Telemedicine In Maritime

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***Abstract*— The aim of this paper is the study and the analytical presentation of modern systems, providing high quality telemedicine services for handling and treatment medical and health problems in shipping. Therefore, in order for specific dissertation to be concerned as an accurate and detailed one, it is divided into five (5) specific chapters.**

First o all, it is worth mentioning the definition of telemedicine. There is also a reference to the definition of telemetry and the purpose it serves.

The central axis of the study is the need to use telemedicine on ships, exposing its benefits.

In addition, the technological factors are presented which contribute to the application of technology in healthcare and shipboard services by classifying the medical data of telemedicine services according to their type into data, images and sound.

At the same time, a detailed description is made of ships' telematics programs and systems, while the Global Maritime Distress and Safety System is being considered.

In conclusion, there is a description of a telemedicine model using the most advanced tools and systems (Maritime Telemedicine Solution), while emphasizing the need for continuous monitoring and updating of telemedicine developments, training, but taking into account that the interpersonal relationship and the mental contact between a patient and a doctor cannot be substituted by screens and wires.

Keywords— telemedicine, telemetry, remote diagnostics, telemedicine technologies, types of medical data, telemedicine systems on ships, NIVEMES, MERMAID, TELE-IASIS, GALENOS, MEDASHIP, GLAROS,WETS ,GMDSS ,Maritime Telemedicine Solution

Introduction

The diagnosis of diseases and illnesses, as well as the treatment of sufferers and injured at sea, continues to be a challenge for Maritime and Naval Medicine in particular. In the cases where there is no doctor or nursing staff on board, one member of staff is responsible for providing medical care to other members when required. The responsible person should be based on any medical / health education available in existing written instructions, information and manuals, and finally on radio-medical and telemedicine advice and instructions that can be obtained from the land. These capabilities will enable him to use both the medical equipment and the medical equipment on board.[1]

I. Telemedicine

A. Definition of Telemedicine

According to the World Health Organization, telemedicine is defined as "The provision of medical care by all health professionals, where distance is a critical factor, using information and communication technologies to exchange valid information, to diagnose, treatment and prevention of diseases, research and evaluation, as well as the continuous training of health functions, but also for all those that are in the field of upgrading the health services of the community anion ".

Generally, telemedicine refers to the application of modern telecommunication and information technologies, mainly in the direction of two-way communication with sound and image transmission that aims to provide medical care to remote patients by all healthcare professionals, telemetry and the transportation of medical knowledge among medical services.

Telemedicine is based on telematics technologies and therefore cannot be considered as a new form of medicine. The adoption of the above technologies leads to the development of new standards of organization and provision of medical services [2]. Telemetry utilizes digital and analogue sensors in combination with wireless telecommunication for wireless information transmission via remote control-supervision. It also bridges the geographical gap between Points of Interest and Information and the Center for Management and Decision Making [3]. One of the needs of telemedicine is also shipping.

B. Telemedicine in Navigation

The adaption of telemedicine technology at sea, using digital libraries distributes medical information to care provider from any remote location. Another useful application is the implementation of the Marine Virtual Hospital with the task of creating and assisting a digital Health Science Library in order to make the internet a useful medical tool for Marine Medical Care as well as a health promotion tool for seafarers [4].

C. *Telemedicine Applications in Maritime*

The use of telemedicine in ships, in relation to its potential benefit, has been a major concern for large shipping companies, while small ones seem to have ignored it [1]. However, the use of this relatively new technology gives the benefit, not only in terms of protecting the health of crew and passengers in general, but also from an economic point of view .One of the reason is the lack of care provider on ships who aren’t physicians, so they don’t have the corresponding level of education and experience. And secondly they are doctors with rarely specialized knowledge who try to deal with all the incidents of different medical specialists.

