J. Chumaeva, Odessa

Background: The globalization of the economy, the solution of the problem of sustainable development of transport in the XXI century demanded, in accordance with the requirements of the international maritime labor market, a change in the paradigm of vocational education, training of seafarers, primarily ship operators (officers), based on the competence approach. This was the objective of the present research.

Methods: 242 seamen aged 22–50 y.o. were included in the study. Among them there were 96 navigators (SN), 78 ship mechanics (SMCH), and 409 cadets (CAD) of the National University "Odessa Maritime Academy" (194 navigators and 215 mechanics at the age of 18-25 y.o.) during passing annual medical examinations, training and marine practice, as well as targeted psychophysiological examination on a voluntary basis in accordance with the requirements of bioethics. Psychophysiological studies were carried out on more than 30 indicators based on professiography (daily self-photography of the working and free time at different stages of the voyage), questionnaires and tests using the computerized MORTEST (marine test) complex in the "SPAS-14" modification, as well as blank tests in the dynamics of training in the marine university and work on board the ship.

Results: The results obtained have confirmed the stressor nature of labor among the contingent under examination. The total average daily working time is 16 hours for the navigators, 14 for the mechanics, 12 for the maintenance personnel, 10-11 hours for the sailors, engine mechanics, electricians, especially when working in combined professions. This leads to the development of fatigue (48.8 ± 3.6), depression (12.8 ± 2.3), reduced performance (63.6 ± 5.5), professionally oriented motivation (31.2 ± 2.6) in the examinees. The data obtained correlate with the results of psychophysiological studies, answers to questionnaires about acute, chronic diseases and injuries, the total number of which was 20.7 ± 1.4% in seafarers and 2.2 ± 0.4% in cadets. In this case, more than 40% of the sailors under examination take with them on a voyage and use medications for the treatment of cardiovascular, nervous, gastrointestinal and urological diseases.

Conclusions: The inclusion of the psychophysiological component, along with elements of medical knowledge in the system of marine university cadets' vocational training, contributes to the development of health-preserving competencies among seafarers.

Management of Seafarers Occupational Health

T. Lebedeva, Odessa; A. Gozhenko, Odessa

Background: The operation of a modern vessel places high demands on the qualifications of personnel. Therefore, the preservation of seafarers' professional health is not only an important social, but also an economic task.

Objective: To consider possible steps for seafarers' occupational health preservation.

Methods: analytical, statistical

Results: According to the requirements of Maritime Labor Convention MLC-2006, the health status of seafarers should be monitored at least once every 2 years. But the statistical analysis of medical
examination commissions data evidences that 4.0–4.5% of seafarers under examination are annually considered unsuitable for work. That is, the existing control of the current state of occupational health does not result in preservation of qualified personnel. In this regard, it is necessary to move from control to management of occupational health on the basis of monitoring of the body"s adaptation to environmental factors. This requires the study of adaptation mechanisms, the definition of their indicators and criteria, the justification of methods of physiological correction, the development of accounting and professional health management and monitoring system.

**Conclusions:** The main promising areas for the preservation of the seafarers" professional health are: the study of the specifics of adaptation to working conditions on maritime transport and the development of methods for managing the processes of seafarers physiological adaptation and rehabilitation.
Noise assessment in a population of shipyard workers

B. Loddé, Brest; P. Capellmann, Brest; M. L. Parod, Brest; G. Mauguen, Rennes; R. Pougnet, Brest; D. Lucas, Brest

Objectives: Deafness and hearing loss are frequently diagnosed during medical examination of shipyard workers. We did a previous study during tanker maintenance. To improve prevention and knowledge on exposure levels, we decided to assess occupational noise exposure during the refitting of a submarine.

Methods: we placed a polar noise monitor with microphone on the welders’ shoulders. Data were analysed by an experimented technician using specific software.

Results: data of an eight-hour working day of 8 boilermakers, 14 welders and 2 engineers were included. Mean levels of noise exposure for eight-hours of work were evaluated respectively for welders, boilermakers and engineers at 92.3, 95, 76 dB (A). Maximum levels were 143 dB for the welders and 143, 5 for the boilermakers.

Conclusions: welders, boilermakers and engineers working in shipyards are exposed to high noise levels. For those workers, individual prevention with hearing protectors is needed and making the workers aware of the problem is useful and important.

