

Abstract

# Remote Monitoring of Ship Pharmacy: An Experience of Maritime Telepharmacy †

Giulio Nittari <sup>1,\*</sup> , Antonio Arcese <sup>2</sup> and Francesco Amenta <sup>1,3</sup> 

<sup>1</sup> Telemedicine and Telepharmacy Centre, School of Medicinal and Health Products Sciences, University of Camerino, 62032 Camerino, Italy

<sup>2</sup> TelePharmaTec s.r.l., 62032 Camerino, Italy

<sup>3</sup> Research Department, International Radio Medical Centre (C.I.R.M.), 00144 Rome, Italy

\* Correspondence: giulio.nittari@unicam.it

† Presented at the Public Health Congress on Maritime Transport and Ports 2022: sailing to the post-COVID-19 era, Athens, Greece, 21–22 October 2022.

**Keywords:** ship's pharmacy; ship medicine chest; inventory management; TelePharmaSEA; software

## 1. Introduction

The ship is not only a workplace. It is a real living environment for a particular class of workers: the seafarers. Seafarers are particularly exposed to a high risk of accidents and diseases. Moreover, onboard commercial ships, there are no health personnel on board, and the health responsibility of the crew is in the Master's hands. That is why it is crucial to have available onboard medicine and medical instruments allowing for the performance of first aid interventions, and to counter any health hazards that may occur. The actual implementation of healthcare onboard ships depends on the "onboard pharmacy", also called "ship's medicine chest". On-board pharmacies currently present several problems: poor or no standardization (they are different for each country, according to different regulations), they usually have little (or not-effective) choice of medicines, and they often bear old medicines that can be replaced by more recent medications and last, but not least, often due to the lack of some specific drugs, an off-label use of medicines available becomes necessary. Another problem is that of expired medicines needing to be replaced. The above problems can be avoided or reduced by providing seagoing vessels with a system that uses computing technologies for handling the ship's pharmacy. A tele pharmacy service (TelePharmaSEA) is the system that we have developed to avoid these problems.

## 2. Material and Methods

The TelePharmaSEA software was developed for making the management of the on-board pharmacy easier and to have medicines and medical instruments required by the flag country's regulations always available. The application is based on a database containing information about medicines and medical devices required by different countries' regulations. To further improve the quality of the service, a questionnaire on "Customer Satisfaction" was developed, submitted to both ships subscribed to this service and TMS providing regular medical advice to a given ship. This allowed us to assess the appreciation for the service offered. The questionnaire was sent to the 80 ships subscribed to the service and we received 65 filled-in forms (81% response rate). Data were analyzed statistically by Analysis of Variance (ANOVA).

## 3. Results

With the use of the TelePharmaSEA software, it was possible to standardize the inventory procedures, to quickly identify and to re-supply expiring medicines, and to facilitate the work of inspectors of maritime health authorities. Overall, thanks to TelePharmaSEA, a



**Citation:** Nittari, G.; Arcese, A.; Amenta, F. Remote Monitoring of Ship Pharmacy: An Experience of Maritime Telepharmacy. *Med. Sci. Forum* **2022**, *13*, 10. <https://doi.org/10.3390/msf2022013010>

Academic Editors: Christos Hadjichristodoulou and Varvara Mouchtouri

Published: 28 November 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

ship's pharmacy maintenance is easier for the crew, not an expert in the field, due to the automatized procedures for medicine control and management. The use of the software, as well as the automation of different activities, in general, carried out manually, will help to handle the ship's pharmacy. The degree of satisfaction received for the service/software is quite high, with 90% of respondents highly satisfied ( $p < 0.05$ ) and 10% satisfied ( $p < 0.05$ ). The same is true for the resolution of technical problems, the correct and efficient management of the problems occurring in the ship's pharmacy, and IT assistance when necessary. Interestingly, the service has also guaranteed economic savings from shipping companies in terms of purchases and supplies for the onboard pharmacy.

#### 4. Discussion and Conclusions

Advanced technologies can support inexperienced people responsible for handling/managing the ship's pharmacy to interact properly with TMAS and competent health authorities. This software represents a real opportunity to simplify the management of the ship's pharmacy and consequently, to improve the quality of medical assistance onboard seagoing vessels.

**Author Contributions:** G.N.: Conceived and designed the study, analyzed the data and interpreted the results, drafted the abstract. A.A.: Contributed to collection of data and analyzed the data. F.A.: Supervised and approved the study. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work was supported by a research grant of the start-up TelePharmaTec.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Study data can be obtained by the corresponding author.

**Conflicts of Interest:** The authors declare no conflict of interest.