Healthcare Planning and Control on Cruise Ships as a Safety Factor

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Healthcare is vital to quality of life in any context, including on-board cruise ships, a key segment of nautical tourism. Cruises have grown in popularity as a leisure activity, leading to the hierarchical development of management within the cruise industry, from corporate levels to individual ships. Each ship operates a chain management system where the infirmary and pharmacy are central to ensuring passenger health and safety. This raises questions about the quality and capacity of healthcare services aboard, particularly the ship's ability to manage complex medical conditions and injuries, as well as its connection to onshore healthcare facilities. Ship infirmaries have inherent limitations in addressing all possible medical scenarios, emphasizing the need for efficient links with port-based healthcare services. Equally important are the capabilities of the infirmary during voyages when shore-based medical help is unavailable. To explore these issues, the research has included desk studies and sample-based statistical analysis. Findings reveal that on-board healthcare and pharmaceutical services meet high standards, supported by effective collaboration with ports and hospitals at destinations. This collaboration ensures passenger confidence, with the availability of healthcare services on-board having minimal impact on the decision to cruise. Surveys indicate high levels of satisfaction with infirmary and pharmacy services, along with efficient connectivity to shore-based facilities. However, disparities in healthcare quality across various global ports raise concerns about accessibility and adequacy of medical services in less developed regions. To address these challenges, cruise management employs a control-oriented system emphasising continuous monitoring and planning. This approach ensures consistent healthcare quality, sustaining passenger confidence and satisfaction during voyages. By integrating on-board systems with onshore resources, cruise liners maintain high service standards, despite the varying healthcare infrastructure in different regions.

KEYWORDS
~ Healthcare
~ Cruise ships
~ Infirmary
~ Nautical tourism
~ Passenger safety
~ Healthcare quality

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1. INTRODUCTION

1.1. Research subject

Tourism, as a significant sector of each nation's economy, tourism has become an activity that connects millions of tourists, workers, and various industries worldwide. There are numerous selective types of tourism based on the preferences and habits of tourists, yet seas and waters continue to attract those who wish to spend their vacations on or near the water, either actively or passively. Tourism that develops on the sea and waters is accessible to all social classes and tourists, meaning that the tourism offer has developed its services to suit “every budget". A good example of this broad offer in tourism is cruising, which has evolved in terms of different types of travel and stays on and by the sea. As a result, research on cruising, within nautical tourism, has significantly advanced, particularly concerning large global cruise ships, which are the subject of this research.

1.1.1. Large international cruise ships

Nautical tourism has developed into a prominent form of selective tourism, encompassing three main subtypes: nautical tourism ports, charter services, and cruising. Within this framework, cruising is characterised by both cruise ships and ports equipped to accommodate these vessels, which can be classified according to their significance and size. Considering Croatia, the country has quality destinations and ports for receiving large cruise ships, as well as domestic small cruisers, which are an important segment of cruising in Croatia.

Cruise ships				Ports		
Sea cruise ships			Freshwater cruise ships	Sea ports for receiving cruise ships		River ports for receiving cruise ships
Large sea cruise ships	Small foreign cruise ships	Small domestic Cruise ships	Large river cruise ships Small lake cruise ships	Certified sea ports for receiving large cruise ships	Non-certified sea ports (small sea cruise ships)	Certified ports for receiving large cruise ships Non-certified sea ports (small sea cruise ships)

Table 1. Classification of cruising (Source: Luković, T. & collaborators: "Nautical tourism in Croatia", Redak ltd Split, May 2024)

Cruising, observed in a broader sense, has developed with the support of focused research and education from esteemed higher education institutions operating in many countries, which are engaged by cruising corporations. Of particular significance are large sea cruise ships, joined by large river cruise ships, whose organisation and operations are worth of research and analysis.

On a global scale, approximately 323 large sea cruise ships (Photoaid, 2024) and 599 river cruise ships (Statista, 2024) sail the world's waters, with around 36 million passengers traveling worldwide in 2023. The revenue generated by large sea cruise ships is substantial, and its growth has been continuous, with the exception of 2020, which significantly affected and berthed all cruise ships in ports. However, the cruise industry is recovering, and it is expected that the global cruise market will grow by 9.29% from 2023 to 2027, reaching a revenue of USD 35.87 billion (Photoaid, 2024) in 2027.

