

# Mind the Gap

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## Abstract

*Patients and physicians often face a serious obstacle in communication because of a cultural and linguistic gap. "My Heart / il Mio Cuore" is an easy multimedia communication tool for patients which presents the "obscure" language of the cardiological discharge report as an intelligible message. Patients can interactively access and explore, in a plain but still scientifically correct manner, the nature and mechanisms of their own heart disease; look at a 3D, dynamic, virtual picture of the diseased heart; access to the instrumental findings and the clinical processes leading to the diagnosis and to the therapeutic medical decision. The project, winner of the "Internacional Pirelli Award" as the best product of multimedia communication in life sciences, forwards the idea of implementing medical informative systems based on integrating communicational tools to interface all the actors of the health system, starting from the patient.*

## 1. Introduction

As medicine and healthcare have become so complex today, patients must take part in the medical decisions concerning the diagnostic and therapeutic processes of their disease. In order for the patients to understand their health status and the medical service they are being offered, they must be a conscious and informed counterpart in the process of medical decision-making. This, however, is often difficult given the difficulty in communication between healthcare providers and users—a phenomenon which is largely neglected by the medical counterpart.

In this setting, the cultural and linguistic gap between physicians and patients inevitably create an unbalanced relationship in which the patient is weakest. Nowadays, the reduction of this communication gap can be preferentially approached through multimedia and web technologies. However, to date the panorama is very heterogeneous as to different countries, institutions and healthcare providers. Often the scientific societies, journals and associations contribute to reduce the cultural gap dedicating some program and/or web space to patient

understanding their disease. Best healthcare providers may offer a center or department for patient and community health education [1]. Although, the problem is far to be solved, the trend is positive and role of the web relevant.

Therefore, our main objective was to integrate the patient's data, transmitting them in a plain, yet still scientifically correct, multimedia format that the patient can easily explore and understand through: completeness of basic concepts, "translation" into common language, easy access and surfing.

In order to offer a contribution to this challenge, we realized "My Heart / il Mio Cuore" Project which provides the single patient with an easy multimedia tool which is able to translate the 'obscure' language of the medical report released at the time of discharge from the hospital into an immediate and comprehensible message. The project applies to the field of cardiac diseases and in particular to 'ischemic heart disease'; however, it could be theoretically applied to other cardiac diseases or more generally be adapted to other clinical sub-specialties.

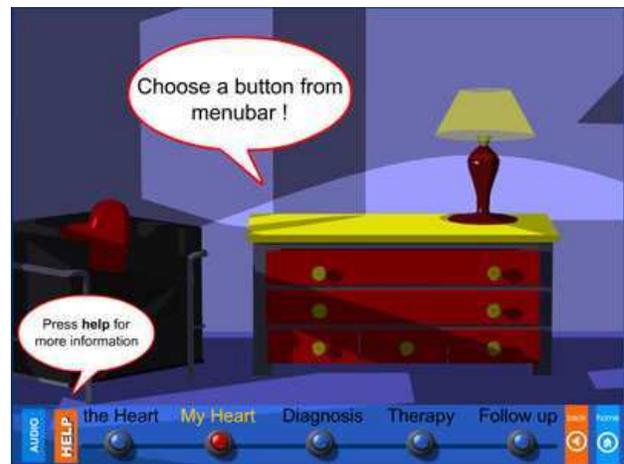


Figure 1: The graphical interface provides a living room scenario with a footer navigational bar. The chest of drawers metaphorically organizes the media chapters, each in a different drawer.

'My Heart' project, was awarded the 10th edition of the Internacional Pirelli Prize as the best product of multimedia communication in the Life Sciences section

[2].

In brief, our application offers patients the possibility to interactively retrieve basic information on the nature and mechanisms of their own cardiac disease, in a simplified but still scientifically rigorous way. They can look at a detailed 3D, dynamic, virtual picture of their heart and its alterations and become aware of the clinical data and instrumental findings supporting the final diagnosis, as well as the therapeutic strategy being followed.

## 2. My heart / il mio cuore

The program “My Heart / il Mio Cuore” provides a multimedia discharge report referring to a patient diagnosed with ischemic heart disease.

It is elaborated by the cardiologist in charge of the patient, at the time of his/her discharge from the Cardiology Unit.

In its overall format, the program is composed of five modules gathered into 2 chapters (two modules in the first, and three in the second) that can be browsed according to the patient’s specific interests and curiosity.