Acute occupational phosphine intoxications: a retrospective study by the Belgian Poison Centre (1st price ISMH15-Poster Award)

P. Van de Sijpe, Brussels; A.-M. Descamps, Brussels; N. Delcourt, Toulouse; D. Lucas, Brest

Background: Phosphine is often used as a fumigant for pest control of containers. A recent publication by the European Agency of Safety and Health at work (EU-OSHA) has mentioned the presence of phosphine exceeding the occupational exposure limit values (OELs) in containerships in European harbours. Occupational accidents with phosphine seem to happen in all sectors of the freight transport sector.

Objective: To analyse the pattern and the incidence of acute occupational intoxications with phosphine and to describe accidental aetiology, clinical presentation and medical care.

Material and Methods: We performed a retrospective review of acute occupational accidents with phosphine reported to the Belgian Poison Centre between January 1, 2000 and December 31, 2018. Co-intoxications were excluded. We used a Chi-squared test to compare proportions.

Results: We retrieved 34 calls for occupational exposure to phosphine covering 24 incidents with 26 victims. It is a very small number in comparison to our total number of incoming calls (1,021,861) in that period, but there was a five-fold increase in proportion of calls (p<0.0001) from the period 2000-2009 (8/528,976 calls or 0.002%) versus the period 2010-2018 (25/492,885 calls or 0.01%). Most incidents (66.6%) occurred in harbours; 12.5% in other sectors and in 20.8% the location was not specified. Victims were mostly (69.2%) seafarers, dock workers or customs officers. Gastro-intestinal (38.4%), neurologic (38.4%) and respiratory symptoms (30.7%) were most common. Of the victims...
46.1% presented more than one symptom and 26.9% had no symptoms. All symptomatic victims had moderate symptoms and no fatalities have been reported. However, 69% of victims had to be hospitalised and 26.9% had to consult a general practitioner.

**Conclusions:** Occupational phosphine intoxication is not a frequent reason for calls to the Belgian Poison Centre although there seems to be an increase of calls in recent years. Further monitoring is needed. Seafarers, dock workers and customs officers are a high risk group. Strict precautions are needed when using phosphine in fumigation processes on ships. Since symptoms are often vague, first-responders need to pay attention to the possible occurrence of acute phosphine intoxication as it is life-threatening. It remains a diagnosis not to underestimate nor to miss.

**Keywords:** phosphine, fumigation, container ship, prevention

**Medical and sanitary risk of fumigators and seafarers when working with fumigated cargoes**

E. Belobrov, Odessa; V. Kyrbanov, Nikolaev; A. Rangaeva, Chernomorsk; M. Zamribortch, Odessa; N. Kvasnevskaya, Odessa

In 2018 the detailed data describing the most likely risks to the lives and health of seafarers when transporting bulk cargo, bulk cargo and piece-cargo on ships of the merchant fleet in navigation were published. These risks include: the danger of slipping, falling and severe injuries; the work in confined spaces; mooring operations; loss of power supply. Over the past 10 years, seafarers' injuries and traumata cost 155 million US dollars. EMSA notes that more than half of all fatalities and 37% of seafarers' injuries are the result of slip, stumble and fall. However, there is no similar statistics of the risks of dangerous and harmful factors during the transportation of fumigated bulk grain cargoes in the ship's holds of extremely toxic fumigation gases like phosphine (6.1 class by IMO IMDG CODE). Phosphorus poisoning of sailors on many ships in the ports of Ukraine led to the hospitalization of 54 foreign and Ukrainian sailors with a fatal outcome and large financial losses. The results of many observations, medical research and development work and investigations of accidents during the transportation of fumigated goods on grain carriers of the bulk fleet, delivery of hazardous toxic chemicals on port ships to the raid and fumigation at the port moorings, allowed us not only to describe and systematize the most likely risks for marine fumigators and seafarers, but also offer specific recommendations for eliminating and minimizing the risks mentioned. For example the risk of falling overboard and drowning, the risk of drowning in the grain in the hold, the risk of slipping on the grain and falling on the cargo deck with severe injuries, the risk of falling from vertical ladders in the holds and overboard, the risk of poisoning phosphine marine fumigators on the vessel, the risk of phosphine poisoning of crew members, the risk of burns from the ignition of fumigation preparations, the risk of microbiological exposure to dangerous factors during the fumigation of grain cargo and diseases, the risk of mental health problems, the risk of exposure to fumigators of seas and seasickness during fumigation of cargoes on ships staying in the roadstead.