The difference between sea and river cruise ships, in terms of capacity, is significant: larger river cruise ships accommodate around 150 guests/bunks, while sea cruise ships have an average of around 3,000 bunks. In 2023, the average occupancy rate of sea cruise ships was 701,490 passengers per cruise ship (Photoaid, 2024) The organisation of large sea cruise ships operates through four associations/corporations, ranked by the number of overnight stays on cruise ships as follows: (1) Carnival Corporation & PLC, (2) Royal Caribbean Cruises, (3) Norwegian Cruise Line, and (4) MSC Cruises. As Dowling points out, the two most prominent regions in the cruise industry are the Caribbean, with approximately 33% of the global cruise market, and the Mediterranean, with about 18%.(Dowling & Weeden, 2017)

The organisation and management of large sea cruise ships have reached a peak of development, as reflected in the decisions made by the management of the four aforementioned corporations. There is almost no competition among them, ensuring continuous growth for all, while skilful business practices help them avoid tax burdens, allowing fleet renewal and development to take priority.(Asič et al., 2015). Within the offerings of large global cruise ships, as well as smaller-capacity cruise ships, certain essential travel requirements must be met, in terms of both legislation and quality of services.

This also applies to high-capacity cruise ships, which represent a form of mass tourism. Therefore, regardless of the size and cost of the trip, some services are indispensable, such as healthcare for passengers during the journey. All these factors have led to extensive research on healthcare services on cruise ships by individual researchers and institutions alike.

In line with the operational organisation of a large cruise ships, the ship is organised as a single unit resembling a small city. According to the size, these are large ships; for example, weighing 248,663 gross tons and measuring 365 meters (1,196.7 feet) in length, *Icon of the Seas* is the largest cruise ship in the world. Christened on January 23, 2024, *Icon* has a maximum capacity of 7,600 passengers and 2,350 crewmembers across 20 decks.(Ship Technology, 2024). Thus, in terms of capacity, it is comparable to a medium-sized city, at least by Croatian standards. It can be concluded that a cruise ship must provide services to passengers that meet all their needs and ensure their well-being, including healthcare, as if they were in their own city. This raises a research question regarding the provision of healthcare at sea through two systems: medical and pharmaceutical.

1.1.2. Healthcare on cruise ships

Considering the subject of this research, the focus is on healthcare, specifically the operation of the ship's infirmary and pharmacy on the cruise ship. In this context, it is important to highlight that the infirmary and pharmacy must primarily focus on common illnesses encountered on the ships.

Figure 1. Medical infirmary on cruise ships (Source: Golden, Fran: "Do cruise ships have doctors, nurses, medical centres or hospitals?'' 2023, www.thepointsguy.com/cruise/cruise-ships-medical-centers (24. 10. 2024))

As research shows, healthcare on cruise ships is well organised, and thanks to research and experience, the most common illnesses and injuries are known. Based on studies and experience, the medical staff on a cruise ships typically handles issues such as sprained ankles, stomach ailments, and passengers who have forgotten to pack their medications. A long-term analysis of passengers' health issues on the cruise ships has led to a list of the most common illnesses and injuries (Kherkher, 2023):

- Slips and falls
- Food poisoning
- Legionnaires' disease
- Recreational accidents
- Gastrointestinal infections
- Infectious diseases
- Norovirus
- Respiratory tract infections
- Pool accidents
- Violent crimes
- Bedbug bites

- Drowning
- Injuries from falling objects
- Fires
- Head injuries
- Pre-existing conditions of the passenger
- Toxic chemical injuries

The list of common illnesses among passengers on a cruise ships is extensive, but all of them are treated in the ship's infirmary, except for the most severe cases that require hospital care and emergency treatment. For this purpose, the cruise ships, or the ship's infirmary, must maintain contact with hospitals on shore, and transportation is generally carried out by helicopter.

Changes in the scope of healthcare occur almost daily, but the pandemic has led many cruise companies to expand their medical facilities on board and introduce new requirements for medical personnel following COVID-19. For example, Royal Caribbean now requires all of its doctors to be trained in acute respiratory diseases and has added an infection control officer who supervises the infection control plan during the voyage on each cruise ship (Golden, 2023). According to the research conducted by Tardivel, White, Treffiletti, and Freeland, medical centres on cruise ships handle approximately 10% of severe emergencies that require immediate care. Around 95% of cases are managed on board; however, the remaining cases necessitate evacuation and consultations on land due to dental, medical, or surgical issues (Tardivel et al., 2024).

