E-health in an International Oil and Gas Company – Saipem’s Experience

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SUMMARY. e-medicine is not and must not be perceived as the sole assistance to a sick person but as the comprehensive management of individual’s health including health education, health monitoring, health information, creating of shared medical database, management and use of medicines, etc. That is why nowadays we prefer talking about e-health. Due to the fact that business in Oil and Gas industry is moving more and more towards remote and frontier areas, both off and onshore, the Industry can represent a significant model for the implementation of e-health. Saipem is one of the biggest contractor companies in Oil and Gas industry. Within it’s organisation, Saipem has an in-house medical department, whose main objective, apart the management of medical emergencies, is prevention, health protection and promotion. To assure the implementation of these principals even in remote and frontier areas Saipem adopted e-health in its daily operations. The authors are giving Saipem’s experience in e-health care, e-health database, e-education and training and e-work care. A part he undoubted success of the application which have shown to be cost effective, user friendly, very well accepted by the internal clients and appreciated by the external ones, beneficial for the individual, the company and the society in both medical management and health promotion and protection activities., there is still a lot of room for improvement.

1. INTRODUCTION

According to the definition of the European Union given in 1990, telemedicine, is “the integration, monitoring and management of patients as well as the education of patients and staff using system which allow ready access to expert advice and patient information no matter where the patient and the relevant information is located–” (AIM 1990) [1].

This definition, as well as the one given by the WHO [2], as the main idea have the transfer of data and not of the patient, or better to say “user” of the service, allowing access to the specialised centres to the individuals that are physically dislocated from them and all with the aim of improving the health care system [3].

Seen and perceived as such telemedicine must not just ensure medical treatment for patients far away from health centres, but can and should also contribute to radically renovating health care system, with particular regard to emergency service medical organization, health education, teaching, training and professional development. That is why we prefer to use the term “e-health”.

As a human being, either as the receiver (in most of the cases patient) or as a supplier of service (most frequently doctor) is always in the centre of interest of the health care, e-health, in a broader view, is not referred only to technical and technological development but also to a “state of mind”, way of thinking, attitude and direction towards webbed, global way of thinking in order to improve the health care at local and global level utilising Information and communication technologies [4].

Nowadays different, or at least the following, concepts are understood under e-health:
• telesassitance (home care),
• telediagnosis–teleconsultation (second opinion),
• telerobotics – governing electrometrical equipment from distance,
• tele-emergency
• tele-education of medical and non medical personnel
• medical database,
• etc.

All areas where Oil and Gas (O&G) industry, with its sites spread around the world, can represent a significant model for the implementation of all these elements.

2. SAIPEM

Saipem [5], an ENI group company based in San Donato Milanese, is one of the biggest contractor company in Oil and Gas industry. Its main activities, structured in the respective Business Units, are Drilling, Offshore Construction and Onshore Construction. With its organisation, that comprises more than 38000 employees of 107 different nationalities, and activities the Company is present at all five continents carrying out its operations more and more in areas
defined as “remote” and/or “frontier” ones. These areas include offshore sites, African desert, South American jungle and arctic areas.

As part of the Quality Health Safety and Environment (QHSE) Department, Saipem has built an in-house medical department, whose main objective, apart the management of medical emergencies, is prevention, health protection and promotion. In order to make these principals available and applicable at all 119 working site scattered world wide [6] Saipem decided to initiate and develop the implementation of e-medicine in its daily operations. The model of Saipem’s Physician for remote locations is to be the “all-ologist” (Medical Officer, Hygienist, Traumatologist, Cardiologist, etc.) [7]. Being this impossible Saipem Med developed this new, e-health, approach that is practical, innovative, imaginative and ambitious.

The aim of Saipem’s e-health project is many-sided. It provides assistance to physicians working in remote areas, where local medical equipment and structure are often the basic ones and the local health care system is either rudimentary or difficult to access. But it also provides information and training courses to medical and non medical personnel, assures a complete and conspicuous medical database of its employees for doctor’s or individual’s consultation.