Consequently, it is necessary to transfer the wounded from the ship, which is both impossible due to the cost of hiring a helicopter and sometimes because of the limitations that may arise either due to bad weather conditions or long distances from the shores. It should be noted that the cost of deflection of the ship, for disembarkation of a patient or injured person is large, taking into account the loss of profit for the ship-owner. Diseases and injuries at sea remain the main cause of insurance claims by ship-owners. Up to one third of insurance claims arise from injuries, illnesses and repatriation of crew members and passengers on board ships in general. However, thanks to assessors' capabilities, a rapid assessment of the patient's condition or the injured person can be made in order to obtain a timely and valid decision to move when it is required or to stay on board and receive the appropriate treatment, following a doctor's advice from the land. In some cases, the removal decision or not, may be critical for the patient, as it may be the cause of further medical complications [1].

II. Technological Factors Contributing to the Application of Technology in Healthcare and Ship Surveillance

The key to solving the problems that arise during the effort to transfer directly information between patients and care providers on ships seems to be the correct transfer of information. This presupposes the correct data management as we all know that the information comes from data processing. The medical data of telemedicine services are classified into three categories, depending on their type, such as data, sound and images [5].

A. *Data*

One of the features of some telemedicine applications on ships is the transmission of data, either static, such as a patient's medical records, or dynamic such as the transfer of vital signs (cardiac types, blood pressure, etc.). The transfer of data is part of two different applications, telemetry applications and information services [6].

Telemetry on ships provides the ability to monitor the physiological functions of patients from a remote location. One of the first telemetry experiments was conducted by NASA, when doctors at its control center watched the physiological functions of astronauts when they were in space. In reference to Information Services, hospitals and private doctors exchange information, such as records relating to the evolution of the health of patients and used diagnostic methods, have access to bulletin ships on the latest developments in the science and transmit patient records, referrals notes and results of laboratory tests between external doctors and nursing institutions.

Many hospitals globally use computer systems on a daily basis in which they keep their patients' files stored in electronic databases, allowing doctors to retrieve information immediately about their patients. Telemedicine can be used to update these files when doctors are outside their workplaces they can have access to files of their patients and remotely inform them.

There are many specialized medical databases that are accessed using computers and communication protocols. Examples of such bases are MEDLINE in the US, accessible through the Internet, Health Online in Europe, etc. These databases provide their users with information about medical incidents and ways to deal with them, medical products, new conferences, etc. Finally, it’s important to mention that messages exchanged by fax are widely used to exchange information [5].

B. *Audio*

One of the simplest telemedicine services is communication and advice between two doctors using the phone. Traditional telephony service is probably the most effective and economic way to facilitate communication with urban health care centers. The phone can also be used to provide medical advice from a doctor to a patient. Another use of traditional telephony is the creation of telephone service lines where specialized staff (doctors or nurses) responds to patient questions and provide simple medical advice [5].

C. *Images*

Medical images can be stable images, for example x-rays, or moving pictures, for example video. The greater transportation of medical images within a telemedicine application is for tele-radiology application, which is probably the most widely used telemedicine application at present. Radiology concerns the use of X-rays and other techniques in medical imaging, while tele-radiology refers to the transfer of these images. Each of the used modalities produces an anatomical or functional patient image [7], such as: Conventional X-ray, Computed Tomography, Magnetic resonance, Ultrasound, Nuclear medicine, Fluoroscopy and Angiography and digital subtraction angiography.

III. PROGRAMS-TELEMEDICINE SYSTEMS FOR SHIPS

Two major programs of telemedicine in navigation are MEDASHIP (Medical Assistance for Ships) operating in European seas and MERMAID (Medical Emergency Aid through Telematics) operating in all oceans.

MEDASHIP was established and sponsored by the European Union, with the cooperation of four European Centers from Italy, the United Kingdom, France and Greece, where the National Center for Research in Natural Sciences "Demokritos" was responsible for its operation. The program aimed to cover, during its first three years of operation, about 65 merchant ships and 80 passenger or cruise ships. Unfortunately, the program didn't continue to function, while it doesn't exist any bibliographic data from the medical procedures during the space that worked. MERMAID is a European sponsorship with features according to MEDASHIP, which covers all the oceans.[8]Except from the two basic programs, more were applied to ships for which the following sections will be analyzed.

