The 23nd IAMUC
samk
Helsinki, 19-20 Oct 2023

Proceedings of the
International Association of Maritime Universities Conference

Introducing Maritime Educational Standard for Mitigation of Infectious Diseases Spread on Large Passenger Ships

Goran Vukelić [1,*], Goran Vizentin [1] and Jörn Klein [2]

[1] *University of Rijeka, Faculty of Maritime Studies, Croatia*
[2] *University of South-Eastern Norway, Faculty of Health and Social Sciences & Faculty of Technology, Natural Sciences and Maritime Sciences, Norway*
[*] *Corresponding author: goran.vukelic@pfri.uniri.hr; Tel.:* +385-51-338-411.

Abstract: Infectious diseases on large passenger ships can easily be spread if effective measures for detection and control are not in place. The COVID-19 pandemic revealed the inability of existing policies and protocols of large passenger ships to effectively detect and respond to emerging diseases other than gastrointestinal illness. An integrated approach addressing prevention, mitigation and management (PMM) of infectious diseases is, therefore, essential. One segment in that approach is developing education programs addressing these PMM tasks and aimed at future seafarers, i.e. students of maritime universities. However, to be able to develop such programs, a common educational standard is needed first. This paper presents an effort to introduce educational standard for mitigation of infectious diseases spread on large passenger ships. To establish such standard, a literature review was performed on large passenger ship epidemiology along with an assessment of current medical educational standard for future seafarers. Gaps are detected and, based on this, mandatory knowledge and skills identified with a clear list of learning goals and outcomes.

Keywords: large passenger ships; cruise industry; infectious diseases; educational standard

1. Introduction

The Covid-19 pandemic has had a significant and unprecedented impact on the global cruising industry. Industry has suffered huge financial losses due to the suspension of operations, cancellations of sailings, and the need for refunds (Schabbing 2022). Cruise lines have also faced numerous challenges, including outbreaks onboard ships, changing regulations, and reduced demand for travel. Several high-profile outbreaks on cruise ships resulted in the quarantine of passengers and crew and negative media coverage, further damaging the industry's reputation (Willebrand et al. 2022; Chen et al. 2022). The need to implement new health and safety protocols, such as increased cleaning and disinfecting measures and social distancing, has also added to the costs for cruise lines. With the global easing of travel restrictions, cruise lines have gradually resumed operations. However, it is expected that the industry will take time to fully recover from the Covid-19 crisis (Pan et al. 2021).

According to scientific literature (Wu and Li 2022; Camarero Orive et al. 2022), there are certain measures that cruise industry can take to prevent, mitigate and manage (PMM) infectious diseases. Prevention measures include screening passengers and crew for symptoms of infectious diseases, implementing strict hygiene and cleaning protocols, providing hand sanitizer stations throughout the ship, and requiring vaccination for passengers and crew. Mitigation measures include early detection of infections through onboard testing, contact tracing, isolation of infected individuals, and providing medical care onboard or in port. Cruise lines should also have contingency plans to manage outbreaks, including protocols for disembarking and repatriating affected individuals and their close contacts. Management measures include regular communication with passengers and crew regarding the status of the outbreak, providing clear and accurate information on the measures being taken to manage the situation, and ensuring that all necessary resources are available for the medical staff to contain the outbreak (Sharples et al. 2022).

Cruise ship staff that is designated to conduct PMM measures on board, needs to be trained for such activities (Smith Johnson et al. 2022). Currently, seafarers adhere to The International Convention on Standards

of Training, Certification and Watchkeeping for Seafarers (STCW), which sets out mandatory minimum requirements for medical first aid and medical care on board ships, setting up standards of competence for seafarers designated to provide medical first aid on board ship and for seafarers designated to take charge of medical care on board ship (Chodnik et al. 2013). According to the STCW convention, seafarers designated to take charge of medical care on board ships must meet specific competency requirements in providing medical care to the sick and injured while they remain on board. As far as infectious diseases are concerned, they need to have a general understanding of them and knowledge of disease prevention that includes disinfection and vaccination requirements. Competences are assessed based on evidence obtained from practical instruction and demonstration and, where practicable, based on approved practical experience. The criteria for evaluating competence regarding infectious diseases is complete and effective protection against infection and spread of diseases. International Maritime Organization's (IMO) Medical Care Model Course 1.15 suggests that the general topic of diseases should be covered in 4 hours of lectures, with the topics of disease prevention and hygiene on board to be covered in one hour, respectively.