3. E-HEALTH IMPLEMENTED AT OPERATING SITES

The e-health elements that Saipem implemented, and is implementing in its routine, daily, operations are: health care, health database, education and training and work care.

4. HEALTH CARE

4.1. “Pronto dottore”

If we understand e-medicine, as it is, to be the transfer of information, the first step in Saipem’s telemedicine “evolution” was the establishment, approximately 12 years ago, of a 24hours dedicate telephone line, named “Pronto dottore” [8,9]. By calling a single extensions of the Company’s directory from any telephone located anywhere in the world Saipem employees are getting in touch with one of the Company’s doctors. Through it any member of Saipem Group of Companies can obtain medical advise, information regarding the epidemiological situation in the world or a specific country, information regarding vaccination, diseases, therapy, preventive actions and activities, pre employment or periodical medical fitness examination, or any other health related issues, including the medical assistance (organization of medical examinations, hospitalization, etc.) in case of need. For medical personnel, except the advice from a senior physician, this service assures the organization of a long distance air transportation of sick/injured personnel with dedicated aircrafts or airliners. The service is multilingual and is provided by Saipem’s medical personnel who are fully familiar with the company, its procedures, organization, working activities, work related peculiarities and, often, with the employee requesting the assistance. There is no numeric evidence of frequency with which this telephone line has been contacted, but it has become the hub of the Medical Department and the extension is one of the first things our new employees learn joining the Company.

4.2. Telemedicasa

In 1996, together with a company called Medicasa, Saipem and ENI developed a telemedicine service for cardiologic emergencies management in remote locations [10]. The service assured the ECG analysis and interpretation by a cardiologist without integration of any of additional tests (except Troponin-T test). The service was accessible 24/7/365 and assured the real time interpretation of recorded ECG that could have been transmitted utilising normal telephone lines, cellular phones or satellite lines.

The service mainly aimed to management of suspected acute cardiologic cases with the scope to: 1. assure the diagnostic evaluation of cardiac cases as accurate as possible, 2. organise in the most efficient and timely possible way the treatment and transportation of patient with acute ischemic cardiac pathology, 3. give the support to local medical personnel identifying potentially risky condition, 4. avoid un-necessary transportation of patients that can be treated locally.

In four years that the system was utilised on 15 ENI and Saipem’s on and off shore sites, almost 300 consultations have been effected, and only in 4% of cases the full emergency network was activated. But for this small percentage of patients more specific and accurate treatment in the acute phase of disease management and transportation in higher safety and security environment were possible.

4.3. INCAS and Shared Clinical Management

The next step within the implementation of telemedicine applications on Company’s operative sites was the collaboration among ENI, Cefriel–Center of Excellence for Research, Innovation, Education & Industrial Lab and with the partnesser del Politecnico di Milano on the development of INCAS–Interactive teleConsultation network for worldwide healthcare Service [11,12,13,14]. As a system ideal to be utilised in remote locations and frontier areas INCAS combines the characteristics of “vertical” (utilising dedicated applications for data and image transferring order to support a single specialist field) and “horizontal” (non specific, and consequently not needing particular application in data exchange) telemedicine systems [15]. It is simple to use, the training time is short, it has the possibility to transmit data in a high quality, reliable and secure way using in an “invisible” way different applications. It can be used either in a real time or “store and forward mode”. For data transmission any system based on TCP/IP protocol can be used: form a normal modem at 56k to a broadband, from a satellite connection to a GSM cellular phone and wireless connections. A telemedicine station in remote area consists in a ECG (12 derivation), a Monitor, a digital camera, X ray scanner and a X ray mirror.

The organisational part of the system is Central Unit for Coordina-
Raffaele – Milan have developed a service for telecardiology assistance in remote area to be used in both emergency cases and for monitoring purposes of employees/patient with known cardiovascular risks (diabetic, hypertensive, dislipidemic status, smokers, etc.). The system is available 24/24 hours 365 days in both real time and store and forward system. This service is provided utilizing a normal telephone line or cellular phone and a small high reliability transtelephone ECG device, Cardiobios 12, that records and transmits 1/12 ECG derivation.

