

First Aid Procedures on Ro-Pax Vessel

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Abstract

The purpose of this thesis is to develop a first aid guideline for RoPax ships. The guideline consists of first aid principles for the most common medical emergencies on RoPax ships, considering the nature of passengers and crewmembers and possibilities of providing medical help on board.

There were conducted a literature review and interviews with crew members responsible for medical care on RoPax ships operating on the Baltic Sea. It was decided that the manual will cover the common severe conditions as well as the most frequent milder conditions for passengers and crewmembers: chest pain and cardiovascular disorders, stroke, gastrointestinal disorders, psychological distress, fractures, sprains and strains, life-threatening bleeding and wounds, seasickness, common cold /upper respiratory disease and fever. The first aid guideline includes suggestions for telemedicine consultation and patient evacuation.

There was developed a training program for additional first aid training for crewmembers of RoPax vessels. The training program has basic and advanced levels. The training program is for additional training, which could be offered to crewmember during the five year interval of their regular first aid trainings.

Language: English

Key Words: First aid, RoPax vessels, Medical Emergencies

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1 Introduction

Nowadays, having 24-hour access to professional medical care is taken for granted. However, the situation is different on board the ships, as in many cases there are no medical professional on board. According to the EU Council Directive 92/29/EEC (1992), in case of an international voyage duration not exceeding three days, the doctor on board is not mandatory. The evacuation of an injured or ill person takes time and before that patient could be handed over to medical professionals his or her treatment depends on the crewmember's possibilities of providing medical assistance.

As most the biggest share of injuries and illnesses, which require first aid on board are related to the elderly passengers (Dahl, 2010; Isom et al., 2018), then it is likely to that due to the ageing of population and growth of maritime travel among elderly people, the number of those incidents is going to increase in the future. Thus, providing first aid on board will become more important.

RoPax vessels operating on Baltic Sea may carry thousands of passengers. While the voyages are typically not exceeding three days they are not required to have doctors onboard (although some of them have doctors) despite the large number of passengers. Large number of passengers is likely to generate frequent situations in which persons on board require medical assistance (Olenburg et al., 2018).

The possibilities for providing first aid aboard depend both on the competence of the crew and medical supplies on board. Therefore, teaching first aid procedures to the crewmembers and having adequate medical supplies is vital for provision of adequate first aid in order to preserve the life and health of ill or injures persons onboard.

In 2007, the World Health Organization published International Medical Guide for the Ships, which includes detailed guidelines for provision of medical procedures, including first aid on ships (World Health Organization, 2007). The principles of first aid are constantly evolving as new scientifically proved evidence for best first aid practices become available. Since 2007, there have been several updates in first aid guidelines (for example Pek, 2016; International Federation of Red Cross and Red Crescent Societies, 2020; Lott et al., 2021; Perkins et al., 2021, Semeraro et al., 2021) and therefore the Medical Guide for the Ships may be at least partially obsolete and the principles of first aid provided in this guide may

contract to some of the modern first aid principles. As according to the authors knowledge, there has not been developed a first aid guideline for RoPax ships, working out that kind of a guideline, could be useful for the crews of RoPax ships. Application of a new guideline, may increase the level of first aid provided to the passengers and crewmembers of these ships, which will contribute to the safety of the people aboard RoPax ships.

2 Purpose and delimitation

The purpose of this thesis is to develop a first aid guideline for RoPax ships. The guideline will consist of first aid principles for the most common medical emergencies on RoPax ships, considering the nature of passengers and crewmembers and possibilities of providing medical help on board.

The research questions of the thesis are:

1. Which are the most common situations requiring first aid procedures on RoPax ferries?
2. What kind of first aid training is offered to the crewmembers of RoPax ferries?
3. How should the first aid be provided in these situations on RoPax ferries?

The first aid guide will cover only the most common medical condition occurring on RoPax ferries. It will also include the training plan for the crewmember of RoPax ferries for keeping their skills up to level for provision of first aid onboard.

3 Previous research

The author of the thesis carried out literature search in Google and Google Scholar search engines as well as in the Thesus database. In the search results of Google and Google Scholar there were no first aid guidelines for RoPax vessels. The only available guideline for first aid onboard was International Medical Guide for the Ships (World Health Organization, 2007). The search from Thesus database

Nemlander and Niirainen (2019) have written a thesis “Medical procedures on-board vessels: First aid booklet for seafarers”. The booklet compiled in this thesis focuses on acute life-saving procedures onboard vessels. Thus, this booklet covers non-life-threatening

medical conditions to a very small extent. In addition, this booklet focuses on the medical procedures on all kinds of ships, not taking account the specific conditions on the RoPax ferries. This booklet is also already five years old, and since then there have been some changes in first aid principles.

4 Theoretical background

The following chapter provides overview of the previous research and legislation about first aid on RoPax ferries. The chapter starts with the description of RoPax ferries, which is followed by results of existing literature about medical emergencies on RoPax ferries, legislation regulating provision of first aid and onboard and first aid training for crewmembers as well as requirements for medical supplies onboard.

4.1. RoPax ferries

RoPax ferries are defined as “passenger ferries with roll-on/roll-off cargo (mainly trucks and cars)” (Harries & Abt, 2021, p. 9). RoPax ferries are vessels ro-ro type vessels, which combine the characteristics of cargo ships and cruise ships. Ro-ro vessels allow vehicles to drive on an off board, which means that cargo on vehicles can be autonomously loaded to these ships. Therefore, ro-ro vessels can be seen as connecting road on the sea. RoPax ferries are meant for both cargo and passenger transport and therefore they have cargo and passenger decks. Usually the lower decks are for cargo and upper decks for passengers. (Cascino & Arini, 2019).

The first ro-ro ferry Leviathan was built in Scotland in 1850 and it could take two trains onboard, so the ro-ro ferries were initially developed for the benefit of railroad transportation. Ro-ro ferries become more popular since the 1950s with the increase in automobile transportation. As the use of personal automobile increased, shipping companies started to provide services, which allowed the passengers their cars abroad. At the same time these vessels started making longer journeys and taking aboard more passengers, which lead to adding passenger cabins to these ships. (Cascino & Arini, 2019).

The size and the layout of RoPax ferries is different with smaller ferries usually operating on shorter routes. These ferries may not have passenger cabins as they are not making overnight voyages. Larger RoPax ferries are travelling longer distances, they have larger

passenger areas and passenger cabins for overnight stays. Larger RoPax ferries may have restaurants, bars, night clubs, shops, children's play areas, spas and gyms, cinemas etc. on board. (Cascino & Arini, 2019).

RoPax ferries are widely used on the Baltic Sea. For example, in 2017 there were 62 Ropax ferries of 16 shipping companies operating on the Baltic Sea. Ropax ferries are mainly used for international routes between different Baltic Sea countries. As of 2017, 97% of the routes were international, which the majority of routes connected to Sweden as Swedish ports handled 71% of RoPax voyages. (Gucma, & Raczowska, 2018).

The majority of RoPax ferries operating on the Baltic Sea are between 170 and 200 m in length (Gucma, & Raczowska, 2018). RoPax ferries on the Baltics may carry thousands of people on board. For example, MS Baltic Queen, which operates on Tallinn–Mariehamn–Stockholm has a capacity of 2,800 passengers with cabin places for 2,500 passengers.

4.2. Medical emergencies on RoPax ferries

Medical emergencies on RoPax ferries may arise both from injuries and acute illnesses of passengers and crew onboard. Although various injuries and illnesses may happen, some of them are more likely on these vessels. Therefore, it is important to know, what types of medical emergencies are the most frequent on RoPax ferries in order to be prepared for them.

The risk of injuries/illnesses onboard is related to the number of passengers and crew on board. The more people are on board, the greater is the probability that some of them has an injuries/illness, which requires medical care. (Vukić et al., 2018) Dahl (2010) reports that during a three-year period on a cruise ship the passenger injury rate was 0.8 per 1000 passenger-days. It means that for example a vessel with 500 passenger and making a two-day voyage, is likely to have 0.8 passenger injuries per voyage. Thus, for vessels with high number of passengers onboard, some kind of incidents that require provision of first aid to passengers are likely to happen regularly. According to Oldenburg et al. (2018) medical emergencies are more frequent on passenger liners than on container ships, tankers, general cargo ships and other boats.

Most of the injuries happen to the elderly passengers, a typical incident is an elderly passenger falling in the cabin or bathroom or hitting herself against a blunt object. In case of a cruise ship, with passengers departing the ship to visit the land areas in the port destinations, about one third of the injuries happens onshore. (Dahl, 2010). According to an analysis by Isom et al. (2018) 70% passenger injuries happen to patients aged 65 years or older and the majority of injuries were caused by ground level falls or falls from stairs. Oldenburg et al. (2018) also state that the number of medical emergencies is related to the number of elderly and people with chronic medical conditions on board. Novaro et al. (2010) point out that the environment onboard and passenger behavior may contribute to the cardiovascular emergencies of passengers. As more and more people with pre-existing cardiovascular conditions travel by sea, they could more likely to have a cardiovascular event on board than onshore due to altered sleep cycles, physical exhaustion, increased alcohol consumption, medication non-compliance and changes in diet.