It has already been evidenced that the maritime education doesn't always reach the goals established by the IMO (Kalnina and Priednieks 2017). Given the complexity of the PMM measures set for infectious diseases, and the lessons learned from Covid-19 pandemic, it is clear that this type of education proves insufficient, especially regarding large passenger ships. This article tries to introduce maritime educational standards for mitigation of infectious diseases spread on large passenger ships, aimed at future seafarers, i.e. students of maritime universities. To establish such standard, a literature review was performed on large passenger ship epidemiology and the needs of key stakeholders in cruise industry (Zagan, S., Chitu, M.G., Manea 2014). Based on this, mandatory knowledge and skills are identified with a clear list of learning goals and outcomes.

2. Developing Educational Standard

Educational standard establishes the essential knowledge and abilities that learners ought to acquire at crucial stages throughout their education. It provides a framework for curriculum development, instruction, and assessment. Educational standard typically includes learning objectives, outcomes, guidelines for competencies of lecturer and expected workload of a student (Stainbank 2022). They serve as a guide for lecturers and curriculum developers in creating learning plans and assessing student progress. Standards can vary in terms of their level of specificity, with some providing general descriptions of learning outcomes and others providing detailed performance indicators that are closely aligned with specific curriculum materials and assessments.

The purpose of educational standards is to ensure that all students have access to education of balanced quality. Standards help to establish clear expectations for what students should know and be able to do. They provide a basis for evaluating the effectiveness of educational programs and services.

Many frameworks and models are available as a help in development of educational standards. The ADDIE model is a framework for instructional design (Saeidnia et al. 2022; Salinas-Navarro et al. 2022) that is commonly used in education and training, Fig. 1 a). ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation, which are the five key stages of the model:

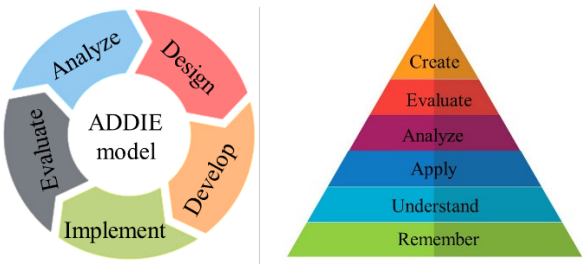
1. Analysis: This stage involves analyzing the needs and goals of students, as well as the constraints and opportunities of the learning environment.

2. Design: In this stage, instructional designers use the information gathered in the analysis stage to design a learning experience that meets the needs of students and achieves the desired learning outcomes. This stage includes developing learning objectives.

3. Development: In this stage, the actual learning materials are developed, such as lesson plans, activities, and multimedia resources. The materials are developed with the instructional design in mind and are typically reviewed and revised several times.

4. Implementation: This stage involves actually delivering the learning experience to students in various format (onsite, online, hybrid, etc.).

5. Evaluation: Here, the effectiveness of the learning experience is evaluated. This includes measuring the achievement of learning outcomes, evaluating the instructional design and delivery methods, and making any necessary revisions.



a) b)

Figure 1. a) Five stages of ADDIE model. b) Bloom's Taxonomy hierarchical model.

Bloom's Taxonomy is used as a most common framework for classifying learning outcomes (Gundić et al. 2020). It is divided into six levels, Fig. 1 b), each of which represents a different type of cognitive skill:

1. Remembering: This level involves recalling previously learned information or knowledge.
2. Understanding: Here, students demonstrate comprehension of the meaning of the acquired knowledge.
3. Applying: Using the knowledge and skills learned to solve problems or complete tasks.
4. Analyzing: Breaking down complex information and examining relationships.
5. Evaluating: Making judgments about the quality of information based on defined criteria.
6. Creating: Generating new ideas or products, or original solutions to problems.

United States' Centers for Disease Control and Prevention (CDC) has established Quality Training Standards (QTS) to ensure quality in developing an educational standard for public health professionals. QTS consist of eight elements that can be successfully transferred to education and training of maritime students:

1. Needs assessment: An assessment should be performed to conclude if the training is needed to close a certain gap among potential learners.
2. Learning objectives: SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) learning objectives should be set for the education or training.
3. Accurate and relevant content: Content should meet the needs of the learners and be based on the needs assessment.
4. Learner engagement: Learner should be engaged in interactive learning process.
5. Usability and accessibility: Materials should be designed for user-friendly experience, and the style and tone of lectures inclusive and clear.
6. Evaluation for improvement: A training evaluation plan should be developed, implemented and used for training improvement.
7. Learner assessment: Learner assessments should be constructed and feedback provided.
8. Follow-up support: Opportunities to learners for continued learning after the training should be provided.