A. NIVEMES

This project is managed and primarily contracted by ATKOSoft under the framework of the Telematics Applications for Health programme that concerned the evolution of telematics. Today, technology renders the application of telemedicine (TM) feasible in a practical way.

The NIVEMES project adopted TM in order to address the above problem by creating a TM network of health care providers and developing the software that will support the practice of TM in everyday usage by integrating actual medical data and administrative features. The rationale for the development of TM has been to serve those populations that have limited access to traditional medical services. A primary use of TM is the direct service to those populations in emergency situations, while a secondary one is the exchange of data between remote medical institutions, in order to be able to serve their patients in the traditional sense. Within this context, NIVEMES developed an international network of telemedicine healthcare providers and telemedicine services that offer individuals or groups in remote locations or emergency situations medical care in a consistent and integrated manner. This conceptual network consists of medical institutions connected via communication links in a coherent network. The project resulted in healthcare services that either are unique (not provided at all up to now) or will dramatically enhance existing ones.
The project developed a core of integrated healthcare services, support functions and applications used by a network of telemedicine healthcare providers - medical institutions. In addition NIVEMES developed a set of integrated healthcare services offered by this network, targeting: a. mobile user groups, applicable to the maritime industry, with the provision of telemedicine services to sailors of ship vessels, and b. remote site population, applicable to the population of the many isolated small islands.[9]

B. MERMAID

Moreover, MERMAID is another breakthrough telemedicine project, which is a telematics-based response to the EU requirement for "long distance medical consultation" to safeguard the health and safety of maritime workers and isolated populations.

The developed system is capable of delivering an integrated 24-hour multilingual worldwide emergency service to transfer medical expertise via satellite and ground-based ISDN networks. The connectivity of the system is realized by combining various communication links, such as mobile satellite technologies, VSAT technologies, and ISDN protocols.

The project has explored almost every category of telemedical application (audio and video conferencing, multimedia communications, flat file and image transfer with low-, medium-, and high-bandwidth data requirements), along with a full range of network choices (digital land lines, cellular or wireless, satellite, and broadband) and analysis in terms of the cost or performance trade-offs inherent to them. Moreover, it provides a variety of services, among which the notable one is electronic transmission of medical information via ISDN-based video conferencing.

In addition, medical telecommunication software is considered that includes a medical record system that can guide the user through patient history and support objective examination coupled with a multimedia HELP function capability, that is, text and illustrations, based on WHO and the EU (DG V) requirements for help at sea, to guide paramedics through all the operations with a teleconsultant. [10]

C. TELE-IASIS

The goal of TELE-IASIS is to continuously monitor patients' images in real-time and their transmission not only by wireless, which can be used on ships but also by wired communication networks, at the base station which is located in the large hospital coordination center .It is worth mentioning that this program covers the need for timely, experienced and specialized remote medical services, allowing real-time transmission of critical bio-signals such as electrocardiography, blood pressure, oxygenation, pulse, temperature, and images at the hospital's coordination center. As a result the program gives to doctors a complete view of the patient's condition. In addition it is applied in several cases including urgent cases such as ambulance services (National Center of Emergency Assistance, Large Private Hospitals, Armed Forces), Health Centers-Rural Hospitals (Connection with Regional or Central Hospitals for consultancy services), and home care institutions such as nursing homes , centers for the protection of the elderly.