The most attractive cruising regions for large cruise ships are Central America and Europe, specifically the Mediterranean. Therefore, in terms of passenger protection and their health safety, as well as the development of the industry, the American College of Emergency Physicians, in collaboration with the Cruise Lines International Association, has established strict standards for patient care, as well as guidelines for medical facilities on ships operating from the United States. This also means that all medical personnel are certified and experienced, as per ACEP standards, where doctors are required to have at least three years of post-graduate/post-registration experience in general and emergency medicine, or to be certified in emergency medicine, family medicine, or internal medicine (Golden, 2023). Certainly, medical personnel vary depending on the size of the ship, but not in terms of service quality, rather in relation to the number of passengers on the cruise ship. For example, the largest cruise ships may have two doctors and five or six nurses. What is particularly important is the requirement that doctors and nurses report to the Chief Medical Officer on board, who is available 24 hours a day for emergencies (Golden, 2023). All of the above is based on the organisation of operations on the cruise ship, and to ensure that everything runs smoothly; that the system of controlling and control planning is responsible and reliable.

1.1.3. Control and planning of healthcare on cruise ships

The management of the largest global cruise ships, viewed from top leadership downwards, begins with the management of the four largest corporations within which the cruise ships are distributed. The fundamental principles, particularly those involving the controlling of operations to minimise tax liabilities to zero while fostering growth, fall within the scope of corporate management. Additionally, compliance with legislation related to the operation of cruise ships is within the scope of corporate management, as well as addressing and securing all other needs that the corporation solves for its ships to ensure smooth operation. The foundation for corporate management decisions is provided by research and insights from numerous specialised research centres and higher education institutions, such as the University of Southampton in the UK and Hochschule Bremerhaven in Germany, as well as many others.

Especially after the COVID-19 pandemic, which caused cruise ships to remain berthed for an extended period in 2020, predictive analysis has become of particular importance. This analysis is being developed in controlling through the processing of information, e-technology, and artificial intelligence (Lebefromm, 2021). Based on the provided information as a foundation, decision-making occurs at the corporate level, which is then operationally transferred to the cruise ship's management. As mentioned earlier, the life and work on a cruise ship are carried out by several thousand crewmembers who are interconnected through controlling, meaning that each employee knows exactly what tasks to perform at any given time. This also applies to the healthcare personnel responsible for passenger care on the cruise ship. In terms of organisation and functioning of the healthcare staff, the working hours of the infirmary and pharmacy are clearly defined. In terms of supervision and control planning, medical staff are on duty 24 hours a day, although most passengers visit during scheduled times. For example, the healthcare facilities on Carnival Cruise Line ships are open on embarkation days from 8 to 9 AM and from 3 to 5 PM; during sailing days from 9 to 12 AM and from 3 to 6 PM; and during port stays from 8 to 10 AM and from 4 to 6 PM (Golden, 2023).

It can be concluded that corporations, as well as cruise ships, organise healthcare through effective control planning, which means they carefully tailor their services to the type of voyage. Specifically, cruise ships are generally categorised based on the type of voyage, and consequently, the type of guests. For example, cruise ships with a focus on

entertainment may offer services in the infirmary such as thrombolytic therapy (for breaking down blood clots) and pulse oximetry (for testing oxygen levels) (Golden, 2023). Considering the higher potential for injuries, wheelchairs and stretchers are provided. At the same time, the pharmacy stocks include motion sickness tablets, aspirin, and other over-the-counter products, antibiotics, as well as a limited supply of prescription medications. The responsibilities assumed by the pharmacy on the cruise ship include managing the stock of emergency medications, such as those required for advanced cardiac life support (Golden, 2023). Thereby, control planning plays a significant role in the operations and functioning of cruise corporations as well as the cruisers themselves.