3. Maritime Educational Standard for Mitigation of Infectious Diseases Spread

An educational standard should contain clear and measurable statements that describe the learning outcomes, objectives, competencies of the lecturer and expected workload. These four points are further discussed in this paragraph.

3.1. Learning objectives

Learning objectives are broad statements written from an instructor's perspective that give general content and direction of a learning experience. They describe what an instructor aims to do (Koh et al. 2021). As for the maritime educational standard for mitigation of infectious diseases spread, learning objective can be set as:

1. Students will be taught the basics of epidemiology and public health, with special emphasis on prevention, mitigation and management of infectious disease spread on large passenger ships.

3.2. Learning outcomes

To establish learning outcomes (Boulougouris et al. 2019), a literature review was performed on large passenger ship epidemiology with Web of Science base taken as a relevant source. Using the search string of "cruising/cruiseindustry/large passenger ships+covid", a total of 319 papers were detected, while using search string of "cruising/cruiseindustry/large passenger ships+infectious disease", a total of 240 papers were detected. Fig. 2 gives the distribution of four main journal categories for published papers.

a) b)

Figure 2. Overview of Web of Science distribution of four main journal categories for published papers with a topic of: a) Covid-19 outbreak on cruise ships, b) infectious diseases on cruise ships.

Based on the reviewed papers and following Bloom's taxonomy, learning outcomes that should be achieved through education of seafarers working on board large passenger ships:

1. Remember the signs and symptoms of infectious diseases and how they are transmitted (Pavli et al. 2016; Willebrand et al. 2022).
2. Apply the rules for personal hygiene (Dahl 2016; Mouchtouri et al. 2020).
3. Apply the rules for cleanliness of the ship (Zheng et al. 2016; Codreanu et al. 2021; van Beest et al. 2022).
4. Understand the necessity of food and water hygiene (Arvanitoyannis et al. 2010).
5. Apply the rules for physical distancing to reduce the risk of transmission of infectious diseases (Rosca et al. 2022).
6. Use personal protective equipment to reduce the risk of transmission of infectious diseases (Zheng et al. 2016; Mouchtouri et al. 2020).
7. Understand and apply health monitoring procedures (Codreanu et al. 2021).
8. Understand the reasons for vaccinations for infectious diseases (Mouchtouri et al. 2019).
9. Use appropriate communication procedures with infected passenger and with medical and port authorities (Li et al. 2021; Anagnostopoulos et al. 2022).

3.3. Lecturer's competencies

Lecturers in the field of prevention of infectious diseases should have a range of competencies to effectively teach students and develop their understanding of the subject matter. Some key competencies include:

1. Knowledge of transmission, prevention, and treatment of infectious diseases (Mouchtouri et al. 2020).
2. Strong teaching skills, including the ability to develop effective lesson plans, create engaging learning activities, and assess student learning (Gundić et al. 2020).
3. Effective communication skills to convey complex scientific concepts in a clear and understandable way (Sharples et al. 2022).
4. Working in maritime sector often requires collaboration with other professionals so lecturers should have the ability to work collaboratively with others (de Água et al. 2020).

5. Given the global nature of maritime industry and infectious diseases, respectively, lecturers should have cultural competency and be able to teach in a way that is sensitive to cultural differences and diverse perspectives (Horck 2010).

3.4. Workload

In total, IMO's Medical Care Course 1.15 should last for 45.5 hours. As mentioned, general topic of all kind of diseases should be covered in 4.5 hours of lectures, while the topics of all diseases prevention to be covered in another one hour, and environmental control on board ship in another hour. To assure quality of knowledge transfer (Rivadeneyra 2022), and understanding the level of knowledge needed, it can be estimated that each of the learning outcomes set in section 3.2 could be covered in one hour, respectively, making that 9 hours. This can complemented with 3 hours of practical work or demonstrations, summing that up to 12 hours in total, which is adequate to 2 day course according to timetables suggested by IMO's Course 1.15.

