

# Telemedical Assistance of Patients on Board Ships Activity of Centro Internazionale Radio Medico (CIRM), the Italian Telemedical Maritime Assistance Service (TMAS)

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**Abstract**—This paper summarizes activity in 2010-2012 of Centro Internazionale Radio Medico (CIRM), the Italian Telemedical Maritime Assistance Service (TMAS). CIRM started its activity in 1935 and from its headquarters in Rome provides free telemedical advice to ships without a doctor on board of any nationality and sailing in all the world. In the three years under analysis CIRM has assisted via telecommunication systems (primarily e-mail) 9,071 patients on board ships, fishing vessels and airplanes in flight. Pathologies most often assisted were accidents followed in the decreasing order by digestive system, urinary and genital systems diseases, dermatological problems, cardiovascular and locomotor system disorders. Days of treatment were approximately 5 per patient and evacuations for medical reasons were necessary in approximately the 3.5% of cases in 2010 and 2011 and the 2.2% in 2012. Medical assistance of remote patients on board ships is probably one of the oldest experiences of telemedicine. Unfortunately the limited technical medical facilities and training on board ships do not allow to provide the high quality assistance allowed by technology currently available.

## I. INTRODUCTION

PEOPLE living ashore may have medical services available within a short time. The situation is different on board ships as the majority of vessels do not have a doctor or adequately trained paramedic personnel and vessels may be at sea for days or weeks before they can reach a port. In this situation, the best possibilities for treating diseases or injuries on board are:

- to provide medical advice via telecommunications systems;
- to guarantee adequate training of personnel with the responsibility of health care on board;
- to have an adequate supply of drugs and essential medical equipment ( the ship's pharmacy ).

The possibility of providing medical assistance to ships via telecommunication systems became possible with the development of radiotelegraphy by Guglielmo Marconi in 1897, the construction of coastal radio stations and the introduction of radio equipment in ships. Today telemedicine represents the most realistic perspective for offering at least a minimum medical care to sailing seafarers [1-3]

The first license for radio medical service to ships was issued on November 18, 1920 to the Seamen's Church Institute on New York. From 1920s to 1930s several maritime countries developed radio medical facilities for their own fleets, with Sweden starting its centre activity in 1922, Netherlands in 1930 and Germany in 1931. The first experience of enlargement of radio medical assistance from a domestic into a really international scenario comes in Italy in 1935, with the constitution of the Centro Internazionale Radio Medico (International Radio Medical Centre, CIRM). The Centre chaired by Guglielmo Marconi and developed in terms of medical organization by a physician, Prof Guido Guida, was established with the mission of providing via radio free medical assistance available 24 hours a day to ill or injured seafarers of any nationality, navigating in all seas of the world.

Over the years, CIRM has pursued its work, interrupted only during the war years 1941-1945, and has enlarged his activity to include patients aboard planes in flight and on small Italian islands. CIRM, a private association until 1950, and from that date established as a non-profit Foundation, has benefited since 1957 of an annual contribution of the Italian government. This support has enabled the Centre to improve his structure and to continue to offer medical assistance free of charge.

CIRM activities are co-ordinated by a President and a Board of Trustees. Centre's structure is as follows:

1. Telemedicine Department
2. Telecommunications Department
3. Research and Education Department
4. Occupational Medicine Department

During the 73 years of medical activity the Centre has assisted more than 70,000 patients on board ships.

Here we summarize the main data of CIRM medical assistance from 2010 to 2012. We will also discuss problems deserving attention for delivering higher quality medical care to the category of remote patients represented by seafarers.

## II. CIRM MEDICAL ASSISTANCE DATA 2010-2013

CIRM medical activity is provided for 24 hour a day and 365/366 days per year by doctors on duty working at CIRM headquarters in Rome. The doctor on duty receives the request of assistance and gives instructions for the case, establishing subsequent appointments depending on the gravity of the medical problem in consideration. If necessary, the doctor can get the opinion of consultants, specialists in the various branches of medicine, who are contacted for

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pathologies of notable complexity or demanding a particular specialisation.

For each patient assisted, an electronic medical file is established and updated following every radio contact with the ship or the plane in flight. According to the gravity of the case and the ship's position, the vessel may be advised to change course to allow the patient medical care in the nearest port with health facilities. In case of an emergency on board, according to the ship's position, either the patient's transfer to another ship with a doctor on board or his evacuation (MEDEVAC) in an airlift mission is co-ordinated.