The THELE-IASIS system offers several advantages such as flexibility, the ability to use all telecommunication networks, thus developing a wider range of applications. Additionally, it not only provides the ability to interface the system with Hospital Information Systems to access additional patient information but also to connect with the most important physiological parameter measuring devices. It is reliable and offers security as it develops systems based on commonly accepted IEC / ISO9126 quality standards. It also uses TCP / IP protocol to allow secure and accurate data transmission. The TELE-IASIS program covers additional security through authorized access and smart card capability and also has the certification of real-time operation in five European countries. Moreover it is continually innovating and is based on state-of-the-art technologies, making it the first complete telemedicine solution for emergencies and remote monitoring, presented in Greece. Finally, its use is easy as the device is small, lightweight, ergonomic, in a friendly working environment, even for beginners, but also portable with 3 hours of continuous operation autonomy. [11]

D. WETS, Worldwide Emergency Telemedicine Services

The objective of WETS is to demonstrate the feasibility and effectiveness of a common infrastructure able to give support to any mobile unit in case of medical emergency on land, sea and air.

It will be achieved through the use of different communication links (i.e. GSM, Satellite, Radio, ISDN),the use of positioning system (i.e. GPS) ,the transmission of vital signs and images,and the access to relevant clinical information. Moreover this system will be managed using an on-board decision support tools (i.e. Multimedia Medical Guide), the access to remote medical expertise (i.e. healthcare referring centers).

WETS will heavily rely on the European HECTOR and MERMAID projects. In fact, it will start its activities on the basis of the user needs analysis and functional specifications definitions as produced in the corresponding HECTOR and MERMAID activities and deliverables. WETS will develop three "extended" pilot sites (in Italy, Greece and Spain), integrating the pilot sites functionality’s of the two aforementioned projects. The main activity will be focused on their validation on a large scale, involving a quite broad range of user-groups, both at the end-user level (seamen, air passengers, fishermen, citizens) and the professional level (medical doctors, ship-owners, airlines). The consortium include all the appropriate actors (University-hospitals as healthcare referring centers, front-end support centers, industries, etc) many of them being already experienced in the management and development of large healthcare telematics R&D projects.[12]

E. GALENOS

In the framework of the GALENOS (Generic Advanced Low-cost Trans-European Network Over Satellite) project operating in trans-European satellite network telemedicine applications, it has been implemented in 14 clinics, six (6) countries. It is also a low cost project. (Figure 1)

figure1: Distributed medical intelligence on GALENOS [13]

Many telemedicine services have become available in a single and low cost technology network due to the involvement of industrial partners in the integration of the communication network.

In the GALENOS network, the hardware requirements for a WoTeSa satellite workstation are met by the following technical features: an IBM-compatible PC with two Pentium® III processors (≥ 600 MHz), 256 Mbytes RAM, a video -Osprey capture board, a local Ethernet network (for LAN, Ethernet, ATM), a sound card, a camera with FBAS or SVideo output as a live source, optionally a second camera as a document camera (for transmission of non-digital images), while digital images can be transmitted directly from WinVicos software and standard headphones. By downloading Osprey video, analog outputs of medical imaging equipment can feed directly to the board.

As far as the communication software report, called WinVicos, has been specially designed and developed for different telemedicine applications. WinVicos (Wavelet-based Video Communication System) is a high-end, interactive video conferencing software, providing real-time video, images and broadcasting sound. In this way teleconference partners can see, images and exchange information, even use remote indicators that show some details. Apart from the main user interface up to four windows can be displayed on the user's desktop: a self-projection with live-source sent to the video conference, a guest showing the video taken and only until two windows showing pictures even if they are sent or received by the partner.

The image quality is superior, without jamming, and there is no need to release a filter. In order to reduce time lapses in a video series, the only difference is that between two successive frames there is coding. In the small transmission bandwidth range, WinVicos live video transmission is superior to all alternative systems. Audio compression is done by the MPEG Layer 3 algorithm, mp3, developed by the German Fraunhofer Institute [13].

The GALENOS network allows doctors not only to receive digital images for medical education but also educates them using state-of-the-art communication, video and computer technologies which are required for the collaboration on a network of distributed medical information (interactive eLearning , figure2).