Vukić et al. (2018) have provided a review of most common injuries/illnesses on ferries and passenger vessels. The most common illnesses to the passengers and crew include cardiovascular disorders, gastrointestinal disorders, including food poisoning, stroke, respiratory problems, mental and nervous problems, including psychological distress. The most common injuries are related to falls and slips resulting in fractures, sprains and strains. Similarly, Isom et al. (2018) report that's that most common passenger injuries are fractures to the lower extremities. According to Marshal et al. (2016) the most common non-infectious illnesses on passenger ships in the Caribbean area were cardiovascular illnesses and stroke.

Passengers may be affected by infectious diseases, with the higher risk specific to certain areas. For example, infections to these diseases are relatively common on passenger ships in the Caribbean area. In this area, the most common infectious diseases are gastroenteritis and influenza. (Marshall et al., 2016). During the COVID-19 pandemic there were coronavirus outbreaks on passenger ships, notably in 2020, which in several vessels resulted in quarantining all passengers and non-essential crew (Guagliardo et al., 2022).

According to Vukić et al. (2018) most of these injuries/illnesses are not life threatening, while cardiovascular problems may pose threat to life. Oldenburg et al. (2014) highlight that the severe medical emergencies on board are most frequently related to

cardiovascular disease and traumas, while events related to cardiovascular disease are especially frequent on passenger ships. According to Dahl (2010) about 12% of the injuries were severe, which required for more than 7 days to healing. However, patient hospitalization in local ports was needed only in 2% of the injury incidents. Isom et al. (2018) also reports that only a few injuries onboard require rapid and emergent patient evacuation to the medical facility. In most cases, it is sufficient to provide first aid on board to stabilize the injury on board and it is sufficient to transfer patient to a medical facility in the next port. Holt et al. (2017) report that cardiovascular illnesses and strokes are the most frequent illnesses that result in patient being evacuated from Oslo-Kiel-Oslo ferry. While, injuries from falls are frequent they are usually not severe enough to have the patient evacuated. Do due to the short duration of the voyage (20h from Oslo to Kiel), in these cases patient will usually remain aboard and will be sent to the medical facility in the port if necessary. Dillard et al. (2023) also states that most of the traumas could be treated on board and do not require evacuation.

Injuries onboard can also be related to the crewmembers. Like in other industries, maritime transport has its occupational hazards, which may cause injuries to crewmembers. These hazards vary according to the type of a vessel, cargo and journey, but on the general seafarers are endangered by the effect of weather, mechanical and operational hazards from cargo and machinery. They are affected by noise, vibration and smoke inhalation and in some cases by infectious diseases. (Bygvraa et al., 2020). The risk of injury to crewmembers is lower for passenger ships as some occupational hazards are related to handling cargo (Oldenburg et al., 2014)

4.3. First Aid on RoPax ferries

According to the Maritime Labour Convention by ILO the seafarers should have access to prompt and adequate medical care. If needed they should be provided immediate access to the medical facilities on shore. The medical care on board should be as comparable as possible to the medical care onshore. (International Labour Organization, 2020). Thus, if it is not possible to provide adequate medical care on board to the injured or sick seafarer, he or she has to be transported to the medical facilities on shore.

First aid can be defined as “immediate assistance provided to an ill or injured person until professional help arrives” (International Federation of Red Cross and Red Crescent Societies, 2020, p. 18) or “helping behaviors and initial care provided for an acute illness or injury (Singletary et al., 2015, p. S576).” The aim of the first aid is to preserve life, prevent further illness and injury, alleviate suffering and promote recovery (Singletary et al., 2015). Besides initial treatment of physical illness or injury, first aid also includes provision on psychosocial support to emotionally distressed people (International Federation of Red Cross and Red Crescent Societies, 2020).

First aid differs from medical care as it can be provided by anyone and in any situation (Singletary et al., 2015). Thus, first aid may be provided by people without medical qualifications and it may be provided outside healthcare institutions, including on board. The general principle of first aid is to “provide help while maintaining your safety, as well as the safety of the ill or injured person and any bystanders (International Federation of Red Cross and Red Crescent Societies, 2020, p. 100)”. Provision of first aid should be adapted to the context (International Federation of Red Cross and Red Crescent Societies, 2020). Thus, provision of first aid onboard should take into account the specific feature of the environment and options for executing first aid procedure with the resources available onboard.

As the previously noted, in most cases the injuries and illnesses for the passengers and crewmembers are mild and do not call for urgent transportation to the medical facilities ashore, but it could be delayed until the vessel reaches the next port on the journey. It has to be considered that if an injured or sick person has to be transported ashore as urgently, then it is likely to cause significant costs. Typically, it will result in evacuation of a person by helicopter or the vessel deviating from its course to reach the nearest port. (Faurby et al., 2017). Evacuation of a person from ship by helicopter is a risky and high-cost operation, which should not be undertaken without necessity. It has to be noted that the possibilities of providing treatment, while patient is on helicopter are limited, and therefore it is not always justified. The better the options for providing treatment for the patient on board, the less is the need for helicopter evacuations. (Williams & Dahl, 2014).

4.4. Requirements for competence and training for first aid

Provision of first aid on RoPax ferries is regulated by different legal acts. The international standards for providing first aid on RoPax ferries are regulated in the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), which was adopted in 1978. Besides international standards, EU and national regulation may apply. The national regulations may be different across countries and in this thesis Estonian national regulation are taken as the basis.

According to the Council Directive 92/29/EEC (1992) many RoPax ferries do not have to have a doctor on board as the duration of their voyages does not exceed three days. In that case they do not need a designated sick-bay either and first aid procedures and thus first aid had to be provided by the crewmember without professional medical qualification and in rooms not specially designed for providing medical care. The Estonian law follows the principles of this directive and also states that if the duration of voyage is not more than 72 hours need not have the doctor onboard nor the sick-bay for treating ill or injured persons (Meditsiiniabi korraldamise nõuded laeval ja laeval nõutava meditsiinivarustuse loetelu, 2014).

Many of the RoPax ferries have voyage durations not exceeding three days and thus they do not have doctors on board. This can be the case even for the ships carrying 1,000 or more passengers. In some cases, these ships have a paramedic onboard, but this is according to the company policies not legal requirements. (Holt et al., 2017). On the Baltic Sea voyage durations between ports in almost all cases do not exceed three days.

According to the Council Directive 92/29/EEC (1992) all persons, who receive professional maritime training, should also be provided basic training about immediate medical and emergency measures, which are applied in case of an accident or serious medical emergency. The requirement of basic medical training for every seafarer, can be justified by the fact that during their career, a considerable share of seafarers will be confronted by at least one serious medical emergency. The study by Olderburg et al. (2014) highlights that 28.9% of seafarers have experienced that kind of an emergency at least once.

According to Maritime Labour Convention, if a vessel does not have a doctor on board, then there should be at least one seafarer on board, who is in charge of medical care and he or

she has to be completed training, which ensures that his or her competences are up to the standards provided by STCW (International Labour Organization, 2020). According to STCW there are standards for the competence for seafarers designated to provide medical first aid on board ship. That competence should allow him or her to apply immediate first aid in case of an accident or sickness on board. They should be able to identify the probable cause, extent and nature of the injuries and treat these injuries appropriately according to the recognized first aid practices. While providing first aid they should be able to minimize the risk of harm to themselves and others at all times. (International Maritime Organization, 2010).

In the STCW, there are listed topics in which, the seafarers designated to provide medical first aid on board ship, should have knowledge of various areas of first aid. These include first-aid kit, body structure and function, toxicological hazards, examination of patients, spinal injuries, burns, scald and injuries of cold, fractures, dislocations and muscular injuries, medical care of rescued persons, radio medical advice, pharmacology, sterilization, cardiac arrest, drowning and asphyxia times. (International Maritime Organization, 2010). According to the Council Directive 92/29/EEC (1992) the captain and crewmembers designated to the provision of first aid should receive special medical training updated at least every five years. This special training should take into account the specific risks and need of the vessel type. For vessels making voyages longer than 150 nautical miles, this training should include practical exercise in the medical facilities.

Dillard et al. (2023) recommends that training of the seafarers designated to the provision of first aid should cover wide area of topics as the medical problems, which the patients and crewmembers may develop could be very different. Therefore, the training should be as generalist as possible.

The international requirements for the competence of seafarer responsible for the medical care, for the vessels, which do not have doctor on board, depend on the routes of voyages. If the ship is typically able to reach qualified medical professionals and facilities within 8 hours, then basic medical training, which includes communicating for medical advice by radio or satellite communication is sufficient. Otherwise, the seafarer responsible for the medical care, should have completed advanced medical training including life-saving

techniques such as intravenous therapy and to provide the sick or injured satisfactory medical care in the they are left on board. (International Maritime Organization, 2010).

Provision of medical care onboard includes telemedicine, especially in case there is no doctor onboard. In case of a more serious event the seafarer responsible for the medical care may contact the medical professional ashore for consultation and further instructions. Therefore, the help given to the patient depends on the communication skills of the person onboard. Telemedicine poses challenges of providing information about the patient condition, so the doctor ashore can make the correct diagnosis and provide help. Consultation through telemedicine reduces the number of cases in which the patient has to be evacuated from the vessel or the vessel has to be redirected the nearest port. (Mulić et al., 2012). As cardiovascular events are the most frequent medical emergencies on passenger ships, they are also the most common medical conditions in telemedicine consultation. The problem with the cardiovascular events is that they need diagnostic tools, such as ECG for correct diagnoses. Without those kinds of tools onboard, cardiovascular events are problematic to diagnose through telemedicine and due to the potential high risk to the patient, these cases could often result in patient being evacuated from the vessel. (Dillard et al., 2023).

