A Management System for Adult Cardiac Surgery

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Abstract

A new system for the computerized management of the surgical path was developed by Tuscany "Gabriele Monasterio" Foundation at the Heart Hospital of "G. Pasquinucci" Massa.

The system has been in operating since 2009 and manages the paths of more than 2500 surgical patients / year in cardiology.

The system was developed from the need to make more efficient and flexible operating room activities, which are related / linked to the waiting lists and the availability of medical resources (beds, staff, implantable devices, etc.).

The surgical path is characterized by many professionals and clinical settings that make it difficult to maintain a timely and efficient global unity. In addition to this, to assess the quality of the hospital and take action for improvement, it is also necessary to extend the surgical path to the postoperative period.

1.   Introduction

The Tuscany "Gabriele Monasterio" Foundation (FTGM) is a public company of the Tuscan region whose statutory mandate is to support, research and training.

In 2009 the Tuscany Region issued a decision with which regulates the computerization of the surgical path.

This process of computerization in FTGM is to follow the patient from first contact until the resignation of the clinical post-operative hospital stay.

In this treatment process, called "surgical path", the patient makes the first visit, signs a proposal for operation, enters on a waiting list, then he is called for performing a diagnostic tests at outpatients' department and / or at hospital pre-admittance department, he undergo to operation, he stays at hospital for post-operation, he is been resigned from hospital.

FTGM has a Hospital Management System (HMS) which consits of several open source software modules such as the central repository, a form of medical records, a form of outpatients' department folder, and several others, including the software module for the management of the surgical program including the management of waiting lists, human resources, material resources, the planning of the team of operating room management reports and indicators of government activity.

2.   Architecture

The system allows the complete management of the course of surgery: surgical evaluation of the visit which begins the process of dynamic management of waiting lists with pre-admission and pre-deposit blood, to the operating theater schedule with the management of the equipe and computerized registry surgery, until discharge from hospital.

This system is composed of modules designed to manage the different characteristics related to surgical procedures.

The system is integrated with other computer systems through the use of standards such as HL7, and in detail with the company's central registry, the Unique Booking Centre (CUP) Acceptance and Discharge Transfer (ADT) Company, which manages the phase acceptance and outpatient ward, and medical record systems for clinical information.
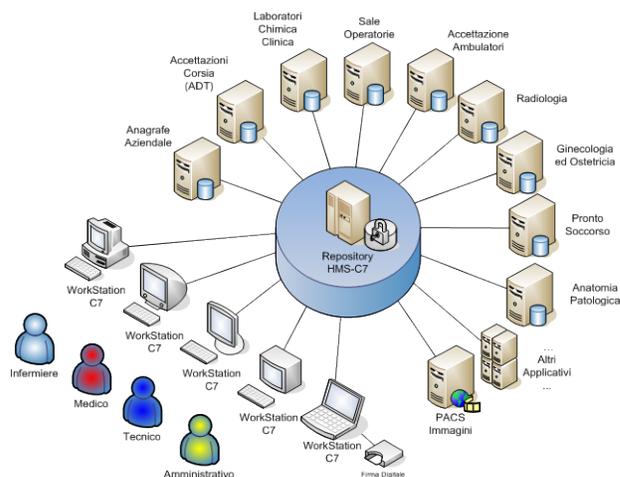

Figure 1. Architecture of Hospital Information System (HMS)

3. Actors

The main roles and duties / functions of the actors of the system software are listed below.

The *surgeon* performs the medical examination, he fills in the proposed operation, he performs the surgery, and ultimately he fills in the surgery register.

The *Surgical Planning Office* (UPC) is responsible for administrative tasks, it checks first the presence of the client list, it checks for the operation (including regional) within 7 working days; it acquires the coordinates of availability to contact the client; it issues the certificate of inclusion in the list and provide the assisted person and citizen documents and information related to the surgical path.

The *health department* has read-only access to all data within its competence, including, the daily and weekly reports on the scheduling of operating theater, the plan allocation of human resources, the team of the operating theater, the attending physicians , etc..

The *patient* receives the proposed surgery, he decides within a certain time whether to take action or not, if he accepts, he receives the certificate of inclusion in the list. This actor does not have access to the system but determines the change of its information in the HMS. He will then consult its reports through access to electronic health records as a service offered by the Tuscan region.