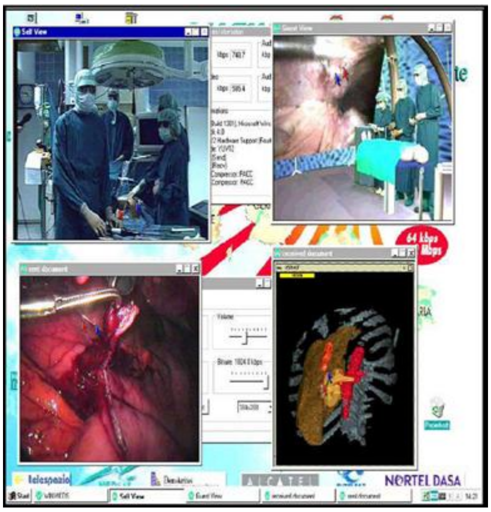

Figure 2: interactive eLearning[13]

These medical networks provide intelligence to the competent network and allow e.g. to local doctors or local hospitals facing unexpected results in order to get online advice from the nearest academic hospital. (intraoperative radiological telepathy, figure3).

Figure3 intraoperative radiological telepathy[13]

Thanks to the network, intraoperative telepathy can be performed, where, after a biopsy, a sample is taken and the diagnosis is made by a remote expert. Proc. SPIE Vol. 4584 203 Intraoperative tele-diagnosis is a database where at any time during surgery, the surgeon can access all pre-operative X-ray, CT, MRT, and discuss with the radiologist in real time .

The ability to get support from external experts, improve the accuracy of computer-aided or robotic surgical treatment, as well as online, analytical documentation, and therefore improved analysis of available patient data, not only will it contribute to the continuous improvement of treatment and patient care.

In conclusion, for all the above reasons, the GALENOS network needs to be expanded.

F. MEDASHIP

The main objective of the service developed by the MEDASHIP project is to supply integrated solutions for medical consultations on-board of ships. The satellite-based telemedicine services address both passenger ships and merchant vessels and are intended to provide passengers and crew members with an effective medical assistance in cases of emergency and in all those cases where the on board medical staff requires second opinion.

During the validation phase the service was tested on board of three ships with the possibility to have it connected to three land medical centers (figure4)

Figure4: Network linking MEDASHIP with specially equipped Mediterranean ships with the three Reference Hospitals in Athens, Genoa and Berlin[14]

In addition to the standard medical equipment aboard the ships, two video cameras, an electrocardiograph (ECG) and an ultrasound (US) equipment are used. With this equipment the following telemedical services have been realised using satellite transmission at a bandwidth of 512 kbps up to 1 Mbps offering the required high quality of images and video transmission.

- Teleconsultation
  The live camera on-board of the ship can be used to transmit the image of the doctor who is leading the examination on-board of the ship or the image of the patient when being questioned by the land-based expert. It can also be used to show the land-based expert an injured part of the patient’s body which he needs to see for his consultation. Thus a very realistic and effective live communication is possible.

- Electrocardiography
  The ECG system is connected to WoTeSa on board the ship and can be controlled by the physician from this workstation. Via application sharing software also the expert can control the ECG system from the land-based workstation. The main menu that includes all the functions of the ECG as well as the patient’s ECG is transmitted to the expert. Thus the expert and

the physician on board can jointly acquire and analyse the ECG report.

- Telesonography
  The S-video output of the US equipment is directly connected to the Osprey video capture board. Satellite transmission tests have shown that not only still images can be transferred but also live ultrasound investigations can be transmitted at 500-700 kbps .With a document camera analogous patient data can be captured and digitized by WinVicos as a document. For example X-ray or CT-images can be captured from an illumination board and displayed locally and transmitted using this document camera function.