Telemedicine consultation should be carried out through satellite communication. The ship will contact telemedical assistance services, which are permanently staffed by doctors, who are experiences in providing remote consultations. In normal conditions, the ship will contact the telemedical assistance services according to the location of the ship in which SAR region the ship is located. (International Maritime Organization, 2022).

Medical evacuation from the ship should be carried out if the benefits of it should be weight against the dangers of evacuation both to the patient evacuated and persons carrying out the evacuation operation. The decision to carry out medical evacuation is made by the person in command of the rescue facility in charge of the evacuation operation. (International Maritime Organization, 2022). Thus, the option to carry out medical evacuation, does not full depend the decisions or the ship captain and crew as the rescue facility may not agree with to evacuate the patient if it is considered too dangerous.

4.5. Requirements for medical supplies

The requirements for the medical supplies on board for the vessels Sailing the flag of a EU member state are regulated by the Council Directive 92/29/EEC on the minimum safety and health requirements for improved medical treatment on board vessels, these supplies must meet the category of a ship and the quantities of these supplies depend on the nature of the voyage, taking into account ports of call, destination and duration. (Council Directive 92/29/EEC ..., 1992).

Category	Council Directive 92/29/EEC	Estonian law
A	Sea-going or sea-fishing vessels, with no limitation on length of trips.	Vessels with no limitation on length of trips
B	Sea-going or sea-fishing vessels making trips of less than 150 nautical miles from the nearest port with adequate medical equipment or which make trips of less than 175 nautical miles from the nearest port with adequate medical equipment and which remain continuously within range of helicopter rescue services	Vessels making trips of less than 150 nautical miles from the nearest port, where health care services are available
C	Harbour vessels, boats and craft staying very close to shore or with no cabin accommodation other than a wheelhouse	Ships traveling on inland waterways and ships on local coastal voyages.

Table 1. Categories of ships

According to both Council Directive 92/29/EEC and Estonian law (Meditsiiniabi korraldamise nõuded laeval ja laeval nõutava meditsiinivarustuse loetelu, 2014). the ships are divided between three categories according to their route with minor differences in categories as presented on Figure 1.

As many RoPax ferries on the Baltic Sea stay within the 150 nautical miles from nearest port with medical care available, so they belong to category B.

The medical supplies onboard should be inspected periodically and it has to be ensured that they are in good condition and ready to use when required. The list of medical supplies onboard should correspond to the most common medical situation onboard. There should be a seafarer, who is responsible for the medical supplies. (World Health Organization, 2007).

The level of medical supplies on board could be on a higher level than required by the legislation for a certain type of a vessel and some vessels do have it on a higher level. As Campagna and Russo (2022) point out increasing the level of medical supplies increases cost for these supplies, but at the same time it could decrease the number of events in which the patient has to be evacuated from the vessel. As patient evacuation is often costly, then having better options for treating patients on board may be economically justified.

To sum it up, it can be concluded that both the competence of crewmembers and medical equipment onboard as well as the medical facilities, which may be contacted via telemedicine can be considered as the resources for first aid. As Lott et al. (2021) state that in case of life-threatening medical emergency all the medical resources available should be applied for provision of medical assistance to the patient. Early telemedicine supports should be considered in case of a life-threatening medical emergency.

5 Research method

Qualitative research method was getting input for the development of the manual. There were conducted semi-structured interviews with crew members for a RoPax ferries operating on the Baltic sea. The interview questions (Appendix I) covered the topics of most common injuries and illnesses on board, provision of first aid on board, telemedicine consultation and patient evacuation, provision of first aid training.

The interviews were conducted with seafarers responsible for the first aid provision from 11 different RoPax vessels operation of the Baltic sea. For each vessel, one crewmember was interviewed.

The interviewed were conducted by the author of the thesis. First, the author contacted the interviewees by e-mail. The author asked for the consent to provided an interview and organized the provision of the interview. The interviews were conducted by electronic communication in Zoom environment. The interviews were recorded on the consent from the interviewees, which allowed the transcription of the interviews. The interviews were conducted in January and February in 2024.

6 Result of interviews

The results of the interviews provide information about the most common illnesses and injuries for passengers and crew members on RoPax ferries. As it can be seen from the Figure 2, there exist some differences between these two groups. The injuries for the passengers are mainly related to the falls, the injuries for the crewmembers are caused by industrial accidents. The injuries for the passengers seem to be severe more often as fractures and dislocations were mentioned, while cuts are most common to crewmembers.

For both passengers and crewmembers, different kinds of pain, fever and diarrhea are frequent. Crewmembers tend to catch common cold and have upper respiratory infections. Seasickness is common for passengers.

The interviews indicated that RoPax vessels operating on the Baltic seas have several crewmembers with at least some medical qualification. Two of the ships have a doctor on board and two other ships have medics. In most of the ships senior officers and some or all deck and engine officers have medical qualifications. In one interview it was also mentioned that security guards have medical qualifications. It should be noted that these medical qualifications could be at different level and they do not always mean that these crewmembers have medical degree, but rather they have completed some advanced medical training.

Who is the person responsible for provision of the first aid on board, depend on, which are the qualifications of crewmember. If there is a doctor or medic among crewmember, then

he or she is responsible for providing the first aid. In other case, there is a crewmember, who is responsible for medical care. It could be the chief mate or second officer. It was also mentioned that smaller injuries are treated at the information desk and it should be noted that first aid could be provided by different persons, especially in less severe cases as there are several crewmembers on board, who have qualification for provision of first aid.

Passengers	Crew members
Cuts (5)	Cuts (3)
Fractures (3)	Foreign objects in the eye (1)
Dislocations (1)	Injuries related to workplace accidents (2)
Injuries related to falls (3)	Common cold (2)
Seasickness (2)	Upper respiratory disease (1)
Headache (1)	Viruses (1)
Fever (2)	Fever (2)
Different kinds of pain (1)	Different kinds of pain (1)
Diarrhea (1)	Diarrhea (1)

Table 2. Most common illnesses and injuries for passengers and crew members of RoPax ferries

Note: Number of interviewees mentioning the injury or illness in brackets

The documentation of medical events depends on the severity of the event. The events are documented in medical information systems, but on some vessels different systems are used depending on the severity of the event as more severe cases are documented in more detail. Less severe events are typically documented in NOOM program and more severe cases in MSM program. There are also separate procedures for documenting workplace accidents for crewmembers.

When providing first aid on board then both International Medical Guide for the Ships and national legislation are followed. However, the interviews indicated that there are no specific first aid guidelines for provision of medical care on RoPax vessels. Instead, different kinds of books, booklets and manuals are applied. These materials are not complied by the ship companies and in some cases, they are not specific to provision of medical care onboard, but describe general first aid principles.

Telemedicine consultation is used for more serious cases, but there are no strict regulations in, which cases the consultation is necessary. One crewmember pointed out that telemedicine consultation is always used, when the situation of the patient is life-threatening. Another crewmember told that telemedicine is contacted when crew onboard runs out of ideas what's wrong with the patient or when crew is not sure about symptoms of the patient. Telemedicine could also be applied on the ships, which have doctor onboard, as in the most difficult cases the doctor alone might not be able to handle the case. It could be concluded, that telemedicine is more often used in severe cases, but the decision to use telemedicine consultation is case-based and depends the capabilities of the crew.

In more serious cases, the patient may need to be evacuated. According to the interviews the decision to evacuate patient is made by the captain, or by captain and medic together. The decision to evacuate the patient often follows telemedicine consultation. Patients are usually evacuated if the patient's condition is life-threatening or if the patient need urgent hospitalization, if the patient's condition is not stable and it cannot be stabilized on board. The decision to evacuate the patient depends on the crew's capabilities of providing care to the patient. As for telemedicine consultation, the decisions are made case-wise.

According to the interviews, the following skills very considered the most important for the crewmembers for provision of first aid on board: assessment of patients condition, cardiopulmonary resuscitation, techniques for stopping bleeding, wound dressing, correct techniques for lifting persons with suspicion of back or neck injuries. The crewmember should be able to remain calm, when providing first aid and their communication skills with patients are important. The crewmember should be self-confident in their skills and they should be able to act decisively. It was also pointed out that the seafarer responsible for provision of medical care, should be able to keep the medical supplies inventory in order.

The results of the interviews indicate that all crewmembers receive basic medical training according to the STCW. According to the STCW standards the training should be provided by in appropriate training center and usually nurses or doctors are the teachers at these courses. The basic training usually covers topics such as basic life support, wound care, treating burns and fractures, managing medical emergencies like heart attacks or strokes, handling allergic reactions, and administering first aid in maritime-specific scenarios. Senior officers, deck officers or security officers receive additional medical training. The advanced training includes the additional topics such as treating serious injuries, administration of intravenous fluids, administration of medicines, taking childbirth, sewing wounds, transportation of patients. On the general the advanced training more comprehensive and precise knowledge, it covers wider range of diagnoses and conditions.