**Control of the holds sealing and prevention of phosphine poisoning in sailing**

E. Belobrov, Odessa; N. Badiyk, Odessa; V. Kyrbanov, Nikolaev; A. Golikov, Odessa; A. Rangaev, Chernomorsk; V. Andreev, Odessa

There are no safe enough methods for routine inspection of holds sealing reliability and prevention of uncontrolled leaks of fumigation gases. The controlling methods existing in maritime navigation are mainly aimed at the safety of navigation and the prevention of water flow. At the same time, in order to ensure the safety of shipping and ship repair, a tightness test is carried out using a number of methods, including complex, time-consuming work associated with the mandatory opening /
closing of the hold covers, the use of test detectors such as water, smoke, air pressure, special ultrasonic equipment and attracting large crew numbers. All the above methods are unacceptable when checking the reliability of gas tightness of fumigation gases of holds fully filled with grain before the sailing, as well as the impossibility of using test detectors based on liquids and chemicals affecting the commodity qualities of the transported grain cargoes. We offered method for monitoring the sealing of holds, preventing phosphine leaks, their migration routes into the air in the working and living areas of the vessel. The method mentioned is based on the use of phosphine gas (PH3) as a test detector when it is inside overdry space of hermetically closed holds of covers and hatch covers (Patent of Ukraine № UA 116604 U). The technology for monitoring the tightness of holds and the presence of phosphine in workplaces near the holds and mouths on the cargo deck, in the tank’s rooms and in the residential superstructure of the vessel included: searching the places for leakage of phosphine by means of an electronic gas analyser and their subsequent simultaneous sealing by the ship’s crew. The final stage of the work was the study of the sanitary-chemical composition of the air corridors, cabins and office space of the main deck (A) of the residential superstructure of the vessel. Implementation of the technologies developed allowed the marine fumigators and the crew to make sure that the holds are tight and the working concentration of phosphine fumigation gas is maintained; secondly, to provide data on the sanitary and toxicological and toxic safety of the residential superstructure, the ship’s tank rooms, deck and engine-room of vessel. This provides prevention of poisoning of seamen with phosphine, preserves their life and health during transportation of fumigated goods along the route.

Acute occupational phosphine intoxications in the maritime shipping sector: a retrospective review

Petra Van de Sijpe, Brussels; Nicolas Delcourt, Toulouse; David Lucas, Brest

Background: Phosphine is the only fumigant which, according to the IMO, can be used for in-transit fumigation in the maritime shipping sector. A recent publication by the European Agency of Safety and Health at work (EU-OSHA) has mentioned the presence of fumigants, including phosphine, exceeding the occupational exposure limit values (OELs) in containerships in European harbours and pointed out a problem of labelling of the fumigated containers. Case reports of acute occupational phosphine intoxications in the maritime shipping sector have been reported in harbours and on ships.

Objective: The goal of this dissertation is to explore whether accidents with acute occupational exposure to phosphine happen in the Belgian and French shipping industry. The subsequent questions are:

- if they happen, what is the frequency of those incidents?
- is there an increasing trend?
- what is the extent, the nature and the severity of those accidents?
- is it possible to explore the aetiology and the prevention policy?

Methods: Queries have been sent to different instances in France and Belgium. In this dissertation are only included cases officially reported to the Belgian and French Poison Centres and to the medical facilities around the port of Antwerp. Conclusions are drawn based on the analysis of the pattern and the incidence of the accidents exploring the accidental aetiology, clinical presentation and medical care.
**Results**: Incidents do not happen frequently in Belgium and France but there seems to be an increase over the last years. Symptoms often seem "vague" such as gastro-intestinal, neurologic and respiratory symptoms, which makes it often difficult to recognise for first responders. In the cases where we know the aetiology of the incident, there often seems to be a lack of clear information in workplaces and among the workers.

**Conclusions**: Regarding symptomatology and aetiology, the findings in this dissertation correspond to the findings in a literature review. Although the exposure incidents in our case series are not frequent and usually had few serious consequences, the event of those incidents should be avoided since they often create a lot of concern about health consequences among the uninformed workers and medical intervention is often needed. Information seems to be the key word: in workplaces, towards the workers and towards the first responders.

**Key Words**: phosphine, fumigation, container ship, prevention

**Incinerators in seaports as a factor of environmental contamination by heavy metals**

D. Bolshoy, Odessa

**Background**: Today, the generally accepted practice is that solid waste generated on ships during the voyage accumulates on board and is disposed of upon arrival at the port in specially adapted incinerators. Analysis of the composition of such wastes has shown that at least half of their mass consists of polymeric materials (plastic containers, bottles, plastic film, rubber, etc.). Previously, we have shown that most modern plastics contain metal compounds, which, when burning polymer material, are partially sublimated or carried away by smoke particles.