The whole process is given on the Chart N° 2. In base of medical indication, the ECG is recorded at the peripheral unit and is transmitted through a dedicated telephone line to the Hospital receiving centre. After the cardiologist’s interpretation the report is sent to the requiring medical personnel in pdf format and is automatically saved in the individual’s medical record. There are two level of assistance:

Emergency. In real time, few minutes after the indication has been set, there is an ECG with report and an online consultation with a Cardiologist.

Routine. ECG and Medical cardiologist report within 24 hours for normal cases and the follow up of employees with risk.

These tools could be offered also to International Health Care professionals operating in cooperation projects in remote areas and developing countries supporting the sustainable development the company is always promoting in its operations. After the program has been implemented, we can anticipate that we noticed the reduction in repatriations cases due to cardiovascular diseases in respect of previous years, no matter statistic results could be published only at the end of the project. The project has even greater importance in monitoring and health surveillance of employees at risk directly at their working locations, as it is discussed later in the text.

5. HEALTH DATABASE

5.1. GIPSI – electronic management of individual medical data

GIPSI (Gestione Informatica Prestazioni Sanitarie Individuali) is an in-house created software (first version back ion 1996.) especially developed to meet Saipem Med requirements that assures real
software integration and medicines

• assure enough standard medicines stocks on each operating site. It allows the medical personnel to:
  • automatically control the expiration dates of medicines on stock
  • to properly plan the replenishment of stock, complying with the quality management system (QMS).

The Program uses cutting-edge software integration and medicines stocks automation technology to connect every aspect of prescription cycle (from medicines requisition to medicines issuance to patient).

6. HEALTH EDUCATION AND E-LEARNING

6.1. “Health” Intranet site
Saipem Intranet Health portal, offers to all Saipem medical and non-medical personnel, the possibility of “entering” in a complex virtual library. It is structured in 2 parts: public users and medical personnel and is accessible only through Saipem intranet network. Public users can properly inform themselves before being assigned to any mission, with country/geographical specific information, vaccination requirements, medical fitness certificate, local Saipem’s safety with the PC are currently accessible through Saipem Health portal. GIPSI e-Learning course and Work Safety with the PC are currently accessible through Saipem Health portal. Each attendee is provided with individualised user’s account to enter the e-Learning site. The course provides educational materials such as lectures and presentations. To evaluate the attendees learned knowledge, an examination is given online at the end of each lecture. The course administrator can monitor the number of access of each registered attendees and can evaluate their performance based on examination result.

6.2. e-learning courses
A “Moodle” [20] platform of e-Learning course is made accessible through Saipem Health portal. GIPSI e-Learning course and Work Safety with the PC are currently available to Health personnel and to all Saipem employees respectively. Each attendee is provided with individualised user’s account to enter the e-Learning site. The course provides educational materials such as lectures and presentations. To evaluate the attendees learned knowledge, an examination is given online at the end of each lecture. The course administrator can monitor the number of access of each registered attendees and can evaluate their performance based on examination result.

6.3. MIGATE
Training of medical personnel working in remote locations represents a crucial point for the best health protection of workers in these areas. Unfortunately, there are no specific university courses in this area. The same stays for dedicated applications of telemedicine, which is important for guaranteeing high level medical assistance in oil and gas industry

In 2007 University of Camerino (Italy) and Saipem developed post-graduate Qualification Course in Telemedicine and Telepharmacy MIGATE (Master In Oil and Gas Telemedicine and Telepharmacy). The mission of MIGATE is to provide to health professionals working in oil and gas fields or platforms a specific training in e-health, telemedicine, telepharmacy and their practical applications. The course represents a real opportunity to achieve an academic background and qualification for improving healthcare to remote patients through e-health learning process.