There are different practices among vessels as some of them provide additional first aid training on board in order to fresh-up the skills and knowledge of the crewmembers, but it seems not to be a usually practice. First aid practice is done also during emergency drills, which are practiced on board.

All the crewmembers receive the basic first aid training every 5 years. The advanced for those crewmembers, who hold a medical certificate are also provided every 5 years in order to renew that certificate. As the 5-year period expires on different dates then, these trainings are regularly available. Some shipping companies provide additional first aid trainings during these 5 years. These additional courses are with short duration, and in some cases the training is provided by the medic or officer responsible for medical care on board.

There were mixed opinions about the readiness of the crew to handle medical emergencies. On the general, the training offered to crewmembers, especially the advanced training, was regarded good. The main problem with provision of first aid is lack of practice. While the minor cases are frequent, then serious accidents and illnesses happen rarely and so the crewmembers do not have much practical experience with it. Although handling these situations, is practiced during training, people tend to forget, what they have learned, if the are not able to put it into practice.

Some of the interviewees pointed out the crewmembers would benefit if they would have first aid training more often. There is no need to teach them more advanced medical

procedures, but instead of they could have more rehearsals of the existing skills and knowledge. The emergency drills, were also found useful, as they allow practicing first aid skills in real-life-like scenarios. One interviewee pointed out that in order to improve, the crew must carry out practical first aid tasks at least once a week. It was also suggested that internship in hospital for seafarers responsible for first aid, could be applied to provide them more practical experiences. It was also pointed out that the level of provision first aid on board could be improved if every RoPax vessel would have doctor onboard.

7 Development of the manual

The first aid manual (Appendix II) was developed considering the possibilities for provision of first aid on RoPax ferries. The manual begins with the general principles of first aid, assessing the patient and providing life support both through manual cardiopulmonary resuscitation and automated external defibrillator.

Next, the manual includes first aid guidelines for specific medical conditions. The selection of conditions included in the manual was made based on both the results of the literature review and interviews. It was decided to include the common severe conditions as well as the most frequent milder conditions. It is obvious that the severe conditions are not the most frequent ones and therefore they were not mentioned in the interviews as the most common on. The final list of the conditions for the manual includes: chest pain and cardiovascular disorders, stroke, gastrointestinal disorders, psychological distress, fractures, sprains and stains, life-threatening bleeding and wounds, seasickness, common cold /upper respiratory disease and fever.

The manual was developed according to the latest scientific-based evidence for providing first aid. Latest European Resuscitation Council Guidelines (Lott et al., 2021; Perkins et al., 2021; Semeraro et al., 2021; Zideman et al., 2021) as well as International First Aid, Resuscitation, and Education Guidelines (International Federation of Red Cross and Red Crescent Societies, 2020) and 2020 international consensus on first aid science with treatment recommendations (Singletary et al., 2020) were used as the most importance literature sources.

The International Medical Guide for the Ships (World Health Organization, 2007) was used to the extent that it does not contract to the current evidence-based first aid principles.

Although this guide is more than 15 years old by the time of it includes specific principles for provision of first aid procedures onboard.

The manual will take into account the medical supplies onboard of RoPax vessels and skills of the crew, considering that the RoPax vessels belong to category B according to Council Directive 92/29/EEC and have the required medical supplies according to this category. It is also considered that crewmember have different level of medical skill, but all crewmembers have passed first aid training and the seafarers responsible for provision of medical care have higher level of first aid skills. The manual also covers the cases in which, telemedicine consultation and/or patient evacuation should be applied taking into account that the RoPax vessels are operating on the Baltic Sea.

The manual is meant for all crewmembers of RoPax vessels. While some parts of it are only relevant for seafarers responsible for first aid, the general principles of first aid and handling of the most common situations, are essential for all crewmembers.

8 Training programme

The manual will also include the training plan for the crewmember of RoPax ferries for keeping their skills up to level for provision of first aid onboard. According to the results of the interviews and literature review, it was decided that the training program for crewmember of RoPax vessels (Appendix III) should be divided into two levels.

The basic level is meant for all crewmembers and the advanced level is meant for the seafarers responsible for provision of medical care or other senior and deck officers. The basic level training program covers less topics ant the advanced program. The following topics are included both in the basic and advanced level training program: general principles, assessment of patient, opening airways, recovery position, basic life support in cardiopulmonary resuscitation, control of life-threatening bleeding, fractures, sprains and stains, mental distress, handling patient with suspected neck/back injuries, self confidence and acting calmly. In addition, the advanced training program covers the following topics: advanced life support in cardiopulmonary resuscitation, patient with chest pain, patient with stroke, gastrointestinal disorders, seasickness, common cold/upper respiratory infections and fever.

The training program is meant for additional training, which could be offered to crewmember during the 5-year interval of their regular first aid trainings. Thus, the training program is not mandatory for crewmembers of RoPax vessels, but recommended for them. The training program is compiled in a way that it allows refreshing the skills and knowledge in the most important areas of first aid on RoPax vessels.

9 Discussion

The first research question of the thesis is “Which are the most common situations requiring first aid procedures on RoPax ferries?” According to the results of the interviews the most common injuries and illnesses for the passengers are cuts, fractures, dislocations, injuries related to falls, seasickness, headache, fever, different kinds of pain and diarrhea. The most common injuries and illnesses for the crewmembers are cuts, foreign objects in the eye, injuries related to workplace accidents, common cold, upper respiratory disease, viruses, fever, different kinds of pain, diarrhea.

Thus, it can be concluded that there are some similarities and differences in the medical events with passengers and crewmembers. Cuts, common cold and different kind of pain are frequent for both groups. At the same time the causes of the injuries are different as for passengers they are often related to falls, but for crewmembers they are caused by workplace accidents. This is in line with the previous literature as both Dahl (2010) and Isom et al. (2018) state that most of the injuries to the passenger are related to falls. This is very much the case for the RoPax vessels, which often have many elderly passengers who are prone to falls. Crewmember do not have so many injuries from falls, as they are younger more physically fit and used to moving around on the ship. At the same time crewmembers are exposed to occupational hazards (Bygvraa et al., 2020), which may cause injuries to them. Seasickness was reported as frequent condition for passengers but not for crewmembers. Probably crewmembers do not have seasickness often are more used to the environment onboard. It is worth noting that seasickness has not been reported as a frequent medical condition for passengers in the previous literature.

Vukić et al. (2018) has found that cardiovascular events are among the most frequent medical events on board, but they were not mentioned in the interviews. Stroke, which

was listed among the common medical condition by both Marshal et al. (2016) and Vukić et al. (2018), was also not mentioned in the interviews.

Thus, cardiovascular events and strokes are not very frequent on RoPax vessels, but still the crewmember should have knowledge and skills to deal with them as they could potentially have fatal consequences. Holt et al. (2017) report that cardiovascular illnesses and strokes are the most frequent illnesses that result in patient being evacuated from Oslo-Kiel-Oslo ferry, which means that the first aid guidelines for RoPax ships should cover these medical conditions as well as patient evacuation.

The second research question of the thesis is “What kind of first aid training is offered to the crewmembers of RoPax ferries?” It was found that all the crewmembers have received basic medical training within their initial training, which corresponds to the STCW standards. All the crewmembers receive the basic first aid training every 5 years. Senior officers, deck officers or security officers receive additional medical training. In case of some RoPax vessels, crewmember are provided additional medical training, but these practices are different. First aid practice is done also during emergency drills, which are practiced on board.

It can be concluded that the current basic training covers the most important topics of provision of first aid onboard, such as basic life support, wound care, treating burns and fractures, managing medical emergencies like heart attacks or strokes, handling allergic reactions. At the same time, the training does not cover some mild but frequent conditions such as upper respiratory illnesses or seasickness.

The third research question of the thesis is “How should the first aid be provided in these situations on RoPax ferries?” It could be concluded that first aid should be provided as comparable as possible to the medical care onshore. The provision of first aid should use the available resources and if need be telemedicine consultation should be used and in some cases patient may be evacuated from the vessel. However, in most cases the medical conditions are not severe and the patient should be given medical care onboard.

Guideline for provision first aid on RoPax vessels was compiled in the thesis. The guideline begins with the general principles, which are followed by the instructions for provision of first aid for specific medical conditions. The reliability of the guideline is based on the inputs

of the guideline, which were first aid recommendation form the recent evidence-based works such as latest European Resuscitation Council Guidelines (Lott et al., 2021; Perkins et al., 2021; Semeraro et al., 2021; Zideman et al., 2021) as well as International First Aid, Resuscitation, and Education Guidelines (International Federation of Red Cross and Red Crescent Societies, 2020) and 2020 international consensus on first aid science with treatment recommendations (Singletary et al., 2020) as well as interviews from 11 crewmembers from different RoPax vessels operating on the Baltic Sea. Thus, the input for developing the guideline came both from theoretical knowledge and statements from people, who have practical experiences with the topic.

The high level of reliability of the research results comes from the sample used in the interviews. 11 crewmembers for different RoPax vessels were included in the sample, thus the interviews provided information from many different ships, which on the general had similar medical emergencies and first aid practices. The interviewees were seafarers responsible for the first aid from 11 different vessels. The interviewees have significant experience with medical emergencies and providing medical care on board.