4. Discussion and Conclusion

There are several aspects that need to be considered before implementing the proposed educational standard. First one is that the development of an educational standard is followed by building an accompanying curriculum. Although related, educational standards and curriculum are two distinct concepts. Curriculum refers to the specific learning materials and activities that lecturers use to teach the content and skills outlined in the educational standards. Standards provide a framework for curriculum development, while curriculum provides the actual content that students receive. So, in order for this type of education to be implemented, and following good practice of maritime education and training, a curriculum must be provided first to institutions and persons conducting it.

Second question would be where to place this type of education, i.e. on which level of education of maritime students. It would serve for crew of large passenger ships, so it wouldn't be necessary for every student at maritime universities, only those planning their careers in cruising industry. It could serve as an elective course on MSc level, possibly in a broader frame of maritime occupational health. Also, it could be placed as a lifelong training program for maritime professionals wishing to expand their knowledge or make a career change.

To sum up, this educational standard serves as a roadmap for creating a competency-based curriculum, identifying instructional methods, establishing evaluation methods and ensuring continuous improvement of mitigation measures of infectious diseases spread on large passenger ships.

Acknowledgements

This work was supported by the European Union under "Healthy Sailing" project. This project has received funding from the European Union's Horizon Framework Programme under Grant Agreement number 101069764.

References

Anagnostopoulos L, Kourentis L, Papadakis A, Mouchtouri VA (2022) Re-Starting the Cruise Sector during the COVID-19 Pandemic in Greece: Assessing Effectiveness of Port Contingency Planning. Int J Environ Res Public Health 19:. https://doi.org/10.3390/IJERPH192013262

Arvanitoyannis IS, Hadjichristodoulou C, Tserkezou P, et al (2010) EU legislation on food and potable water safety which could be potentially applied on board ferries and cruise ships: A comparison with US legislation. Crit Rev Food Sci Nutr 50:533–566. https://doi.org/10.1080/10408390802437121

Boulougouris E, Mizythras P, Chrysinas L, et al (2019) Developing multidisciplinary blended learning courses for maritime education with cross-European collaboration. WMU J Marit Aff 18:319–340. https://doi.org/10.1007/S13437-019-00167-X

Camarero Orive A, González-Cancelas N, Avilés López N (2022) Port Strategy to Minimise COVID-19 Risk in Cruise Ports: Application to the Port of Arrecife in Lanzarote. J Mar Sci Eng 10:. https://doi.org/10.3390/JMSE10121990

Chen Y, Zhang Z, Wang T (2022) Dire Straits: How tourists on the Diamond Princess cruise endured the COVID-19 crisis. Tour Manag 91:. https://doi.org/10.1016/J.TOURMAN.2022.104503

Chodnik T, Jezewska M, Jaremin B, et al (2013) Polish system of education in maritime health care and medical assistance for seafarers. Int Marit Health 64:24–29

Codreanu TA, Pingault N, O'Loughlin E, et al (2021) The healthy crew, clean vessel, and set departure date triad: Successful control of outbreaks of COVID-19 on board four cargo vessels. Prehosp Disaster Med 36:611–620. https://doi.org/10.1017/S1049023X21000686

Dahl E (2016) Cruise tap versus handshake: using common sense to reduce hand contamination and germ transmission on cruise ships. Int Marit Health 67:181–184. https://doi.org/10.5603/IMH.2016.0034

de Água PMGB, da Silva Frias AD, de Jesus Carrasqueira M, Daniel JMM (2020) Future of maritime education and training: Blending hard and soft skills. Pomorstvo 34:345–353. https://doi.org/10.31217/P.34.2.15

Gundić A, Vujičić S, Maglić L, Ivanišević D (2020) Methods for demonstrating a competence and criteria for evaluating a competence in stcw convention. Pomorstvo 34:245–251. https://doi.org/10.31217/P.34.2.5

Horck J (2010) The gender perspective in maritime education and training. WMU J Marit Aff 9:93–119. https://doi.org/10.1007/BF03195168

Kalnina R, Priednieks V (2017) Proficiency improvement method in maritime education. WMU J Marit Aff 16:139–159. https://doi.org/10.1007/S13437-016-0112-X

Koh LY, Li K, Chia YY, Yuen KF (2021) Quality design for maritime studies programme in the digital era. Marit Policy Manag. https://doi.org/10.1080/03088839.2021.1983220