1.2. Lack of research, aim, objectives, and research hypothesis

As mentioned above, the research area is broad and covers over 300 large cruise ships distributed among four cruise corporations, and thus four corporate management systems that monitor the development of management and services on each cruise ship. Therefore, it can be concluded that there are certain differences in the healthcare system between the corporations as well as the cruise ships. Additionally, it is possible to hypothesise differences in the development of healthcare based on the size of the ship, and particularly the duration of the voyage. Nevertheless, despite these factors, it is expected that a well-developed system exists that ultimately satisfying the needs of passengers on the cruise ship.

A significant limitation of the research lies in the fact that Croatia does not have its own large cruise ships, but it does have cities and ports that can accommodate such ships, which, with their beauty and history, are attractive to cruise passengers, such as Dubrovnik, Split, and Zadar, among others. Therefore, direct contact with cruise passengers for this research, which is conducted in Croatia and in the Croatian language, is not possible during the off-season. As a substitute for a larger sample of cruise passengers, the research has taken into account the opinions and attitudes of potential passengers, namely individuals who have a strong desire to travel or work on a cruise ship at some point. The sample of cruise passengers involved in this research is small, but it is still indicative.

A specific form of limitation in this research may arise from the level of healthcare development at the destinations where cruise ships enter. In cases where more significant healthcare services are required, the cruise ship must rely on a higher level of healthcare service, which, logically, is expected from the medical facilities at the destination. The equipment and capabilities of healthcare institutions along the Croatian Adriatic coast are not uniform, which raises concerns about the quality and complexity of the services. Therefore, a limitation of the research related to the possible lack of knowledge of healthcare services at each destination where the cruise ship docks is present and must be considered.

Despite the limitations of the research, the aim of the study is focused on evaluating the level of safety and the quality of healthcare services for passengers on the cruise ships during their voyage. The objectives are set to segment the research into two main areas of healthcare on the cruise ship: ship's infirmary medical services for injuries and illnesses during the voyage, as well as the services provided by the ship's pharmacy. It should be noted that the infirmary and the pharmacy represent a unified system within the healthcare services aboard the cruise ship. Therefore, an analysis will be conducted based on the fundamental areas of understanding in order to contribute towards the knowledge of the issues and the quality of healthcare services provided on the cruise ship.

2. METODOLOGY AND SAMPLE

In accordance with the subject of the research and its characteristics, as well as the aim of the study, an appropriate methodology has been established. The research conducted, in addition to traditional methods of analysis and synthesis, partially relies on the desk research method. However, the majority of the research is focused on surveys in order to obtain significant insights. The desk research method has been used for processing scientific and professional knowledge related to the operations on the cruise ship, the functioning of the infirmary and pharmacy on the cruise ship, as well as the related legislation. The surveys, which form the main segment of the research, are directed towards three ways to achieve the goal and confirm the hypothesis.

a) The first questionnaire involves a group of potential cruise passengers who wish to travel or work on a cruise ship. This group also includes a smaller subgroup of students who had previously travelled on a cruise ship.
b) The second questionnaire has been conducted with a small group of experts who are knowledgeable about the functioning of the infirmary on the cruise ship, as well as the broader healthcare system related to it.
c) The third questionnaire includes a small group of experts familiar with the pharmacy system, specifically focusing on the operations of the pharmacy aboard the cruise ship.

The aforementioned three questionnaire were conducted in 2024, after the end of the season for major world cruise ships, at least as far as the Croatian coastline and cities visited by cruise ships are concerned. The sample surveyed regarding potential cruise passengers included 55 respondents, of whom 45 were students who had not travelled on a cruise ship but were interested in cruising, either as passengers or as crewmembers. Within this group of 55 respondents, 10

students had either travelled on or worked aboard a cruise ship and therefore had experiential perceptions of the healthcare services. The questionnaire was conducted with a sample of 55 students of both genders.

2.1. Designing the research

Given that the research consists of three questionnaires and two groups of respondents, experts and potential cruise passengers, particular attention is given to sample selection. The group of potential passengers consists of potential passengers (45) and passengers who have already travelled on a cruise ship (10), either as passengers or as part of the crew during internships.