The high level of validity of the research results come form the questions used in the interviews. During the interviews it was understood, that the interviewees understood the questions well and there were no misunderstandings. All the interviews were conducted by the author of the thesis, which also increases the validity of the results of the interviews.

One of the challenges of compiling the first aid guideline was to make it easy to read for the crewmembers. It had to be understandable for all crewmembers not only medical professionals or crewmembers, who have received advanced medical training. The guideline could not also be very long, but it had to include the most important medical conditions. During the work process, the guideline was shortened and simplified several times and more illustrations were added to it.

In future, the guideline should be reviewed and updated according to changes in first aid principled. The author of the thesis recommends that the guideline should be reviewed in five years.

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Appendix I Interview questions

1. What kind of injuries and illnesses are most common for the passengers on your vessel during the voyages?
2. What kind of injuries and illnesses are most common for the crewmembers on your vessel during the voyages?
3. How is first aid provided on your vessel? When someone has an injury or illness onboard then who will provide first aid? To whom and how that kind of situation is reported?
4. Which of the crewmembers have medical qualification on your vessel, if any?
5. Which regulations or manuals are followed for the provision of first aid on board?
6. How are the medical events that happen onboard documented?
7. In which cases telemedicine consultation is for provision of first aid on board?
8. In which cases the patient is evacuated? Who will make the decision about patient evacuation?
9. Which skills are the most important for the crewmembers for provision of first aid on board according to your opinion?
10. What kind of first aid training is provided to the crewmembers? What does the first aid training consist of? Which skills and knowledge are taught in first aid training? Is there a training plan for first aid training, and who is responsible for choosing the content of the training?
11. How often is first aid training provided and to whom it is provided?
12. Who does provide the first aid training?
13. What are the differences in first training for the seafarer responsible for medical care and other crewmember, if any? For example the differences in the skills and knowledge taught on these trainings?
14. How do you rate the preparedness of the crewmembers for provision of first aid onboard? What are the deficiencies in their skill or knowledge, if any? What kind of areas of first aid they should have more training, if any?
15. How could provision of first aid on your vessel be improved? What could and should be done for that?

Appendix II First Aid Guideline of RoPax ships

1 General Principles

First aid should be provided by maintaining the safety of the first aid provider, the ill or injured person and other persons (referred as patient onwards). Therefore, you should assess the safety of the scene (International Federation of Red Cross and Red Crescent Societies, 2020):

- Which dangers are present on the scene and it safe to provide first aid there?
- Are there any other areas, in which the level of dangers is lower?
- If possible then measures should be taken to increase the safety of the scene or the patient should be evacuated to a safer area.

Do not enter the scene if it is not safe (International Federation of Red Cross and Red Crescent Societies, 2020). If the patient is in danger, then remove the danger before providing first aid (World Health Organization, 2007).

Wear personal protective equipment (PPE), if possible. PPE should consist of gloves, face mask and eye protection. If no PPE is available then wash hands before and after providing first aid. (Pek, 2017).

Check the patient for life-threatening conditions first. If the patient does not have any life-threatening conditions, then deal with other conditions. Treat the most severe conditions first. (International Federation of Red Cross and Red Crescent Societies, 2020).

If there are many patients, assess all patients before providing first aid (International ..., 2020). If some patients seem to be unconscious then evaluate them first (World ..., 2007). Find out which patients are in the most critical conditions affecting breathing and circulation and treat them first (International Federation of Red Cross and Red Crescent Societies, 2020).

Communicate with patient to get information and explain them what they are doing. Treat patients with respect and empathy (International Federation of Red Cross and Red Crescent Societies, 2020).

Decide if you can handle the situation alone. If not, then call for help. If there is more than one patient then call for help. If the patient can be treated better. (International Federation of Red Cross and Red Crescent Societies, 2020).

Assess the next available level of care (International Federation of Red Cross and Red Crescent Societies, 2020). If there are other crewmembers at the scene ask them to help. If the situation is more serious report to the seafarer responsible for the medical care. If necessary, consider telemedicine support or medical facilities ashore.

If there is a large number of patients and crewmembers could not provide adequate help a on-board public announcement to possible medical staff among passengers should be made (Perkins et al., 2021).

First aid should be provided with the equipment available. If necessary then ask other crewmembers to bring necessary equipment. Start the provision of first aid, with the resources you have. Act as best as you can while waiting the equipment to arrive. (International Federation of Red Cross and Red Crescent Societies, 2020).

2 Assessment of the patient

If possible, then approach patient for the direction that the patient can see you as it scares them less (International Federation of Red Cross and Red Crescent Societies, 2020).

First, check if the patient has life-threatening conditions by evaluating the following questions (International Federation of Red Cross and Red Crescent Societies, 2020):

1. Is the patient responsive?
2. Is the patient's airway open and clear?
3. Is the patient breathing normally?
4. Does the patient have a severe bleeding?

Shout loudly and if possible then call patient by name to check if the patient is responsive. If the patient does not react, then shake him or her from the shoulder or leg (World Health Organization, 2007).

If the patient is unresponsive, then check if his or her airways are open and clear (World Health Organization, 2007). If the patient is able to speak or cry, it means airways are open and clear (International Federation of Red Cross and Red Crescent Societies, 2020).

Establish open airways, if needed. First, check the patient for obvious signs of spinal injury. If there are no signs of spinal injury, then tilt the patient's head back. Exert pressure on patient's forehead with the on hand and raise the chin of the patient with two fingers of the other hand

If spinal injury is suspected, then open airways with jaw thrust. Grasp the patient's jaw bones from each side and lift the jaw gently upwards. If patient's lips are closed, open the lower lip with thumb. It may dislocate patients jaw, but it will heal over time. (Alexandrou, 2024).

Check for visible obstructions in the patients mouth or throat. If there are any, then remove them with your finger. (World Health Organization, 2007).

Patient's breathing may be assessed in several ways (World Health Organization, 2007).

- Watch for chest movements;
- Place your ear near patients mouth to hear patient to breathe;
- Place you cheek near patients mouth to feel patient to breathe;

If patient is able to speak or cry, it means he or she is breathing normally (International ..., 2020). If the patient's breathing is slow and labored (agonal breathing), breathing should be considered as inadequate and a sign of cardiac arrest (Perkins et al., 2021).

Check patient for life-threatening bleeding. Check the entire patient's body from head to toe to detect the signs of bleeding. (Canadian Red Cross, 2018).

If the patient does not have any of the previously listed life-threatening conditions, then the following questions about the patient should be evaluated (International Federation of Red Cross and Red Crescent Societies, 2020):

1. Is the patient showing signs of altered mental status, such as confusion or aggression?
2. Are there any evident signs of injury in the patient? If yes, the closer examination of these injuries is needed.

3. Does the patient have any history of allergies or known medical conditions?
4. How does the patient describe their current state?
5. What additional signs can be observed in the patient, such as body temperature, movement, etc.?

Assessment of the patient should continue while providing first aid. The condition of the patient may change and the you should be able to take notice of that (International Federation of Red Cross and Red Crescent Societies, 2020). Initially stable patients may develop life-threatening conditions.

If there is no immediate threat to the patient and the patient, then leave the patient in the position the patient was found until further help arrives (International Federation of Red Cross and Red Crescent Societies, 2020). If patient does not need cardiopulmonary resuscitation, then the patient should be placed at a lateral side-line recovery position. (Zideman et al., 2020). The patient should not be placed in recovery position if there is a suspicion of a neck, back, hip or pelvic injury. In that case the patient should not be moved if not necessary, but it has to be ensured that his or her airways are open. (Pek, 2017).

Placing the patient to the recovery position should be done in the following steps (Zideman et al., 2021):

- Kneel beside the patients, ensuring both legs are extended straight.
- Place the arm closest to you at right angles to the body, with the palm facing upward.
- Bring the far arm across the chest, securing the back of the hand against the patient's cheek nearest to you.
- With your other hand, grip the patient's far leg just above the knee and lift it, maintaining contact with the ground.
- While keeping the hand against the cheek, gently pull on the patient's far leg to rotate the patient onto their side.
- Adjust the patient's upper leg to ensure both the hip and knee are bent at right angles.
- Tilt the patient's head backward to ensure the airway stays open.

- If needed, move the hand supporting the cheek to maintain a tilted position, directing the patient's head downward to facilitate the drainage of fluids from the mouth.

Monitor the patient in recovery position regularly. Leave them unattended only if necessary, for example while treating other patients (Zideman et al., 2021).

If it is safe to transport the patient, then he or she may be transported to sick-bay, cabin or other similar location. Do not transport the patient if it delays provision of first aid in a life-threatening situation. Before moving the patient, check for signs of spinal injuries and fractured long bones beforehand. (World Health Organization, 2007).

3 Cardiopulmonary resuscitation

Cardiopulmonary resuscitation (CPR) may be conducted in the form of basic life support or advanced life support. Basic life support includes chest compressions and rescue breaths and the use of automated external defibrillator (AED). Advanced life support includes more complex techniques such as intubation and administration of adrenaline (Perkins et al., 2021).