**Methods**: To assess the degree of an environmental load of metals present in the combustion products of polymeric materials, we measured the levels of metals in the soil in the area adjacent to the industrial incinerator located in the port of the city of Yuzhny. The SSU-150 M incinerator is located in the industrial zone on the territory of the Yuzhny Sea Trade Port enterprise and provides flue gas discharge in the volume of 5,500 m³/h. The installation fully complies with the requirements of environmental legislation and regulatory documentation. Soil samples were taken at distances of 1 m, 5 m, 10 m, 20 m and 50 m from the installation. The content of lead, cadmium, copper and zinc was determined by atomic emission analysis in selected samples.

**Results**: The data obtained indicate that, despite the low content of HM in the recyclable waste, the incinerator is a source of heavy metals in the environment (in this case, the soil), and far away from the incinerator, the level of heavy metals in the soil decreases. It is evident that the mechanism of HM soil contamination is carried out through the formation of a gas-aerosol fraction of the combustion products of polymers (smoke), which, mixed with cold atmospheric air, condenses and settles in the adjacent territories.

**Conclusions**: It should also be noted that the identified environmentally significant changes in the composition of the soil were formed, in our opinion, during the period of operation of the incinerator, that is, over the past nine years. Despite the fact that none of the surveyed sampling points revealed an excess of MPC values for heavy metals, there is a reason to believe that with an increase in the duration of operation of the incinerator, this figure can be achieved.
Off-label use of prescribed medicinal products on board ships

F. Amenta, Camerino; G. Nittari, Camerino; G. Pallotta, Camerino; N. Ioannidis, Camerino

Objective: The set of medicinal products and devices available on board and compulsorily required to be carried constitutes the "onboard pharmacy", more simply called "medicine-chest". This study has investigated the off-label use of medicinal products on board ships based on prescriptions of Centro Internazionale Radio Medico (CIRM), the Italian Telemedical Assistance Service (TMAS).

Material and Methods: The analysis was carried out on 17,844 clinical records of patients assisted by the CIRM from 1st January 2011 to 31st December 2015. Out of 17,844 clinical records, 632 were excluded as not related to prescriptions of medicinal compounds. Analysis was then divided into two phases: in the first phase, the diagnoses were reviewed as per the ICD-10 classification proposed by the WHO. In the second phase, the congruence of the pharmacological therapies prescribed by CIRM physicians with clinical diagnosis was made according to the MICROMEDEX Database. This database includes information on the primary purpose of medication, drug dosing and off-label uses, and it also gives information about the chemical, pharmaceutical, and related biological substances used in clinical patient care.

Results: From the analysis emerged that prescribed drugs were not always corresponded to their primary indication of use. In particular, in 2011 off-label drug use was quite large (more than 30%) for some ICD-10 classes. In the subsequent years (2012-2015) a decrease of off-label use of drugs was noticed. The age of assisted patients, regardless of gender, was between 18 and 64 years (Mean 38.5 ± 11.6 years). As per female gender patients, they were people involved in cruise ships, guests of merchant ships (supernumerary) and migrants.

Conclusions: The off-label use of drugs is allowed, but can lead to some not negligible ethical and health problems, compromising the quality of provided healthcare. The present results suggest that standardisation of onboard pharmacies is crucial, for approaching any medical problem onboard, and for ensuring high-quality healthcare to seafarers all over the world. From collected data, off-label prescriptions are necessary because doctors have a limited choice of drugs onboard. Introducing a more equipped medical chest could reduce the off-label prescription of drugs, and all the problems related to it.

Service Profiles of Maritime Doctors in Denmark

D. A. Bygvraa, Esbjerg; O. Jensen, Esbjerg

Background: The maritime doctors are appointed by the Danish Maritime Authority to provide fit for work examinations to the seafarers, fishermen and off-shore employees. They should have a clear understanding about the working and leaving conditions aboard according to the MLC2006. So far very little is known about how maritime doctors respond to seagoing professionals' health needs. The aim of this survey was to gain insight on aspects of maritime doctors practices.

Methods: The research was electronic and anonymous. It was done via a questionnaire based on international standards adapted to the Danish context in May 2017. It contained 40 questions about
the maritime doctors demographic characteristics, breadth of services offered, follow up practices and training topics that they consider important in order to stay current. We got back 50% responses.

Results: The vast majority of maritime doctors are men with a specialization in general practice. Their mean age is 55-60 years. Their working experience lies within 10-20 years. They rank "training in guidelines for fitness evaluation and medical examinations" (80.8%) as their first priority, followed by "laws and regulations related to maritime medicine" (70.2%), and "working conditions and health risks aboard" (57.4%). Most of them provide counselling and follow-up.