Thus, the first group of respondents includes potential cruise passengers and passengers who have already travelled, having used the services of the on board infirmary and pharmacy, and therefore have opinions about these services. In this context, and considering that the ratio of passengers to crew on large cruise ships is approximately 1:3 in favour of passengers, it is important to take the crew into account nearly as much as the passengers in this research. This is why students from the Faculty of Maritime Studies in Split, Nautical Studies, were considered suitable for surveying. These students are being trained to work on ships, including on cruise ships. They are future users of shipboard medical services, whether as crewmembers or passengers. Furthermore, some of these students will work on large international cruise ships after their studies and will make decisions regarding healthcare similar to those made by passengers. To ensure high representativeness, fifth-year students were chosen, as they are closest to entering work on ships and cruise ships.

The second group of respondents, who answer questions through two separate questionnaires, one focused on the infirmary and the other on pharmacies, consists of experts who are familiar with the system or have worked in healthcare on cruise ships. In this way, a high level of applicability of the research results to practice and operations on cruise ships is achieved.

2.2. Procedure

The research procedure has been conducted in phases. The first phase, related to the research and methodology, focuses on the design of the appropriate questionnaire. The second phase is focused on the selection of a representative sample, while the third phase involves the implementation of the sample.

The research was conducted in November 2024, coinciding with the end of the cruising season when large cruise ships enter Croatian ports and destinations along the Adriatic. This period also marks the peak of educational activity at the Faculty of Maritime Studies in Split, Nautical Studies, which is particularly relevant for this research. As has been mentioned before, the questionnaire respondents regarding cruise travel are fifth-year students, meaning they are closely connected to working on board and the healthcare services they will use during their voyages.

3. RESULTS

The research related to healthcare services on cruise ships is based on three types of questionnaires that covers two groups of respondents. The results of the questionnaires highlight issues in each segment of the research. The first part of the study, the first questionnaire, is directed towards potential cruise passengers or crewmembers, which connects them to the broader issues of the healthcare system as covered in the research.

	Questions	YES	NO	%yes	%no
1	Have you ever travelled on a cruise?	10	45	18,2	81,8
2	Do you have any serious health issues?	2	53	3,6	96,4
3	When deciding to travel, do you seriously consider the cruise ship's medical facilities?	15	40	27,3	72,7
4	Does your decision to travel on a cruise ship predominantly depend on the quality of healthcare provided on the cruise ship?	5	50	9,1	90,9
5	Does your decision to travel on a cruise ship predominantly depend on the quality of healthcare provided at the destinations where the cruise ship stops?	13	42	21,8	78,2

Table 2. The overall results of the perception of fundamental information related to healthcare on cruise ships indicate several key insights (Source: The questionnaire was conducted by the authors at the Faculty of Maritime Studies in Split, 5th-year students of the Nautical Studies program, 2024/2025, autumn 2024)

As seen from the questionnaire results, 10 respondents have already travelled on a cruise ship. Of the total number of respondents, only 3.6% have serious health issues, but only 27.3% seriously consider the organisation of healthcare on the cruise ship. Here, it is important to link the high level of satisfaction with the perception of healthcare on the cruise ship with the low level of consideration of healthcare services when making the decision to travel. Additionally, a significant 78.2% of respondents do not consider the cruise ship's healthcare facilities when making the final decision to travel. However, 21.8%, although a relatively small percentage, should still be considered by the cruise ship management in the future. As mentioned, 10 respondents have travelled on a cruise ship, either as passengers or as part of the crew, so it is important to analyse their answers to the same questions.

	Questions	YES	NO	%yes	%no
1	Do you have any serious health problems?		10		100,0
2	When making a decision to travel, do you seriously consider the cruise ship's preparedness for healthcare needs?	2	8	20,0	80.0
3	Does your decision to travel on a cruise ship primarily depend on the quality of healthcare provided by the cruise ship?	1	9	10,0	90,0
4	Does your decision to travel on a cruise ship primarily depend on the quality of healthcare provided by the destinations where the cruise ship stops?	3	7	30,0	70,0
5	Are you satisfied with the quality and organisation of healthcare services available on the cruise ship, as found on the cruise ship website and travel information?	9	1	90,0	10,0

Table 3. Total results of the perception of key information by respondents who have travelled on a cruiser, related to healthcare on the cruiser. (Source: The questionnaire was conducted by the authors at the Faculty of Maritime Studies in Split, 5th-year students of the Nautical Studies programme, 2024/2025, autumn 2024

The questionnaire results from respondents who have travelled on a cruise ship show similar outcomes to those of potential passengers. However, it could be concluded that some results are more pronounced for certain questions, such as satisfaction with the organisation of healthcare on the cruise ship, with 90% of respondents expressing a positive opinion.