- Reduction of cost
  The costs for emergency interventions for removing a passenger from the ship and hospitalization abroad are not to be undervalued. The removal of a passenger in the Caribbean can cost up to $ 11.000 and the cost for hospitalization can range from 500-1000 € per day. Consequently, market trends force passenger shipping lines to offer services that help to improve the response to on-board clinical emergencies, improve the customer satisfaction and the companies' image.[14]

G. GLAROS

The telemedicine system ,"GLAROS" provides possibilities for managing and sending the patient's electronic medical record as well as the possibility of videoconference between doctors. It's designed for no familiar users, making it simple to use.

Doctors of various specialties participated for its design, making it complete and easy to use. It has been applied since 1997 to the National Telemedicine Network of the Ministry of Health linking the remote stations with the Telemedicine Unit of Sismaglio Hospital. This is a single application and not many applications, which would give the user a different "philosophy", image and menu.

The Patient's Electronic Medical Record was produced by the Telemedicine Unit of the Sismaglio Hospital and contains demographic data, medical history as well as relevant clinical and paraclinical examinations, such as laboratory, X-ray, ultrasound, CTM, cardiographs, texts, and photos. The data is stored in a database and displayed by patient and visit as the user can have directly access to each patient's data .Pressing only a key, the user can digitize images and radiographs and enter them into the system.

All twain5 compatible devices such as scanners of any size and cameras of any resolution are supported, and also full image processing capabilities are provided. In addition to the basic features, the user has sophisticated image processing filters, the application of which can highlight details that are not easily visible. Lastly, with regard to data transmission, the system supports all the widespread types of telecommunication connections such as analogue PSTN, ISDN Digital Telephony, Mobile Telephony, Satellite Telephony and ADSL.

The data is compressed for even faster transmission and thus used error correction protocols for 100% reliability. Transmission is extremely easy enough for the user to choose what to send, modem, ISDN, and destination. It is worth noting that any terminal can connect to any other, without having to go through a central server. [15]

IV. GMDSS (GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM)

GMDSS is a system with clear advantages, which consists in interconnecting various systems such as NAVTEX and Safety-NET navigation information transmission systems and INMARSAT, COSPAS-SARSAT, and Galileo satellite systems. Thanks to their combination, it is possible to activate directly the search and rescue services by making a call at the touch of a button and transmitting it to all terrestrial and satellite communications systems available in the area so that it can be taken directly to the nearest coastal center coordination of search and rescue operations, as well as on other ships. As well as providing ships with high communication capabilities without the need for special data storage and thus if the radiologist's specialty is abolished.

The most important of the new communications capabilities of the GMDSS system are the automatic and immediate reception of navigation safety information, radiotelephony capable of direct two-way voice communication of the "ship to station land," ship-to-ship" station and "ship-to-aircraft", Narrow Band Direct Printing Telegraphy, Digital Selective Calling and Enhanced Group Calling.

Digital Selective Calling (DSC) technique is used for call only. By using digital codes, a station is given the opportunity to restore contact and transfer information to another or group of stations. It also is used for alarms in conventional communications.

Using the Enhanced Group Calling, a call technique, information is transmitted from land to ship, with:

- Selection of ships belonging to a specific flag, regardless of the area in the Fleet-Net service.

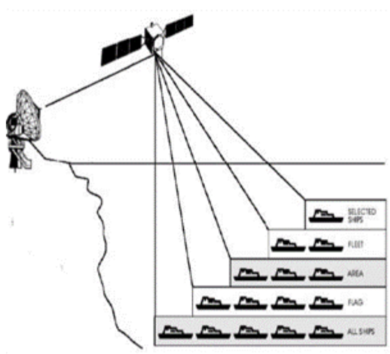

Figure5: Group calling of ships belonging to a specific flag, irrespective of the area where they are located.