Conclusions: In general, doctors with more than 10 years of experience and more than 20 annual visits of seagoing employees, were more likely to be involved in seafarers' vaccinations, follow-up practices as well as patient education. Furthermore, the professionals highly valued education and training to better serve the seagoing employees. They considered topics with relation to guidelines, laws and regulations, very important to their daily practice. The survey may help the competent authorities to organize relevant continuous professional education. The investment in high quality pre- service examinations is proved cost-effective for the shipping industry while it generates a high level of satisfaction among the employees. It contributes to their welfare and prevents ill health at sea.

Norovirus on a cruise ship: lessons learned for outbreak control and crisis management

A. Ibrahim, Rotterdam; E. Fanoy, Rotterdam; A. de Raad, Rotterdam; J. Donkervoort, Rotterdam; M. de Graaf, Rotterdam; M. Koopmans, Rotterdam; A. van der Eijk, Rotterdam; A. Westra, Utrecht; I. Boxman, Utrecht; B. van Dijk, Rotterdam; S. Wiegmans, Rotterdam

Background: The Dutch public health service (PHS) is the designated organisation for control measures to prevent and contain outbreaks in the port of Rotterdam. All ships entering the port with (possible) infectious cases on board must notify to the PHS via the "Maritime Declaration of Health". In September 2018, over 40 cases with (possible) acute gastroenteritis (AGE), were notified by the ship captain to the Harbour Coordination Centre. To assess the situation, the passengers and crew (n=4,500) were temporarily not allowed to board-off and all cases with AGE were treated by strict hygiene regulations and kept in isolation.

Methods: After a site visit, the PHS advised to scale down the emergency level and started an investigation. Diagnostics were performed on stool specimens of passengers and crew with AGE.

Results: It was difficult to have a shared, identical overview of the number of cases on board, due to several parties involved. Two of 11 specimens tested positive for a co-infection of norovirus GII (NoV) and Coxackievirus (Cv); One tested positive for a co-infection of sapovirus and Cv; Two tested positive only for NoV GII. These findings are suggestive for a food or water related source, instead of introduction via an infectious individual. Therefore, coordinated collaboration with the Food and Consumer Product Safety Authority, was initiated to execute source tracing. Source tracing revealed that served clams were suspected as a possible vehicle of infection. Diagnostic tests on the clams tested positive for NoV group I and II. Sequencing of viral RNA could not confirm a match between the virus strains from clamps and stool.

Conclusions: Although we could not confirm an exact source, a food related outbreak is plausible considering the virus mixture. We recommend performing lab diagnostics to learn from outbreaks and enable traceback of contaminated food when epidemiological research would suggest a food source. Regarding grip on the correct number of cases during the heat of an outbreak and smooth response actions, we recommend building personal contact at public health and hospital level before an outbreak happens, for instance via regular exercises. Guidelines concerning outbreaks on ships
should include actions to be taken by public health officers, ship crew, laboratory partners. Further studies on ship outbreaks is necessary to improve the evidence for upscaled preventive measures and outbreak investigations above the standard procedures.

**Travel medicine for sailing on cruise ships?**

F. Heblich, Kiel

**Background:** For many travellers, the first point of contact for travel medical advice is their general practitioner, for patients with a severe illness their specialist. This can be seen on the one hand in the general practitioner’s or specialist’s practice. On the other hand ships’ doctors find more and more frequently that patients have received travel medical advice beforehand.

**Methods:** To enable physicians to provide appropriate advice, some differences between everyday life at home and vacation on board are shown and in addition the limited diagnostic and therapeutic possibilities in the board hospital of cruise ships are exemplarily presented on the basis of case reports.

**Results:** Medical complications concern not only possible problems of traveling long distances or the destinations themselves but also changes caused by the platform ship as well as with regard to nutrition and exercise. Aggravation of pre-existing conditions can often be coped with on well-equipped cruise ships, but sometimes end fatally.

**Conclusions:** Although some travellers already ask for travel medical advice before they go on a cruise, more cruise ship guests, especially those with pre-existing conditions, should be advised before the trip. In order to give useful advice, physicians should be informed about the differences between living ashore and sailing on a cruise ship so that they can evaluate possible consequences for their patients.

**The development of the port of rijeka as indivisible part of the city through the centuries**

M. Sušanj, Rijeka; D. Rončević, Rijeka

**Background:** Rijeka is the largest Croatian port on the eastern Adriatic coast. The history of its development is also a story of the very burning and complex history of the city of Rijeka that has changed many states, rulers and political systems.