The second part of the research focuses on understanding the operation of the infirmary and pharmacy on the cruise ship.

	Questions	**YES**	**NO**
1	Does a passenger, upon boarding the cruise ship, have an obligation to bring a link to the doctor regarding his/her health condition? **ADDITIONAL EXPLANATION**: Passengers have optional insurance, but depending on the company, insurance may sometimes be mandatory for passengers over the age of 80.		**X**
2	Does the infirmary system have the technical ability to connect, as in point 1, with all countries from which passengers come?		**X**
3	If the answer is YES, what happens with passengers who do not have it. Do they have an obligation to bring a written valid document regarding their health condition and any illnesses they may have?		**X**
4	Does the cruise ship have valid agreements with all the cities on its route for the emergency reception of passengers from the ship?	**X**	
5	Does the cruise ship have a helicopter for transporting passengers to a hospital on shore? **ADDITIONAL EXPLANATION:** If necessary, the helicopter comes from the shore to the cruise ship to collect the sick passenger.		**X**
6	If e) is marked as NO, does the cruise ship have direct contact and an agreement for helicopter emergency transport in each city on its route? **ADDITIONAL EXPLANATION:** There are agreements between countries.	**X**	
7	Does the infirmary have all the medical records and comprehensive reports on the health status of the crew? **ADDITIONAL EXPLANATION:** The infirmary has medical records for all crew members	**X**	
8	Is the infirmary focused on common illnesses and injuries on the cruise ship?	**X**	

Table 4. Questionnaire on awareness of the operations and possibilities of the infirmary on a cruise ship (Source: group of experts)

As can be concluded from the above, the organisation and operation system of the infirmary on the cruise ship is structured. However, in the case of extraordinary health conditions that the onboard infirmary cannot handle, services on shore are used. In this segment, significant differences in the quality of healthcare can arise, and there is a very high quality legal protection system managed by the European Union (Europa.eu, 2024), as well as numerous specialised private companies (Brais Law, 2024).

The second part of the research involves examining the operations of the ship's pharmacy on the cruise ship.

	Questions	YES	NO
1	Does the passenger on the cruise ship, before departure, have an obligation to provide the pharmacy with a list of all medications? **ADDITIONAL EXPLANATION:** The passenger submits a list of his/her illnesses before travelling.		**X**
2	Does the passenger have an obligation to bring his/her own medications?		**X**
3	Has the pharmacy accepted the responsibility to ensure a sufficient quantity of medications for the crew and passengers?	**X**	
4	Does the pharmacy on the cruise ship have direct contact with medication suppliers in each country and port of arrival?		**X**
5	Does the pharmacy plan and monitor its supply of medications according to the duration of the cruise and the number of passengers, within the timelines for medication replenishment?	**X**	
6	Does the pharmacy have an independent monitoring system for its operations on the cruise ship? **ADDITIONAL EXPLANATION:** There is external inspection of the pharmacy's operations.		**X**
7	Does the pharmacy ensure the provision of medications for the crew?	**X**	

Table 5. Questionnaire on the system and operation of the ship's pharmacy on the cruise ship (Source: group of experts)

It can be concluded that the ship's pharmacy is efficient, as it accepts the responsibility of supplying all necessary medications, which, under the conditions of numerous illnesses and potential conditions of passengers on the cruise ship, represents a significant obligation. The same conclusion applies to the needs of the crew. Therefore, passengers and crew can fully rely on the ship's pharmacy, which is extremely important and deserves commendation.

4. PROPOSAL (MODEL)

The conducted research highlights two areas of healthcare for passengers on the cruise ship. On one hand, cruise corporations have developed a healthcare system for passengers that largely meets passengers' needs and positively affects their safety and decision to travel. In this system, the passenger submits all the necessary details of their health prior to the trip, which allows for the preparation of the infirmary and pharmacy on the cruise ship. The size of the cruise ship, i.e., the number of passengers, does not influence the health safety of passengers, as cruise ships ensure the number of healthcare team members in accordance with the number of passengers. However, on the other hand, around 5% of annual health incidents on cruise ships end up in healthcare centres on shore. Unfortunately, approximately 200 deaths occur each year, with 80% of these fatalities caused by cardiovascular events (Tardivel et al., 2024). These facts direct the efforts of the cruise ship management to address the issue, that is, to plan and monitor the healthcare process on the cruise ship during the voyage, and share it afterwards. In this process, the key factor is the communication between the passengers and the cruise ship management, which, in case of more issues that are serious relies on communication between the cruise ship and healthcare centres on shore.