When patient is in cardiac arrest, then CPR should be started as soon as possible. The signs of the cardiac arrest are the following (Perkins et al., 2021):

- Lack of breathing;
- Slow and labored breathing (agonal breathing);

Brief seizure-like movements may occur initially after onset of cardiac arrest. Once these movements cease, assess the individual's responsiveness and breathing. If in doubt, if the breathing of a patient is agonal, then assume it is and start CPR immediately (International Federation of Red Cross and Red Crescent Societies, 2020). As the first person on scene start CPR and do not wait for help to arrive (Semeraro et al. 2021).

Deliver chest compressions to the lower half of the sternum "center of the chest" (Perkins et al., 2021). position your dominant hand against the sternum and place your non-dominant hand over the first (International Federation of Red Cross and Red Crescent Societies, 2020). The depth of the compressions should be 5-6 cm (Perkins et al., 2021).

Decompress chest to 5-6 cm and allow the chest to fully recoil after each compression for maximizing the effectiveness of CPR. Do not lean on the patient's chest. (Perkins et al., 2021). If possible then the chest compression should be provided, while the patient is lying on a firm surface (International Federation of Red Cross and Red Crescent Societies, 2020).

The rate of chest compressions should be 100-120 compressions per minute with consistent rhythm. Avoid interruptions while providing chest compressions. (Perkins et al., 2021).

If there are more than one first aid provider available, change the provider of chest compressions after 1-2 minutes to prevent fatigue. Keep the interruption in chest compressions due to that change minimal. (International Federation of Red Cross and Red Crescent Societies, 2020).

Rescue breaths can be delivered by mouth-to-mouth, mouth-to-nose or bag-valve-mask. When available then bag-valve-masks should be preferred for delivering rescue breaths (International Federation of Red Cross and Red Crescent Societies, 2020).

The patient should lay on the back and the mask should be right size for the patient. Insert an oropharyngeal airway (Guedel airway) to patient' mouth. If possible do bag-valve-mask ventilation with two persons. One person handles the mask and the other on squeezes the bag. (Harbat, 2022).

Place the mask over the patients nose and mouth holding mask with thumbs and index fingers placed on either side of the connector stem. Tilt the patient's head backwards, while placing the mask. (Harbat, 2022).

Use the "C-E" grip (Figure 6), placing the middle, ring, and little fingers (the "E") under the mandible and pulling the mandible upward while the thumbs and index fingers create a "C" and then press down against the mask. (Harbat, 2022).

Check for the proper seal before starting to operate the bag. Squeeze bag consistently and in a controlled manner for 1 second to provide oxygen. Release the bag to allow it to reinflate the ventilation rate should not exceed 8-10 breath per minute. Observe patient's chest for adequate chest rise during ventilations. (Harbat, 2022).

If you are alone then hold the mask with one hand and squeeze the bag with the other hand. (Harbat, 2022).

Mouth-to-mouth or mouth-to-nose method are not preferable to due the risk of transmission of infectious diseases from patient to first aid provider. However, there have been reported only a few cases of that kind of transmission of diseases. (Fragkou et al, 2021). As RoPax vessels should have bag-valve-masks among medical supplies according to Council Directive 92/29/EEC, then mouth-to-mouth or mouth-to-nose rescue breath may be given until a bag-valve-mask is brought to a patient if there is it is known that patient does not have infectious diseases.

For mouth-to-mouth method rescue breath tilt the patient's head backwards. If spinal injury is suspect then the tilt should be minimal. Place the heel of your opposite hand on the patient's forehead, ensuring that the thumb and index finger are directed toward the nose. Pinch patient's nostrils with thumb and index to close them and prevent air from escaping. Open the patient's mouth, inhale deeply and then create a secure seal with your lips over and around the patient's mouth. Then breathe into patient's mouth. Inhale after each breath. Monitor the patient's chest to see it to rise. (World Health Organization, 2007).

If mouth-to-mouth rescue breathes are impossible to give due to patient's injuries or there is an obstruction in patient's mouth, then mouth-to-nose rescue breathes could be given (World Health Organization, 2007).

For mouth-to nose rescue breaths tilt the patient's head backwards and lift the patient's lower jaw to seal the lips. Take a deep breath, seal the lips around patient's nose and breathe into it. Then remove your mouth and allow the patient to passively exhale. (World Health Organization, 2007).

The rate of chest compression and rescue breaths should be 30:2. First give 30 chest compressions and then 2 rescue breaths (Perkins et al., 2021).

On the general, chest compressions are more important for CPR success. If you are is unwilling or unable to provide rescue breaths, then provide chest compressions only. (International Federation of Red Cross and Red Crescent Societies, 2020).

Early use of AED increases the probability of cardiac arrest patient survival. Therefore, an AED should be brought to the scene of event as soon as possible. (Perkins et al., 2021). RoPax vessels should have AED onboard according to Council Directive 92/29/EEC.

The first crewmember on the scene should start chest compressions and the other should fetch the AED. If necessary, the first crewmember should call for help.

When the AED arrives on the scene, it should be immediately turned on. Attach the electrode pads of AED to the patient's bare chest following the positioning indicated on the AED or the pads themselves. If there are multiple first aid providers on the scene, the chest compressions should be continued while attaching the electrode pads. (Perkins et al., 2021).

After attaching the electrode pads, follow the spoken or visual prompts from the pad. When AED starts analyzing the patient's heart rhythm nobody should touch the patient. (Perkins et al., 2021).

If the AED indicates shock, ensure that nobody is touching the patient and press the shock button. If the AED is fully automatic, then it will deliver the shock without the need for pressing the shock button. After delivering the shock restart CPR and continue till the AED says so (Perkins et al., 2021).

If the AED does not indicate shock then restart CPR and continue till the AED says so (Perkins et al., 2021).

Continue CPR until the normal breathing of the patient is restored. If the patient starts coughing or speaking, then stop CPR (International Federation of Red Cross and Red Crescent Societies, 2020).

If the AED gives an instruction to discontinue chest compressions, then stop them (International Federation of Red Cross and Red Crescent Societies, 2020).

If initial resuscitation efforts are ineffective, advanced life support techniques such as airway management, administration of medications, and addressing underlying causal factors may be necessary (Semeraro et al. 2021). Advanced life support should be provided only by a person who has received training for that (Perkins et al., 2021).

If efficient ventilation is not achieved by rescue breaths with basic airway management, then tracheal intubation should be done. Intubation should not cause a delay longer than 5 seconds in chest compressions (Perkins et al., 2021).

When according to the analysis by AED the cardiac arrest rhythm is non-shockable then 1 mg adrenalin could be administered. 1 mg adrenaline should also be administered if the cardiac arrest rhythm is shockable and the AED has given three shocks, but the patient has not resume normal breathing. From that point on 1 mg adrenaline should be established every 3 to 5 minutes while continuing CPR. Adrenaline should be preferably administered intravenously, so intravenous access should be established. If it is not possible to successfully establish intravenous access intraosseous should be established. (Perkins et al., 2021).

If the patient's cardiac arrest rhythm is VF/pVT after three AED shocks, then the patient could be administered 300 mg amiodarone, after five shocks the patient should be given additional 150 mg amiodarone. If amiodaron is not available, then as alternative 100 mg lidocaine after three shocks and 50 mg after five shocks could be given as alternative. (Perkins et al., 2021).

4 Control of life-threatening bleeding

Severe external bleeding is a life-threatening situation that demands immediate first aid intervention. Bleeding is stopped by application of pressure. There are several ways to do it. First aid providers may use their hands, pressure dressings or bandages or external compression devices such as tourniquets for that reason. (International Federation of Red Cross and Red Crescent Societies, 2020).

In most cases, the fist direct manual pressure is the first choice (Zideman et al., 2021). In case of life-threatening bleeding to extremities tourniquets should be used. If tourniquet is not available, then direct pressure should be applied until the tourniquet arrives (Singletaray et al., 2020).

If application of direct manual pressure does not stop the bleeding then haemostatic dressings could be used. (International ..., 2020). Pressure dressings should not be used for

stopping the severe bleeding, but they may be applied later, when the bleeding is under control (Zideman et al., 2021).

Wear gloves or cover hand with plastic bags to shield yourself from the person's blood. If no gloves or plastic gas are available, use bandages or clothing as a protective barrier- (International Federation of Red Cross and Red Crescent Societies, 2020). If possible, then wear eye protection (World Health Organization, 2007).

If the person with bleeding is conscious and able to do so, then ask him to apply pressure on the wound with his own hands. Ask the patient to lie down and then start applying manual pressure on the wound. (International Federation of Red Cross and Red Crescent Societies, 2020).

For applying manual pressure bandages can be utilized to apply pressure to the wound, but bandages could replace manual compression only after the severe bleeding is under control (International Federation of Red Cross and Red Crescent Societies, 2020).

If the bleeding does not stop then first try increasing the pressure. If it still not does not stop the bleeding then consider alternative methods such as using a tourniquet or haemostatic dressings. (International Federation of Red Cross and Red Crescent Societies, 2020).

Place the hemostatic dressing directly to the bleeding site and then apply direct manual pressure to the dressing (Zideman et al., 2021).

Use tourniquets in case of life-threatening bleeding to extremities. Use tourniquets if there are many patients as applying manual pressure do the wound does not allow the first aid provider to perform other tasks. (Singletaray et al., 2020).

If a tourniquet is not readily accessible, apply manual pressure until a tourniquet can be secured (Singletaray et al., 2020).