Course activity includes 16 ECTS (European credit transfer and accumulation system) and has a modular organization. Teaching is based on e-Learning (150 hours), e-practical activity (50 hours), own study (200

Chart 2. Telecardiology process description

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what we still consider to be an underusing of the system. The positive aspect is that the system in 262 cases (96%) the ECG was part of the monitoring system. As shown in the Graph N°2 in 49% of cases the ECG was normal, while in 51% one or more abnormalities were identified [16].

The model, still in progress and needing improvement particularly in the accustoming of the medical personnel to a new way of communication among colleagues, has:
- assured specialist’s examinations directly at operating sites
- extended the employees “working life”
- rendered safer the operating sites
- allowed the employee to fully enjoy leave period
- brought benefits in cost effectiveness and employees’ satisfaction to the individuals, Company and society in general

8. CONCLUSION

In Oil and Gas industry telemedicine is not perceived as a tool only for the management of medical cases but also as a best solution to provide a comprehensive health care system particularly for sites and operations going on in remote and frontier areas where local health structures and organisation do not guarantee adequate and immediate health care.

Starting from 1996 Saipem implemented in its daily health care activities the e-health solutions in health care (“Pronto Dottore”, Telecardiology, Shared Clinical Management), health database (GIPSI, Medicines Management), health education and training (Health Intranet site, e-learning courses, MIO-GATE) and has introduced in 2007 a new element in e-health – “work care”, telemedicine related to occupational health. The implementation of e-health protocols is facilitated by the presence of reliable, medium band, communications system at all operating sites, needed for Company’s core business purposes.

In all the areas of its implementation e-health, as in many other studies [24,25,26], has shown to be efficient, cost effective, and beneficial for medical personnel, employees, Company and society in general opening great possibilities for sustainable development of areas where the operations are carried out.

The problems encountered in its full implementation and further development were similar to those faced in other trials: necessity for medical personnel to start being familiar with the new way of communication and “mind set up” in the management of clinical cases [11, 27]; communication problems [28] with off shore units using satellite communication due to their continuous movement and/or operations activities that might interfere with satellite communications (i.e. crane movements). Using satellite communications the problems could occur with a band-width particularly during the day time operation when for operational needs a large number of information are exchanged through internet occupying almost whole bandwidth.

In base of the acquired experience Saipem is committed to continue the implementation and development, but above all, the continuous improvement of its e-health applications. The extension of use of e-health in health information, training, monitoring and particularly in health related Sustainability programs are foreseen for the next years.

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Graph 2. Percentage of abnormal ECG-es

hours), examination for each module, a final examination and a dissertation.

Up to now nine doctors have completed the Master and 10 more are following got during this academic year.

7. WORK–CARE

The peculiarity of the overseas assignment and working shifts implies that an employee spends at least half (if not two thirds) of his/her time on a working site away from home and form his family doctor. Moreover, on site he/she might be exposed to a work related risks (noise, stress, vibration, toxic substances, etc.) that require compulsory health surveillance. Not to mention the borderline health risks each individual might have (diabetes, hypertension, cardiac problems, etc.). In order to assure the on site health surveillance (compulsory by law) and monitoring (to follow up the employees health conditions) Saipem created a pilot program and transformed a “home care” model of telecardiology in a “work care” [16].

The process is described in the paragraph 1.4 and in Chart N° 2. In this model the process owner is not the individual, as it is in “home care” but the site doctor who is in charge for the health of the employee and decides for the future management of a chronically ill patient. Simplifying the thing, this often means repatriation or remaining at working site. “Work Care”, telemedicine linked to the Occupational Health also fulfils the legal obligations of health surveillance [23].

During the first years of the pilot program (February 2007–February 2008) from 11 sites 273 ECGs have been sent and examined, what we still consider to be an underusing of the system. The positive aspect is that the system in 262 cases (96%) the ECG was part of the monitoring system. As shown in the Graph N°2 in 49% of cases the ECG was normal, while in 51% one or more abnormalities were identified [16].

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