**Methods:** The archive material from the Rijeka State Archive, the Maritime and History Museum of the Croatian Coast Rijeka and the Museum of the City of Rijeka was used in making this work. The projections and development plans of the Port Authority of Rijeka and future port concessionaires are also presented.

**Results:** Important historical times and border changes, starting from the proclamation of the free royal port exactly 300 years ago to the present day, have influenced the construction and development of port, population migrations, industry development, maritime affairs and shipbuilding. Some of these events and inventions are part of the world’s industrial, maritime and historical heritage. Together with the development of the port and the city a public health institutions for seafarers and citizens were also founded. In 21st century the port of Rijeka is
experiencing a major urban transformation, opening to citizens and new facilities such as passenger, nautical, tourist, recreational and museum contents.

**Conclusions:** The port is the urban tissue of the city of Rijeka indivisible with its inhabitants. Apart from port facilities, historic buildings and ships, museum installations, archive material and written traces, this connection is best seen in the mentality of citizens, openness and multicultural environment. Part of this story will be seen in the Rijeka - European Capital of Culture 2020 project.
MayDay MayDay-Virtual simulation in Medical communication onboard

N. Rantalaiho-Kulo, Turku

**Background:** The main goals in this OnboardMed-project (10/2016-6/2019), is harmonise and develop courses of skills in maritime emergency management, medical treatment and occupational safety. The other goals are to provide students and marine and nursing teachers high quality learning and teaching materials; distance learning materials too. The main goals for participants are to understand communication onboard in emergency situations. Medical communication is all the communication concerning the patient’s medical history, condition, examination and treatment. It can be verbal and written. The captain is always responsible for medical care and final decisions regarding health of seafarers. Full responsibility for the diagnosis and prescription of treatments belongs to the doctor on board or to the TMAS physician. There is the lack of communication in emergency care situation. This is one reason for more international exercises is needed in this field.

**Methods:** We implemented a practice in medical communication between partner countries. The practice tested the management preparedness and co-operation of authorities in an emergency care situation. The participants could be from different countries, because this practice will be in virtual simulation based on Skype or Cello mobile phone application. The participants could participate in this virtual simulation in their own countries, not in same simulation class.

**Results:** This practice piloted in October 2018 with Åland University of Applied Sciences. The participants had a scenario, an emergency care situation onboard. They had to practice communication in this kind of situation and solve the problems onboard. The communication tool in this simulation scenario was a cello, mobile phone application. The virtual simulation practice took time about 4hours /scenario. The feedback from participants was simply and nice to know. More virtual communication simulation with international partners is needed.

**Conclusions:** The communication in emergencies is quite a challenge, because the situation is what it is, You have to decide what to do next quickly, international crew onboard, no common language. The human factors influence all the time. More this kind of virtual, international communication is needed in field of medical communication onboard. If You practice more medical communication in simulation in authentic environment, You will be better prepared for emergency situation onboard than without it.

Maritime Telemedicine for seafarers: current situation and Thailand perspective

N. Sai-ngern, Bangkok; P. Sithisarankul, Bangkok

Seagoing vessels face the risks of being isolated in unpredictable conditions with limited resources. Even with strict pre-embarkation health screening, medical emergencies do occur onboard and result in an enormous amount of expense. As most commercial vessels do not have dedicated medical personnel onboard, the effective treatment and care of patients relies heavily on adequately trained crew members, the onboard medical handbook, availability of on board medical supplies, and maritime telemedicine. Since its inception in the 1920s, Telemedical Advice Service (TMAS) has
proven to be a very cost effective and critical component in the health management of seafarers. Thailand, after ratification of Maritime Labour Convention 2006 (MLC 2006) in June 2016, is in the process of establishing a national TMAS at Abhakornkietwong Medical Center, involving collaboration between the Thai Royal Navy, Ministry of Health, Ministry of Labour, and others, with the goal of becoming a leading maritime country.

**Keyword:** maritime telemedicine, TMAS, Thailand, seafarers

---

**Telemedicine of expert level in the practice of marine medicine**

G. Tereshchenko, Odessa; P. Zubov, Odessa; A. Gozhenko, Odessa

**Background:** The possibilities of telemedicine when a patient is in extreme conditions with a high physical and psychoemotional load and limited ability to obtain highly specialized medical advice are irreplaceable.

**Objective:** to work out the qualitative methodology of remote medical care expert level in the practice of marine medicine.