If it is not possible to apply tourniquet for any reason, such as proximal extremity wounds, or when the size of the wound will not permit successful placement of a tourniquet, then apply manual pressure. (Singletaray et al., 2020).

If possible, then use a manufactured tourniquet. RoPax vessels should have two of them in medical supplies according to Council Directive 92/29/EEC. However, if only an improvised

tourniquet is available for severe, life-threatening external extremity bleeding, for example there are multiple victims with severe bleeding and there are not enough tourniquets on board, it can be used as a last resort (International Federation of Red Cross and Red Crescent Societies, 2020).

Place the tourniquet on the injured limb 5-7 cm above the bleeding site. Do not place the tourniquet over a joint. Tighten the tourniquet until bleeding diminishes and ceases although this may cause significant pain for the patient (Figure 10). Maintain consistent pressure on tourniquet. Record the time of application of tourniquet. (Zideman et al., 2021).

Monitor the responsiveness of the patient. Due to the loss of blood the patient may develop shock or cardiac arrest. If the person becomes unresponsive, then keep his airways open and check breathing. In case of inadequate or absent breathing start CPR. (International Federation of Red Cross and Red Crescent Societies, 2020).

When the bleeding has stopped then the wound should be closed and dressed. The patients' pulse and blood pressures should be checked. Rapid pulse and dropped blood pressure may indicate hypovolemic shock. (World Health Organization, 2007).

5 Chest pain and cardiovascular disorders

Chest pain mainly refer to an onset of myocardial infarction (heart attack) and therefore it has to be taken seriously and the patient should be checked by medical professionals (Lott et al., 2021). Chest pain may be a symptom of many other heart, lung or rib cage conditions, but from the viewpoint of first aid the risk of heart attack is the most critical (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient is experiencing chest pain then check the patient for the following symptoms of risk for heart attack (International Federation of Red Cross and Red Crescent Societies, 2020):

- intense pain,
- shortness of breath,
- patient's skin is pale
- patient's lips, ears, finger or toes are blueish.

Chest pain combined with the pain in arm or shoulder or in combination with sweating may be a sign of imminent heart attack (International Federation of Red Cross and Red Crescent Societies, 2020).

If the risk of heart attack is high then AED should be brought to the patient as the patient may need resuscitation after the heart attack (International Federation of Red Cross and Red Crescent Societies, 2020).

Place the patient with the chest pain s in a comfortable position and he has to avoid physical activity. For prevention of heart attack oral dose of 150–300 mg acetylsalicylic acid could be considered. Provision of acetylsalicylic acid is contradicted if the person regularly takes acetylsalicylic acid or if he is allergic to acetylsalicylic acid. (International Federation of Red Cross and Red Crescent Societies, 2020).The patient with the chest pain could be also administered aspirin (Singletaray et al., 2020).

Ask the patient about his preexisting heart and other medical conditions and about the medication patient takes. If patient has diagnosed angina or any other heart condition, then ask if the patient has taken his medication according to the prescription. If the patient has not taken medication, then it has to be assured that he takes it. (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient has had myocardial infarction (heart attack) then his evacuation should be considered. If the patient is not evacuated, then the patients should be confined to a complete bed rest (World Health Organization, 2007).

6 Stroke

If stroke is suspected, then it is important to evaluate the patient condition and confirm that the patient has actually had a stroke. Implementing a stroke assessment scale helps reduce the time it takes to provide necessary help to the patient. (Perkins et al., 2021).

FAST is an efficient and easy stroke symptoms assessment scale. FAST is an acronym, which stands for FACE, ARM, SPEECH, TIME. It diagnoses stroke, by three times of symptoms and stresses the importance of timely provision of help to a stroke patient. (International Federation of Red Cross and Red Crescent Societies, 2020).

- FACE - Assess for facial numbness or weakness, particularly on one side, by requesting the patient to smile or show their teeth. Observe if their mouth appears crooked or if one corner droops.
- ARM: Evaluate for arm numbness or weakness, especially on one side, by instructing the patient to extend both arms simultaneously in front of them with palms facing upward. Carefully observe for any sagging or drifting of one arm.
- SPEECH: Assess for abnormal speech, difficulty in speaking or understanding, or a loss of speech by inquiring with the person or their companions about any changes in their speech.
- TIME: Recognize the importance of time by determining the duration of symptoms—when they began or when the individual was last seen without symptoms by others. Promptly provide help to the patient.

When the patient has fascial numbness, arm numbness and speech difficulties then for conformation of possibility of stroke, then blood glyucose measurement should be done (International ..., 2020). Stroke could be ruled out if (Grose & Torbey, 2013).

- The patient has highly abnormal blood glyucose levels (below 2.8 or over 22.1 mmol/L);
- The patient has history of seizures or epilepsy.

Assist the stroke patient to take a comfortable and suitable position. This may be lying on back or sitting upright. (International Federation of Red Cross and Red Crescent Societies, 2020).

Stroke patients may be needed to evacuated immediately, but it depends on the condition of the patient (World Health Organization, 2007). Continuously monitor the stroke patient and assess his breathing. Keep to talking to the patient and monitor his consciousness. (International Federation of Red Cross and Red Crescent Societies, 2020). If the patient loses consciousness, then he should be evacuated (World Health Organization, 2007).

Monitor the pulse rate and blood pressure of the patient. Usually blood pressure is elevated after stroke. If the systolic pressure is higher than 170 mmHg or lower than 120mmHg then it indicates poor outcome of stroke and in that case, evacuation should be considered. Very high blood pressure for young patients refers to cerebral haemorrhage, which calls for evacuation and hospitalization. (World Health Organization, 2007).

If the pulse rate is rapid and irregular then stroke may have caused embolism, in which case patient has to be evacuated (World Health Organization, 2007).

After the stroke the patient should lie flat for first 24 hours or until evacuated, then he will be allowed to sit up. If the patient is unconscious he should be put into recovery position and turning the patient after each two hours is recommended for avoiding bed sores. (World Health Organization, 2007).

Give the patient a sip of water to drink. If the patient is unable to drink then oral feeding and fluid intake is not possible for the patient. (World Health Organization, 2007).

The patient with swallowing difficulties should be inserted an intravenous cannula and given normal saline (0.9% sodium chloride), one litre every eight hours. (World Health Organization, 2007).

If the patient is able to swallow normally, then encourage him to drink 3 liters per day, but only clear fluids (World Health Organization, 2007).

If the patient cannot be evacuated in 24 hours, and is able to swallow and is not known to have an active peptic ulcer or has no major trauma or surgery in past two weeks, then the patient should be given every evening two tablets of docusate with senna and orally daily 150 mg acetylsalicylic acid (aspirin). (World Health Organization, 2007).

7 Gastrointestinal disorders

Abdominal pain may be caused by many conditions and these conditions are not always related to the disorders in abdominal area. In case abdominal pain it is the most important to find out if the patient has a severe condition, which calls for evacuation. The following symptoms refer to serious conditions. (World Health Organization, 2007):

- Persistent intense pain;
- Tenderness and muscle spasms in the abdomen, either localized or generalized;
- Lack of bowel sounds;
- No bowel movement or passing of gas (flatulence) for 24 hours;
- Profuse vomiting;
- Dark or blood-tinged stools and/or the passing of pure blood;

- Dark or blood-tinged urine;
- Symptoms of shock: dizziness upon standing, rapid pulse, low blood pressure, clammy skin, decreased urine output;
- Yellowing of the skin around the eyes and the whites of the eyes;
- A patient appearing visibly unwell or highly anxious.

In case of these symptoms, telemedicine consultation is needed and the patient evacuation has to be considered (World Health Organization, 2007).

The patients with these severe symptoms should stay in bed. Insert an intravenous cannula and give administered 0.9% sodium chloride solution, one litre every six hours. If intravenous cannula cannot be inserted, then the patient should be given only water or rehydration solution. (World Health Organization, 2007).

If the patient is vomiting or has diarrhea, then double the administration of sodium chloride solution to compensate fluid loss (World Health Organization, 2007).

If the patient's urine is scanty and concentrated and patient is thirsty then the amount of sodium chloride should also be increased up to two litres every six hours, until the urine is plentiful and pale (World Health Organization, 2007).

Intramuscular morphine 10-15 mg every three to four hours may be given to the patient with severe abdominal pain to relieve the pain (World Health Organization, 2007).

If the patient with abdominal pain does not have the severe symptoms, the patient should stay in bed and have a light low-fat diet and drink plenty of liquids. In cases of upper abdominal pain, administer omeprazole orally at a dosage of 20 mg twice daily. If the pain is characterized by colicky discomfort and hard feces are palpable in the rectum, provide a laxative. The main strategy is to wait and see. If the condition of the patient does not improve in 24 hours, then telemedicine consultation is needed. (World Health Organization, 2007).

People may get foodborne illnesses onboard. These conditions may cause vomiting with little or no diarrhoea, watery diarrhoea with little or no vomiting, and blood-stained diarrhea (World Health Organization, 2007).

In case of vomiting with little or no diarrhea it is likely that the condition will improve in few hours. Give the patient large quantities of clear fluids to drink. (World Health Organization, 2007).