- Selection of ships located in a specific geographical area

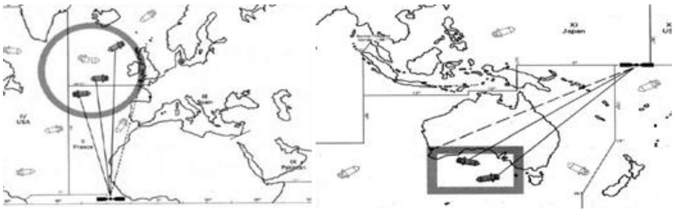

Figure6: Group calling of ships in a cyclical geographical area

Activating research and rescue procedure of GMDSS includes automatic update of adjacent ships, coastal stations and Rescue Coordinating Centers RCC.

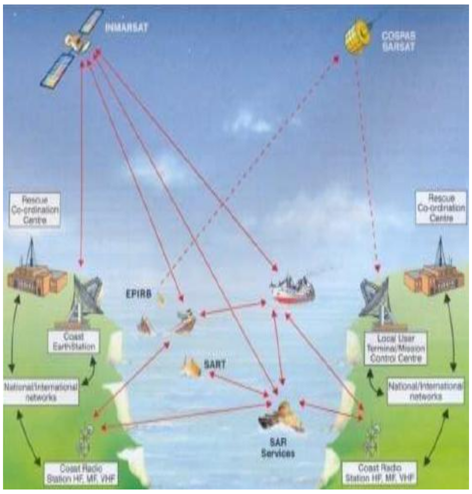

Figure7: Activate search and rescue

The activation of search and rescue services is carried out with several terrestrial and satellite means, such as Emergency Position Radar Beacon-EPIRB. The radio beacons, as shown in Figure 8, are mounted on floating lifeboats - automatic activation for emergency alarm emission. When activated, they provide hazard identification information, ship, position, hazard type and activation time. They can also be turned on manually

Figure8: Emergency Position Radar Beacon-EPIRB

Additionally, it also occurs by activating the Search and Rescue Radar Transponder (SART) transponders. It is a 9 GHz (X-Band) device and is used by lifeboats and life rafts to detect them by rescue boats.

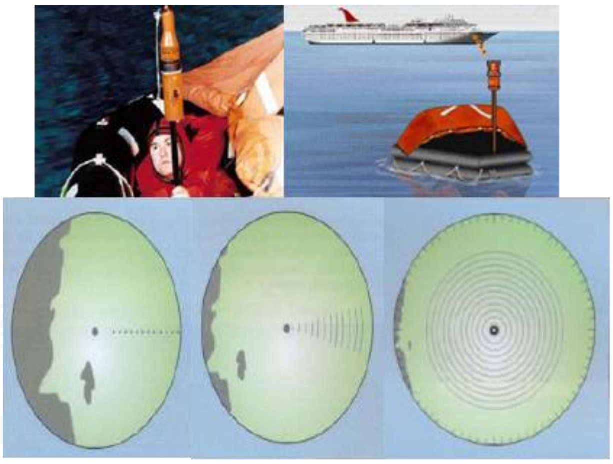

Figure a figure b figure c

Figure9: SART -search and rescue transponder and radar display

Figure a: The original radar display is in a straight line with 12 moments in the wreck of the wreck (090).
Figure b: When the distance is reduced to 1 m, the indication is converted from straight to concentric arcs.
Figure c: when the distance from the wreck is reduced further, the display changes to concentric circles [16].

V. MARITIME TELEMEDICINE SOLUTION (MTS)

The Maritime Telemedicine Solution (MTS) model uses the most sophisticated tools and systems available today. It offers, among other things, remote examinations and on-line diagnostics - on-board services, which until recently were only available in a diagnostic center or clinic.

Its main advantage is that solutions cost less in both money and time. Additionally, it is clinically superior, providing excellent results in patient diagnosis and creating a greater sense of moral satisfaction and safety among crew members. In addition, the benefits are also extended in cost-effectiveness.

The ship's non-operating time or emergency approach to a port can be enormous if the port is not close to an adequate nursing infrastructure to handle the incident or to be managed uncontrollably by an agent. The proposed solution provides a "safety zone" that can both relieve the captain and ship-owners of further concerns when dealing with sensitive medical cases [16].