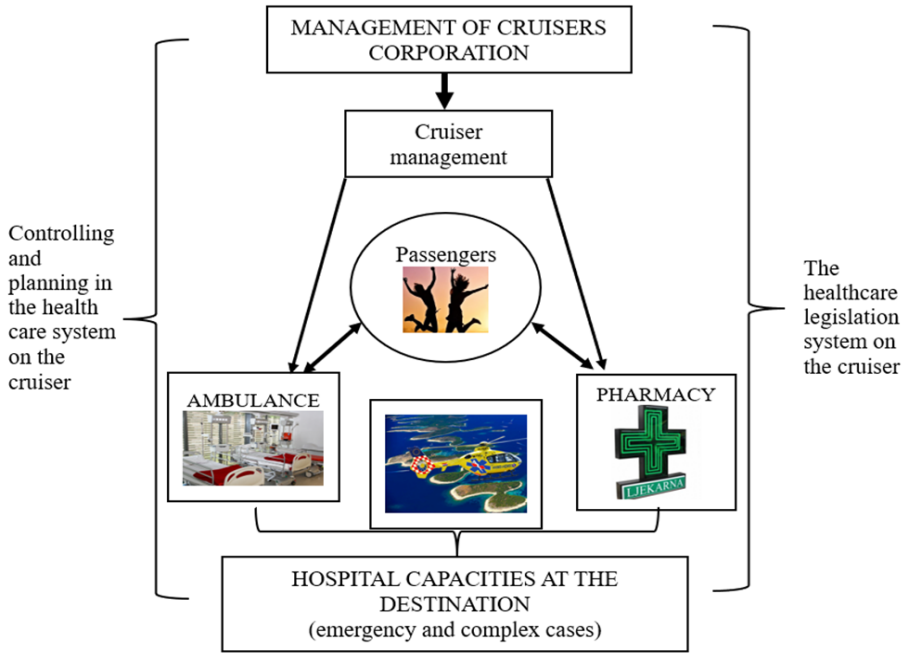

Figure 2. Model of operational healthcare system on a cruise ship (Source: made by authors)

As seen from the proposed model of the healthcare system for passengers on the cruise ship, what represents a limit in the entire care system is the 5% of cases (Tardivel et al., 2024) that the infirmary and pharmacy on the cruise ship cannot resolve. Although this represents only 5% of the cases, when considered in absolute numbers, it amounts to a large number of ill passengers who need urgent and quality healthcare on shore. This opens up a significant problem that the corporation's management must address strategically, and the cruise ship management must resolve operationally. Some destinations and healthcare centres on the coast are not able to provide the high-quality healthcare that is urgently needed, which presents a major challenge for the corporation and the cruise ship. Therefore, with proper planning and controlling aimed at specific passengers, for whom predictive analysis can assume that they will encounter health problems, the undesirable situation can be monitored and prevented. In this sense, the cruise ship is connected with the healthcare institution at the destination that can resolve the issue, which is then connected with the institution that is not capable of handling the care of the ill passenger. For all of this, control planning and constant monitoring are required, which become part of the passenger healthcare system on the cruise ship.

An example of good practice in control planning, as a segment of the passenger healthcare prevention and monitoring system on the cruiser, are the mandatory forms used for communication and awareness of the passengers' health status, as well as safety procedures during the voyage. For this purpose, three fundamental forms have been prepare (Tardivel et al., 2024) such as:

a) ‘’Framework 8-04 - Health Preparation for Cruising: Checklist for Healthcare Providers’’, which consists of three groups of questions:
    1. Health risk assessment and communication about travel risks,
    2. Vaccination and risk management,
    3. Medication supply based on risk and need.
b) Framework 8-05 - Healthy Cruise Preparation: Checklist for Passengers, which consisting of two groups of advice and instructions:
    1. Advice and preparations before the voyage,
    2. Advice, information, and instructions during the voyage.
c) After the voyage, passengers are directed to the latest health guidelines from the CDC (Centres for Disease Control and Prevention) related to COVID-19.