In case of watery diarrhoea with little or no vomiting or blood-stained diarrhea the patient should be given orally 500 mg ciprofloxacin twice a day for free days. Ciprofloxacin should not be given to pregnant women. If a crewmember has diarrhoea and it is important for him to return to duty then he should be additionally given initially 4 mg of loperamide and the 2 mg of loperamide after each diarrhoeal motion, while not exceeding 8 mg daily dose. Loperamide should not be given without ciprofloxacin. (World Health Organization, 2007).

8 Fractures, sprains and stains

While sprains and stays are minor injuries, a fracture could be a severe injury. Untreated fractures may lead to disability and fractures to long bones can sometimes cause life-threatening bleeding. Therefore, any injury to extremality should initially considered as fracture and treated with caution. It has to be taken into account that without X-ray it is not possible to adequately diagnose of fracture. (International Federation of Red Cross and Red Crescent Societies, 2020).

The movement of an injured limb must be minimized. Stabilize the injured limb in the position it was found. Immobilization may offer comfort and support and reduce pain. Keeping the injured limb elevated may reduce swelling. (International Federation of Red Cross and Red Crescent Societies, 2020). Patient should not engage in activities, which cause pain (World Health Organization, 2007).

Evaluate all fractures for signs of internal and external bleeding, especially if the fracture involves long bones like the femur. In case of external bleeding, stopping the bleeding is a priority. (International Federation of Red Cross and Red Crescent Societies, 2020). After stopping bleeding, cover the wound with a clean dry dressing and it should be monitored for signs of infection (World Health Organization, 2007).

If a fractured limb is apparently cool and pale, then it may be attempted to be straightened. Straightening of a fractured limb should be done by a person, who has knowledge to do so.

(International Federation of Red Cross and Red Crescent Societies, 2020). Angulated long bone fractures should not be straightened by first aid providers (Perkins et al., 2021).

For sprained joints and soft-tissue injuries apply ice or cooling for up to 20 minutes consecutively as it may alleviate pain and aid in recovery. Cooling is efficient if it is done shortly after the injury. Prolonged cooling for more than 20 minutes may risk skin damage. (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient has cramps, then do not apply cooling. If compression dressing provides comfort, it may be applied to a strain or sprain. (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient needs to be transported, then the injured limb should be protected by splinting (Perkins et al., 2021). Splinting will limit pain and reduce the chance of further injury during patient transportation (International Federation of Red Cross and Red Crescent Societies, 2020).

If a fracture is suspected then the patient may be given tramadol orally 50-100 mg three times a day, or morphine orally 10-20mg every three to four hours for pain management (World Health Organization, 2007).

In severe cases of fractures patient evacuation may be considered. If there is abnormal sensation in the injured limb or weak or absent pulse or when skin is pale in the injured limb, then patient should be urgently evacuated. In case of suspected fracture to pelvis, hip or femur, the evacuation should be considered. (World Health Organization, 2007).

9 Seasickness

Seasickness is a motion sickness that may occur, when brain's estimation of motion is different from actually experienced sickness. First aid is often not effective for seasickness and the condition will pass on its own. Seasickness can often more easily be prevented than relieved. (International Federation of Red Cross and Red Crescent Societies, 2020).

Advise the patient to breathe in a calm and controlled manner. The patient should find some activity and which distracts them from seasickness symptoms. Looking into the distance or listening to music may also relieve seasickness. (International Federation of Red Cross and Red Crescent Societies, 2020).

Antihistamines could be given to a patient, who has seasickness. They tend to be efficient only on some persons, so if the patient knows that antihistamines have not helped for seasickness in the past, then they should not be given. (International Federation of Red Cross and Red Crescent Societies, 2020).

If a person has had seasickness then you could provide advice for preventing seasickness in future. It is recommended to eat light meal before the journey. Eating ginger biscuits or drinking ginger tea or taking mint or peppermint before and during travel may also help. The travelers should also be encouraged to take fresh air and look into distance. (International Federation of Red Cross and Red Crescent Societies, 2020).

Scopolamine and ondansetron are medications, which may help to prevent seasickness. Scopolamine transdermal patches are applied to the skin behind the ear. Scopolamine causes sedation and thus it could only be recommended to passengers. Ondansetron is a non-sedating medicine, but it only helps to prevent nausea and vomiting and not other symptoms of seasickness such as dizziness and loss of appetite. Ondansetron should be given 8 mg every 12 hours, orally. (World Health Organization, 2007).

10 Common cold / upper respiratory infections

Common cold is related to respiratory infections, which have typical symptoms such as sore throat, blocky or runny nose, cough and patient feeling unwell. In case of common cold, cough starts usually three or four days after the onset of other symptoms. If cough starts earlier then it may refer to influenza or asthma. (World Health Organization, 2007).

Common cold will heal on its own, but treatment may relieve the symptoms (World Health Organization, 2007). Encourage the patient with common cold to drink water in small amounts (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient has blocked nose then nasal drops containing vasoconstrictors such as oxymetazoline or similar medication should be administered (World Health Organization, 2007).

In case of sore throat, medication should be given to relieve pain. The patient may be given paracetamol, medicated lozenges or mouth sprays. If paracetamol is not relieving pain, ibuprofen should be administered. Drinking hot drinks could also be advised for relieving

pain. Antibiotics should only be prescribed by a doctor. (International Federation of Red Cross and Red Crescent Societies, 2020).

In order to prevent the spread of infection, encourage the patient to wash their hands frequently. Advise other person to wash their hands after coming into contact with the patient or objects touched by the patient. (World Health Organization, 2007).

11 Fever

Fever is a condition in which the body temperature of a person rises above 38°C. It is a typical and natural response to infections and in most cases, fever is not harmful. A fever exceeding 39°C could be harmful and may suggest the presence of a serious infection. Fever could be more dangerous to children, persons aged 65 and above, persons with cancer or weakened immune system. Fever lasting more than three days will also refer to a serious condition. (International Federation of Red Cross and Red Crescent Societies, 2020).

Advise the patient to rest and dress lightly. Offer the patients plenty of fluids to drink. (International Federation of Red Cross and Red Crescent Societies, 2020).

If the patient feels unwell then paracetamol or acetaminophen may be used for controlling the fever (International Federation of Red Cross and Red Crescent Societies, 2020).

Applying lukewarm water with the sponge to a person with a fever may help reduce temperature faster, provided it does not cause discomfort or induce shivering. Cold water should be avoided, as it can lead to constriction of blood vessels, hindering heat dissipation, or prompting shivering, which generates additional heat. (International Federation of Red Cross and Red Crescent Societies, 2020).

Assess the potential causes of fever and ask the person to monitor his condition. If the patient has change in mental status, difficulties in breathing, severe abdominal pain or sensitivity to light and vomiting then it refers to serious condition. (International Federation of Red Cross and Red Crescent Societies, 2020). Telemedicine consultation should be applied and evacuation considered.

12 Mental distress

Mental distress may be caused by traumatic or disturbing events. The causes of mental distress may be various and people's psychological reactions to these events may be different. Mental distress may be experienced immediately after a shocking event, but mental stress may be persistent and endure for long periods. (International Federation of Red Cross and Red Crescent Societies, 2020).

Provide support to the patient in mental distress. Listen to the patient actively and show empathy. Allow the patient to express their emotions openly. Accept patient's emotions without judgment, and respond to them with compassion, empathy, and understanding. It's crucial to remain composed and mindful of both verbal and non-verbal communication to effectively support the individual in distress. (International Federation of Red Cross and Red Crescent Societies, 2020).

Allow the person to react in their own way and time is beneficial. If the person expresses his emotions by crying or shouting, it's not helpful to try to calm him down by telling them to "stop" or "calm down." Instead, it's more effective to provide a calm, empathetic, and supportive presence, which can help him navigate through his strong emotions. (International Federation of Red Cross and Red Crescent Societies, 2020).

Express that you are there to provide help but at the same time it is important to respect patient's autonomy. If someone declines help, it should not be forced upon him. (International Federation of Red Cross and Red Crescent Societies, 2020).

Aim at empowering persons to make their own decisions. This is especially important when the person is disempowered or lacks control over a difficult situation. Assist the person in finding solutions to immediate needs and problems, affirming the person's capability to cope. Prioritizing needs and finding practical solutions is key. (International Federation of Red Cross and Red Crescent Societies, 2020).

The person in distress should be connected with family and friends, if possible. The person in distress should be asked who should be informed and called upon in the person's social network. (International Federation of Red Cross and Red Crescent Societies, 2020).

The person in mental distress should be connect to the people and institutions, who could provide further help to him. If need be, the patient should be referred to mental health professionals. (International Federation of Red Cross and Red Crescent Societies, 2020).

Appendix III First Aid training program

	Basic level	Advanced level
General principles	X	X
Assessment of patient	X	X
Opening airways	X	X
Recovery position	X	X
Cardiopulmonary resuscitation (basic life support)	X	X
Cardiopulmonary resuscitation (advanced life support)		X
Control of life-threatening bleeding	X	X
Patient with chest pain		X
Patient with stroke		X
Gastrointestinal disorders		X
Fractures, sprains and stains	X	X
Seasickness		X
Common cold / upper respiratory infections		X
Fever		X
Mental distress	X	X
Handling patient with suspected neck/back injuries	X	X
Self confidence and acting calmly	X	X