In the years under analysis CIRM has assisted thanks to telemedicine 9,071 patients, the largest majority of which on board merchant ships ( Figure 1). Assistance has required 45,471 teleconsultations, with an average of 5 contacts per patient. Days of treatment were approximately 4/5 per patient. The largest majority of requests for medical advice come from cargo ships (98.6%), whereas requests from fishing vessels and from planes represented respectively the 0.6% and 0.8% of cases assisted.

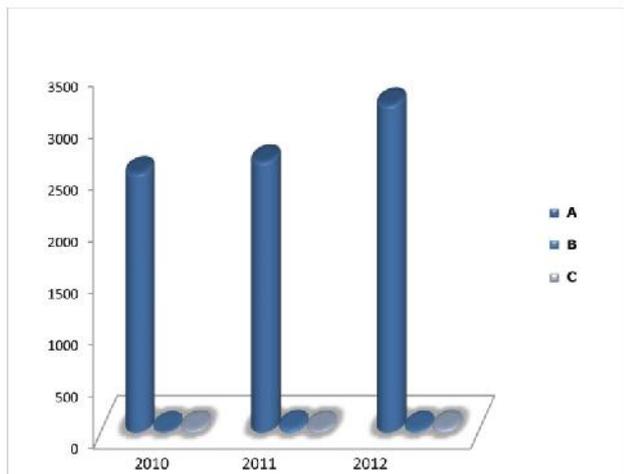


Fig. 1. Patients assisted by CIRM on board of cargo ships (A) , fishing vessels (B) and airplanes (C) in years 2010-2012. A constant increase in the number of ships asking for medical advice to CIRM is noticeable.

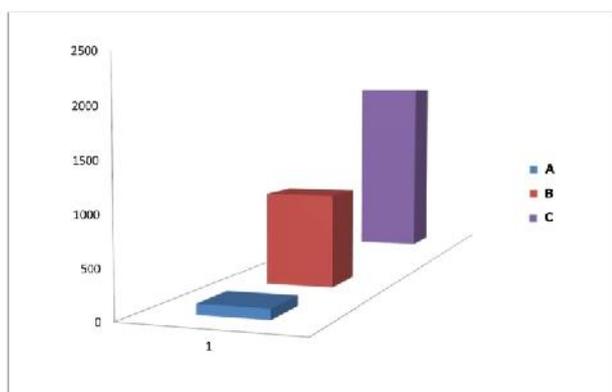


Fig. 2. Telecommunication systems used by ships for contacting CIRM in the years 2010-2012. A: Other systems, B: Telephone, C: e-Mail.

Telecommunication systems used for contacting CIRM

were represented primarily by e-mail, followed by telephone and other systems (telefax, coastal radio stations) (Figure 2).

With the years the use of e-mail as a contact system is significantly increased. This communication system increased from the 74.8% in 2010 to the 80.0% in 2011 and to the 83.0% in 2012. Cost reasons and the increasing diffusion of internet as the main communication system on board ships are the most probable reason of the large use of e-mail for requests of medical advice.

A triage tag is assigned by a dedicated software to the first request of medical advice from a ship. White tag indicates that patients have minor injuries and need just first aid and home care-like assistance. Green tag indicates that patients require a doctor's care in several hours or days but not immediately. Yellow tag indicates that patient's conditions are stable for the moment but require watching and frequent re-triage. Red tag indicates patients requiring immediate treatment or other life-saving intervention, and have first priority. They cannot wait. Black tag indicates severely injured/ill patients that are unlikely to survive given the care available. Figure 3 shows the triage tags allotted to patients assisted by CIRM. The majority of cases involved yellow and red tags situations indicating the level of complexity of pathologies for which ships ask for medical advice.