4. Functions

Management function of the waiting list contemplates the clinical management of the patient, and is able to present to the manager of the list, the clinical picture of patients in order to reassess the classification of urgency.

The patient is selected from the central registry, the key parameters are entered for the management of appointments, clinical data retrieved from the central repository (Fig. 2) and added to the list with a priority code. (Fig. 3)

Figure 2. registrar company and patient card

Figure 3. Waiting list

The administrative secretarial functions are related to management of on duty shifts, to manage permissions per profile, the management of the list of doctors and their presence or absence (Fig. 4).

These features can be managed centrally (activities of an office of jurisdiction), or in distributed mode, each puts its information on the presence of absence, according to the organization.

In any case, there is the figure of the theater who oversee and approve the weekly and daily schedules.

Figure 4 List doctors, absences and presences guard shifts

The head of the department with his team of surgeons performs weekly planning of operations depending on the type of pathology, the type of device to be used clinically, the level of criticality of the operation plan and the resources available.

At any time and from any location-enabled clinical network (PCs, laptops, tablets, etc..) they may consult the web journal of the clinical patient, checking the test results of pre-admission and if necessary throughout the patient's medical history from its first access FTGM.
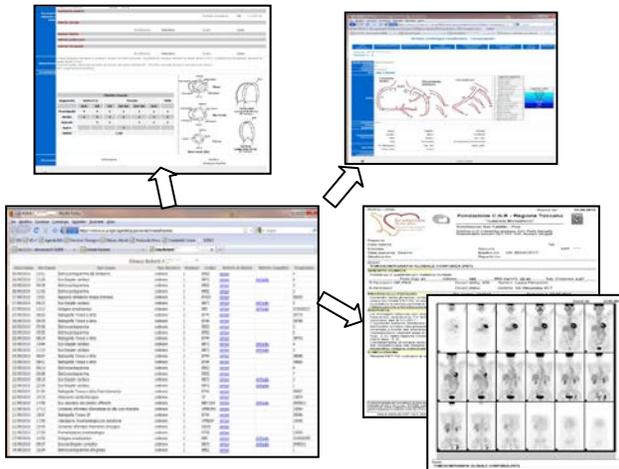
Figure 5. Journal of clinical visits and examinations, consultation reports

The function of managing the team of the operating theater and the program allows you to efficiently manage the activities and ergonomic operating theater, through a dynamic configuration of the operating theaters in use in various departments with detection of potential collisions resulting from use.

Figure 6. Management of operating rooms, patients and the team of hall

The program features an ergonomic graphical interface that guides users through the various steps of the surgical route, in which they exploited some graphics features such as Drag & Drop for faster planning and programming of actions.

A synthetic monthly view allows you to have an overview on the status of activities in the operating plan and execution.

Figure 7. Monthly dashboard for managing the surgical planning

The software allows the generation and display indicators on the activity operating theater, the number of operations per operating theater, per operator, per period, the mortality rate, the waiting time, the number of changes per patient data, etc..

These indicators allow management of the department in real time on every single item of interest.

Figure 8. Management reports

5.   Technology

The system is based on open source platform called Bio-Medical Framework (BMF www.ftgm.it / bmf) designed and built in FTGM as required by the regulations "open source" for the Public Administrations. The BMF Framework was developed in Java and benefits from all the language features. The system is equipped with WEB user interface and complies with current regulations on the handling of sensitive data. The system is Open Source and is released under GNU Lesser General Public License (Figure 9).

Figure 9. Open source multi-platform.

6.   Conclusion

The system has been in production since January 2009, allowing the management of the operating team of cardiac surgery for adults, including a number of professionals such as surgeons, anesthetists, administrative and information technology for the treatment of 8,000 surgical patients.

The use of this software has brought significant improvements in the management of the path of a surgical patient from admission to a pre-surgical planning.

Its architecture allows us to evolve rapidly. The evolutionary steps already taken are: integration with the folder of anesthesia and drugs to assess the cost to the patient and clinical risk management, plus an integration with an open source DICOM viewer called up directly from the clinical diary by the use of unique key for the clinical repository (patient ID).

Its database is also designed to search for real-time evaluation of the most important performance indicators.

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