Li H, Meng S, Tong H (2021) How to control cruise ship disease risk? Inspiration from the research literature. Mar Policy 132:104652. https://doi.org/10.1016/J.MARPOL.2021.104652

Mouchtouri VA, Dirksen-Fischer M, Hadjichristodoulou C (2020) Health measures to travellers and cruise ships in response to COVID-19. J Travel Med 27:. https://doi.org/10.1093/JTM/TAAA043

Mouchtouri VA, Lewis HC, Hadjichristodoulou C, et al (2019) A systematic review for vaccine-preventable diseases on ships: Evidence for cross-border transmission and for pre-employment immunization need. Int J Environ Res Public Health 16:. https://doi.org/10.3390/IJERPH16152713

Pan T, Shu F, Kitterlin-Lynch M, Beckman E (2021) Perceptions of cruise travel during the COVID-19 pandemic: Market recovery strategies for cruise businesses in North America. Tour Manag 85:. https://doi.org/10.1016/J.TOURMAN.2020.104275

Pavli A, Maltezou HC, Papadakis A, et al (2016) Respiratory infections and gastrointestinal illness on a cruise ship: A three-year prospective study. Travel Med Infect Dis 14:389–397. https://doi.org/10.1016/J.TMAID.2016.05.019

Rivadeneyra JM (2022) ECTS, workload, and quality of higher education. Int Conf High Educ Adv 2022-June:307–314. https://doi.org/10.4995/HEAD22.2022.14231

Rosca EC, Heneghan C, Spencer EA, et al (2022) Transmission of SARS-CoV-2 Associated with Cruise Ship Travel: A Systematic Review. Trop Med Infect Dis 7:290. https://doi.org/10.3390/TROPICALMED7100290/S1

Saeidnia HR, Kozak M, Ausloos M, et al (2022) Development of a Mobile App for Self-Care Against COVID-19 Using the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) Model: Methodological Study. JMIR Form Res 6:. https://doi.org/10.2196/39718

Salinas-Navarro DE, Mejia-Argueta C, Montesinos L, Rodriguez-Calvo EZ (2022) Experiential Learning for Sustainability in Supply Chain Management Education. Sustain 14:. https://doi.org/10.3390/SU142013133

Schabbing B (2022) Die aktuelle Lage der Kreuzfahrtindustrie: Besondere Herausforderungen für Finanzmanagement, Strategie und Marketing. Zeitschrift für Tour 14:227–242. https://doi.org/10.1515/TW-2022-0002

Sharples L, Fletcher-Brown J, Sit K (Jason), Nieto-Garcia M (2022) Exploring crisis communications during a pandemic from a cruise marketing managers perspective: an application of construal level theory. Curr Issues Tour 1–16. https://doi.org/10.1080/13683500.2022.2109006

Smith Johnson EM, Mais Thompson EG, Immanuel Paul N (2022) Preparing the post-pandemic workforce for the cruise and hospitality industry. Worldw Hosp Tour Themes 14:137–146. https://doi.org/10.1108/WHATT-11-2021-0147

Stainbank LJ (2022) Addressing the learning outcomes for professional skills using an integrated teaching strategy. Cogent Educ 9:. https://doi.org/10.1080/2331186X.2022.2109798

van Beest MRRS, Arpino F, Hlinka O, et al (2022) Influence of indoor airflow on particle spread of a single breath and cough in enclosures: Does opening a window really 'help'? Atmos Pollut Res 13:. https://doi.org/10.1016/J.APR.2022.101473

Willebrand KS, Pischel L, Malik AA, et al (2022) A review of COVID-19 transmission dynamics and clinical outcomes on cruise ships worldwide, January to October 2020. Eurosurveillance 27:. https://doi.org/10.2807/1560-7917.ES.2022.27.1.2002113

Wu W, Li L (2022) Developing an international public health cooperation mechanism for the cruise industry. Front Mar Sci 9:. https://doi.org/10.3389/FMARS.2022.946852

Zagan, S., Chitu, M.G., Manea E (2014) Special methods of curriculum design applied for maritime universities. In: Proceedings of the 7th International conference of education, research and innovation. Seville, pp 1446–1453

Zheng L, Chen Q, Xu J, Wu F (2016) Evaluation of intervention measures for respiratory disease transmission on cruise ships. Indoor Built Environ 25:1267–1278. https://doi.org/10.1177/1420326X15600041