**Method:** neurophysiological modeling.

**Results:** We have synthesized the model "patient - a person whose responsibilities include the provision of medical care on board the ship." The latter analyses its capabilities and conducts a search for an expert for consultation. When preparing for it, clinical information is collected, certain situations are videotaped, all diagnostic information is systematized taking into account its dynamics. During the video consultation, in the presence of the patient, the situation is reported, and the patient formulates his request. The expert first works with the patient and asks the responsible person to carry out all the necessary manipulations, answers all the patient's questions and gives him the necessary recommendations. In the second phase, the expert makes recommendations for the patients management, i.e. clarifies diagnostic and therapeutic procedures. If necessary, consultation is re-appointed. This model was tested on a small group of patients while symptomatic treatment was either unassigned or cancelling Experts were involved extraterritorially, many unique diagnostic examinations were conducted without the patients leaving for another country: a hardware survey was conducted locally, and the decoding and analysis were performed by an expert remotely (EEG examination on cognitive evoked potentials and comparison with the standard database).

**Conclusion:**

1. The method developed allows to increase the level of medical care under difficult conditions and go to the patient-oriented medicine.
2. This methodological approach allows the responsible person to teach certain dispatch functions, and in the future, quickly improve his professional level and avoid mistakes.

---

**Medical Applications for iPhone and Android**

N. Griffiths, Singapore

This poster presentation will look at various apps that are available to assist medical professionals.
Improved telemedical assistance at sea with point-of-care syndrome-based for infections

F. Amenta, Camerino

**Background:** Because of their nature of work, seafarers are bound to visit many ports in different countries and are exposed to various pandemic and epidemic diseases such as malaria, cholera, yellow fever, tuberculosis etc. Seafarers are vaccinated and medically checked thoroughly, but they are in major danger of being exposed to infectious diseases present in areas they visit. Unfortunately lacking on board ships diagnostic facilities and adequately trained health professionals, diagnosis of suspect infectious diseases is not precise and this can have consequences for the treatment of these disorders. In this paper we summarize our experience on how the presence on board of a with point-of-care (POC) syndrome-based for diagnosis of infections can improve the delivery of medical assistance on board ships.

**Methods:** Twenty-five CMA group ships were equipped with a POCRAMé POC. This system delivers rapid diagnoses of infectious diseases. We report here the results of 10 cases of medical assistance delivered from Centro Internazionale Radio Medico (CIRM) on patients on board ships using POCRAMé.

**Results:** Pulmonary and gastrointestinal pathologies first selected on symptomatology-based criteria were further analysed by POCRAMé. The system has perfectly oriented diagnosis and has demonstrated to be a simple and easy-to-use system that improves remarkably potentialities of medical diagnosis on board ships.

**Conclusions:** The availability of POCRAMé for rapid diagnosis of infectious diseases on board ships could represent a relevant progress for improving the quality of medical care on board ships.
Author Index

A
Abaya, A. R. · 41, 69
Abel, J. · 3, 7, 75, 76
Abesamis, J. · 3, 25
Adre, L. · 41
Alcaraz, M. J. · 3
Albers, T. · 17
Amenta, F. · 48, 58, 59, 68, 80, 98, 106, 110, 112
Ancedy, C. · 31
Andreev, V. · 103
Arcese, A. · 80
Auffray, J. P. · 29, 31
Aytin, J. · 55

B
Badiyk, N. · 103
Bakir, M. S. · 95
Barbarewicz, F. · 88
Barberon, B. · 29
Battineni, G. · 48
Baygi, F. · 51, 71
Belfroid, E. · 77
Belobrov, E. · 103
Beth-Hübner, M. · 31, 34
Bolshoy, D. · 105
Boon von Ochssee, W. · 48
Bost, E. · 72
Boxman, I. · 107
Brätveit, M. · 34
Braun, C. · 13
Braun, M. · 58
Broekhuysen, J. · 77
Brunet, J.-C. · 75
Brüning, T. · 31
Buhlunger, M. · 18
Burrkert, M. · 3, 79
Bygvraa, D. A. · 18, 39, 51, 71, 72, 106

C
Canals, L. · 73
Capellmann, P. · 34, 102
Carter, T. · 3, 28, 36, 94
Chowdhury, S. A. A. · 15
Chumaeva, J. · 100
Clamagirand, V. · 34
Coombs, W. M. · 3

d
Dahl, E. · 3
de Boer, J. · 77
de Boer, J. · 95
de Graaf, M. · 107
de Raad, A. · 107
de Rooij, D. · 77
Delcourt, N. · 102, 104
Dengler, D. · 71, 81
Denisenko, I. · 3, 21, 31
Descamps, A.-M. · 102
Deschamps, F. · 39
Dewitte, J.-D. · 26
Di Canio, M. · 59
Dirksen-Fischer, M. · 95
Djurjanovic, Z. · 89
Djurhuus, R. · 34
Donkervoort, J. · 107