CONCLUSION

In conclusion, by pointing out that the value of human life is invaluable, telemedicine is the only dynamically evolving high-level medical care in patients who have no way of accessing Health Units at this level, such as marines and ship passengers.

However, the high cost of satellite telecoms remains a problem, although the equivalent of wired is significantly reduced. For this reason, health care providers are responsible for monitoring and updating the developments in telemedicine, training and designing planned actions for wider and more efficient implementation of telemedicine programs, both in the world of navigation and in the general population.It is worth mention that telemedicine, although it is the ideal solution for patients who have no other access to High-Level Health Service Units, but in no case can substitute the clinical practice of medicine next to his bed sick. This is because not only diagnostic and therapeutic possibilities are more, but also the interpersonal relationship and the mental contact developed between the patient and the doctor cannot be substituted by screens and wires.[1]

REFERENCES

The template will number citations consecutively within brackets [1]. The sentence punctuation follows the bracket [2]. Refer simply to the reference number, as in [3]—do not use "Ref. [3]" or "reference [3]" except at the beginning of a sentence: "Reference [3] was the first ..."

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For papers published in translation journals, please give the English citation first, followed by the original foreign-language citation [6].

[1] http://www.elzoni.gr/html/ent/777/ent.21777.asp

[2] Kalogridis S., "Telepresence through smart devices. A New Perspective of Domestic Nursing "" DIPLOMATIC WORK NTUA, SCHOOL OF ELECTRICAL ENGINEERING AND MECHANICAL COMPUTERS, SECTOR MATERIALS INFORMATION AND MATERIAL TRANSMISSION SYSTEMS, 2010.

[3] http://nemertes.lis.upatras.gr/jspui/handle/10889/1280K. Elissa, "Title of paper if known," unpublished.

[4] Lazakidou A, A., Siassakos K.M., "Electronic Health Systems and Applications of Telemedicine in Navigation", Nazisibios Chora, Periodical Edition of Nautical Sciences, Issue 2/2008.

[5] Botsis T., Chalkiotis S., (2008), Informatics Hygeias, Publisher: "Diavlos"

[6] Perdikouri M., Yavas P., Papadogiannis D., (2003), Telemedicine in Practice, Publisher: Onboard.

[7] Golfinopoulos P., Karavas N., Koutsouris D .: Information Transmission with Applications in Telemedicine and Tele-Education through Political and Military Communications Networks (2007), Department of Information Transmission Systems and Materials Technology, School of Electronic and Computer Engineering, ΜΠ

[8] http://perialos.blogspot.gr/2012/05/blog-post_05.html

[9] http://www.cordis.europa.eu/result/rcn/27403_en.html

[10] Anogianakis. G,. Maglavera S., Pomportsis A., Bountzioukas S., Beltrame F.,.Orsi G, ''Medical emergency aid through telematics: design, implementation guidelines and analysis of user requirements for the MERMAID project", International Journal of Medical Informatics, Volume 52, Issue 1-3, pp. 93-103, 1998. (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5508113/)

[11] Lazakidou A, A., Siasiakos K.M., " Electronic Health Systems and Telemedicine Applications in Navigation ", Navisibios Chora, Revised Edition of Naval Sciences, Issue 2/2008.

[12] http://www2.telemed.no/publikasjoner/nedlastbare/total_final_report.pdf

[13] Graschew G., Roelofs T.A., Rokowski S., Schlag P.M., '' GALENOS as Interactive telemedical networks via satellite,'' Optical Networks Design and Manegement, XiaoMin R., Auyama editors, Proceedings of SPIE, Vol.4584, APOC 2001, Beijing China, 2001

[14] http://cdn.intechopen.com/pdfs/14284/InTech-Real_time_interactive_telemedicine_for_ubiquitous_healthcare_networks_services_and_scenarios.pdf

[15] http://www.protonlabs.eu/products_seagull.html

[16] http://dspace.lib.ntua.gr/handle/123456789/7716