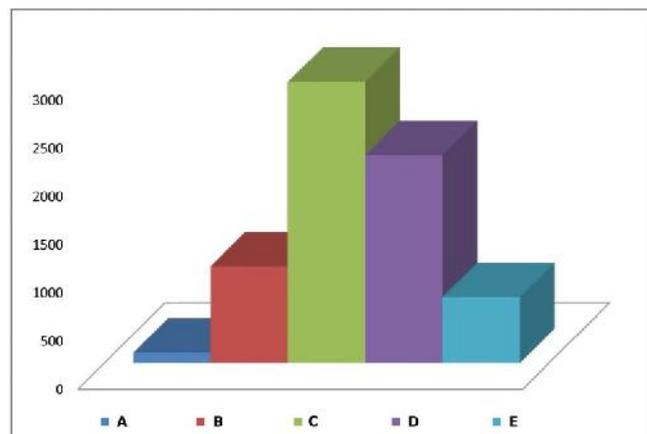


Fig. 3. Triage tags allotted to patients assisted by CIRM in the years 2010-2012.

A: White, B: Green, C: Yellow, D: Red, E: Black

Ships can ask for medical advice for any type of pathology. Accidents, followed by diseases affecting gastrointestinal system, urogenital system, skin, cardiovascular system, respiratory system and locomotor system (Figure 4). Other pathologies accounted for less than the 5% of total cases assisted.

In terms of outcome of CIRM assistance, approximately one third of the cases treated by CIRM ended with the recovery of the patient while still at sea. In another third of the cases, the patient's situation could be followed until the destination port, without the need to advise a change of course or the patient's transfer.

A diversion in the closest port with adequate health facilities was recommended when patients conditions required immediate and dedicated medical treatment.

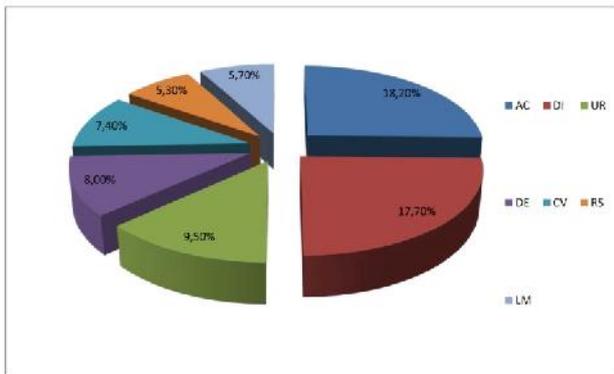


Fig. 4. Pathologies more often assisted by CIRM in the years 2010-2012. AC: Accidents, DI: Digestive System, UR: Urogenital system, DE: Dermatological pathologies, CV: Cardiovascular system, RS: Respiratory system, LM: Locomotor system.

In particular cases, according to the gravity of the patient's condition and to the ship's location, the patient's transfer to another ship with a doctor on board, or his MEDEVAC by aero-naval rescue missions was co-ordinated (Figure 5).

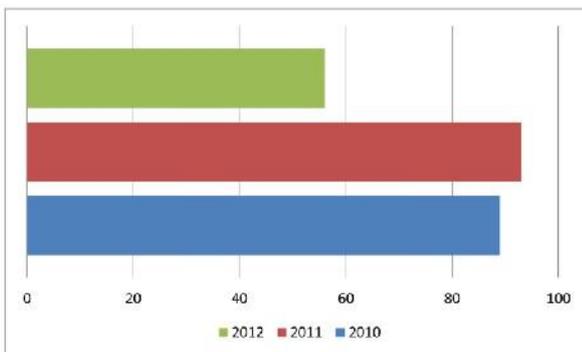


Fig. 5. Medical evacuations coordinated by CIRM in the years 2010-2012.

Taking into account the different number of cases assisted per year, medical evacuations averaged the 3.5% in 2010 and 2011 and the 2.2% in 2012. In some cases, due to location, or when the patient's conditions were already satisfactory, contacts with the ship were interrupted, and thus the Centre was denied data about the situation's outcome. Cardiovascular and external causes represent the principal causes of deaths among seafarers assisted by CIRM [4].

### III. TELEMEDICINE AND IMPROVEMENT OF MEDICAL ASSISTANCE TO SEAFARERS

In spite of the technological progress, medical assistance to seafarers was not always improved in parallel with advances of medicine and of telecommunications.

The development of telemedicine instruments to transmit detailed medical data ashore and the enlargement of equipment of ship's pharmacy will contribute to improve medical assistance to seafarers.

An adequate medical training of ship personnel for

improving their capabilities of dialogue with doctors ashore, the use to require for telemedical advice in case of any type of disease or accident on board and not only in emergency situations and of ship's pharmacy under telemedical supervision will certainly help to guarantee better health care on board ships.

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