E
Ehlers, L. · 95
Ekkernkamp, A. · 95
Erese, R. · 51
Erese, V. · 51

F
Faesecke, K.-P. · 3, 68, 69, 95
Fanoy, E. · 107
Felten, C. · 32, 33
Fimbault, J. C. · 19, 29
Fotteler, M. · 39

G
Garrido, M. V. · 17
Gäßler, A. · 65
Gerdoe-Kristensen, S. · 49
Ghailan, T. · 39
Golikov, A. · 103
Golikova, V. · 100
Gozhenko, A. · 100, 111
Grams, B. · 27
Grannemann, J. J. · 83, 91
Grepinet-Ayewubo, C. · 14
Griffiths, N. · 23, 66, 67, 111
Grubman-Nowak, M. · 45, 46, 58, 93
Guerrero, F. · 31

H
Hadjichristodoulou, C. · 3, 77
Haga, J. M. · 13, 37, 97
Hansen, H. P. · 46, 90
Harth, V. · 3, 10, 17, 35, 42, 81, 86, 88, 95
Hayes Mejia, R. · 73
Heblich, F. · 56, 84, 108
Hedtmann, J. · 33
Heidrich, J. · 3, 81
Henaff, D. · 19
Henning, E. · 95
Hermenau, A. · 43
Herold, R. · 35
Herttua, K. · 36, 49
Heuser, J. · 95
Hisamune, S. · 17, 40, 53
Hoitz, J. · 58
Horneland, A. M. · 3, 14, 25, 45, 46, 93
Hübschmann Pettit, J. · 89
Huigen, R. · 48
I
Ibrahim, A. · 107
Imsen, H. S. · 25
Ioannidis, N. · 106
J
Jahn, C. · 62
Jegaden, D. · 34
Jego, C. · 14
Jensen, H. J. · 22, 62, 87, 88, 91, 95
Jensen, K. O. · 54, 90
Jensen, O. · 51, 71, 106
Jensen, O. C. · 39, 72
Jeżewska, M. · 3, 45, 46, 93
John, O. · 62
Jörgens, R. · 21
Jorgensen, O. C. · 18
Jouve, E. · 34
K
Kähler, W. · 27
Kalkowski, M. · 95
Kirchhöfer, M. · 86
Kivelä, S. · 97
Klapa, S. · 27
Klein, A. · 95
Kober, K. · 42
Koch, A. · 25, 27, 51
Kogi, K. · 53
Kohfahl, J. · 28
Koopmans, M. · 107
Kordsmeyer, A. C. · 95
Korinth, G. · 35
Kot, J. · 3
Krassa, M. · 95
Kvasnevskaya, N. · 103
Kyrbanov, V. · 103
L
Langenbuch, P. · 75, 76
Langer-Böhmer, S. · 81
Laraqui, C. · 39
Laraqui, O. · 39
Laraqui, S. · 39
Le Gac, J. M. · 29
Le Gall, A. · 31
Le Goff, N. · 26
Lebedeva, T. · 100
Lefkowicz, R. · 14
Lehnert, M. · 31, 32
Leth, T. · 90
Lindner, A. · 42
Lodde, B. · 19, 26, 102
Lodde, B. · 31, 34
Logounov, K. · 37
Lotz, A. · 31, 32
Lucas, D. · 3, 26, 31, 34, 71, 102, 104
Luisa Sanchez, M. · 52
Lundberg, A. · 89
Lützhoft, T. · 99
M
Mache, S. · 14, 17, 81, 86
Manar, N. · 39
Mansourati, J. · 31
Mauguen, G. · 34, 102
Megard, M.-F. · 26
Mendoza, C. · 65
Mette, J. · 17, 86
Meyer, G. · 32
Milan, M. J. · 41
Minerva Calimag, M. · 65
Misery, L. · 26
Mouchnouri, B. · 77
Müller-Bagehi, F. · 35
Müller-Bagehi, S. · 35
N
Neumann, F. · 81
Nicolic, N. · 3, 43
Nielsen, K. · 99
Nier, M. · 58, 59
Nittari, G. · 48, 68, 80, 98, 106
Northern European Maritime Authorities Medical
Group · 25
O
Oca, C. · 51
Oestereich, T. · 33
Oldenburg, M. · 3, 21, 22, 61, 62, 81, 87, 88, 95
Ong-Salvador, S. · 65
Ostermark Jensen, K. · 99
P
Pallotta, G. · 48, 80, 106
Panuta, A. · 97
Parod, M. L. · 34, 102
Pesch, B. · 31, 32