From the above, it can be concluded that the care for passenger healthcare on the cruise ship is of a high standard, and it does not end with the disembarkation of passengers after the voyage. Instead, it continues in the form of instructions and warnings about possible negative health reactions following the voyage (Founders Law, 2021). Thus, the problem remains with the services in the ports, at the destination, now requiring urgent medical care for a passenger with severe injuries. This segment of cooperation between the cruise ship and the healthcare institution at the destination is a crucial part of healthcare management, especially in terms of control planning and operations.

5. DISCUSSION

Cruising in Croatia operates through various forms of activity, with ports capable of receiving large cruise ships being particularly important due to the influx of a large number of passengers. The arrival of a cruise ship in a Croatian port signifies an increase in the number of tourists by several thousand daily, with the most prominent arrivals occurring in Dubrovnik, Split, and Zadar, as well as in numerous other certified Croatian ports for receiving large international cruise ships.

From the perspective of passengers, cruising represents a segment of life spent on board the ship, making it logical that during this time, healthcare services must be organised. The relative isolation of the cruise ship and its passengers at sea during the voyage necessitates the development of a comprehensive healthcare service provided by the ship's infirmary and pharmacy. As demonstrated by this study, the healthcare service and infirmary on cruise ship are well organised, as is the system connecting passengers and the cruise ship, as well as all other stakeholders involved in healthcare during the voyage. In terms of the completeness of healthcare services, the ship's infirmary can address approximately 95% of all medical issues that arise during the voyage. However, 5% of healthcare needs must be handled on shore. In this regard, the cruise ship maintains contractual agreements with healthcare facilities at each port of call and has provisions for the urgent transfer of ill passengers from the ship to land-based healthcare institutions.

This study confirms that a well-organised healthcare system aboard positively influences the decision to travel by cruise ship, particularly by alleviating concerns about insufficient care on board. However, challenges related to inadequate healthcare on shore, despite the contractual relationship between the cruise ship and land-based healthcare providers, are mitigated through special agreements and institutions that take responsibility for the passenger's care in the event of a medical emergency. In conclusion, the entire system of passenger healthcare on the cruise ship is well organised, which indirectly contributes towards the continuous growth in the number of cruise passengers worldwide. Thus, control planning is deeply integrated into the management system, both at the corporate level and on board. This means that controlling anticipates events, adapts the entire healthcare system to changes and conditions aboard and around the ship, and carries out the planning accordingly. In this context, controlling is a dominant component of management that would be ineffective without it. The absence of controlling and the failure to predict emerging risks, particularly significant strategic risks, can lead the entire cruise industry into severe problems, as exemplified by the global impact of COVID-19, from which the large cruise industry is still recovering (McCormick, 2021).

6. CONCLUSION

The findings of this study highlight a strong commitment to passenger healthcare on cruise ships, which positively influences both the perceptions of potential passengers and the satisfaction of those who have already travelled. Healthcare services provided through the ship's infirmary and pharmacy are highly demanding; however, passenger feedback and the impressions of potential travellers, often shaped by media portrayals, consistently reflect their exceptional quality. This is a crucial factor in ensuring that concerns and fears regarding healthcare on a cruise ship, which has been transformed into a floating city, do not negatively influence the decision to travel. Nevertheless, cruise operators and their corporations must maintain the quality of healthcare services to ensure that the positive perception is sustained in the long term. The importance of healthcare during the voyage became particularly evident in 2020 when the COVID-19 pandemic caused all cruise ships to remain berthed in ports worldwide, putting the entire cruise industry in an unprecedentedly difficult situation. However, the following years, along with capable corporate management, helped bring the cruise ships back to the market and to new voyages. The impact of this crisis was so profound that it was not until 2023 that the cruise industry returned to pre-COVID-19 levels. This highlights that controlling is especially important in cruise ship management, particularly its predictive analysis, which is used to anticipate potential crises. In this regard, planning is established in line with the objective state of the market and predictions of future changes, leading to control planning. Without it, healthcare services aboard cruise ships would be ineffective and highly risky.

CONFLICT OF INTEREST

Authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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