The first and opening chapter, “The heart”, provides the patient with the basic notions on circulation as well as with the explanation of the medical jargon used in the report. This section is essential for understanding the referral and results of each medical testing and, more in general, for understanding the nature of ischemic heart disease and its impact on heart function. Accordingly, the chapter is broken down into two modules: the first illustrates the basic concepts on heart function and blood circulation while the second offers a brief glossary of the medical terms belonging to the area of ischemic heart disease.

The second chapter, “My heart”, specifically describes to the patient the conditions of his/her heart as it appears in a synthetic and comprehensive dynamic 3D virtual view. From there, the patient may access to the remaining three modules: 1. diagnosis, 2. therapy, 3. follow-up, which provide additional details on the kind and meaning of tests performed during hospitalization, the type and significance of treatment being followed or assigned, and recommendations and/or scheduled check ups.

Finally, beside each chapter and each module, there is a specific menu, the topics list, where the patient can find the explanation of the topics pertaining to the different areas of interest. As a general scheme each module was formed by a list of topics which appear on the left, and a main pane showing the details of the selected topic.

### 2.1. Target user

The target user is the average cultured patient of a Cardiological Unit, with basic computer skills for surfing

the web. First-time users are tutored by the program through a brief introduction and Help topics, which can be skipped once the user has become familiar with the system.

### 2.2. Graphical user interface

The media graphical interface scenario is thought as a comfortable, dim-lighted living room with a navigation bar footer (Figure 1). The idea is to reproduce a homely environment in which all the medical reports are comprehensible and ordered. This feature is metaphorically represented by a chest of drawers where each drawer stores a chapter or a module of the media. Thus, each time the user explores a new section, the related drawer opens up and the content shows up on the screen. The multimedia was developed using Flash technology.

The graphical synthesis of the patient disease was represented by a 3D dynamic heart model obtained using Java and Java3D application [3].

### 2.3. The heart

This chapter provides the patient the basic information on the disease he/she is affected by—namely ischemic heart disease, a disorder of blood supply to the cardiac muscle responsible for chest pain and loss of cardiac function. Background information ranging from heart anatomy and function up to coronary disease, myocardial ischemia and infarction. Understanding of basic notions does not require any prior medical knowledge.

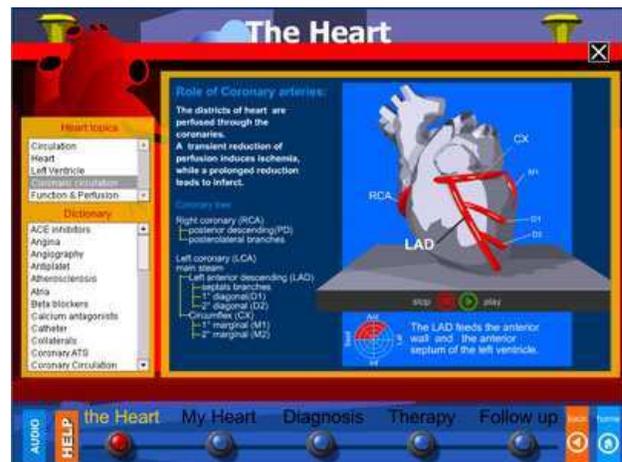


Figure 2: The front page of chapter “the Heart”, with the list of topics and the small dictionary, or glossary, on the left. The main pane shows the information on the selected topic.

The chapter is divided into two modules. The first module is composed by 5 sections that contain motionless and in-motion cartoons on blood circulation, cardiac

anatomy and function, risk factors, coronary atherosclerosis, ischemia and infarction. The second module contains a brief glossary of cardiology terms (Figure 2).

In more detail, the first section deals with the pump function of the heart and the flowing of blood in the systemic and pulmonary circulations. In the second section, the 4 chambers of the heart are described as well as their way to contract and relax. Then the attention shifts to the left ventricle and to the bull’s eye representation of its main features: mechanical function, perfusion and viability. The forth section contains the scheme of the coronary arteries, introduces the concept of blood perfusion of the cardiac muscle, and the dependence of its distribution to the different sectors of the ventricular wall upon the anatomy of the coronary tree. Starting from the preliminary illustration of coronary obstructive disease (atherosclerosis) which causes alterations in blood supply to different segments of the ventricular wall, the concepts of regional ischemia and infarction are introduced. Finally, the fifth and last section discusses the relationship between ischemic heart disease and regional and global cardiac function with a graphical model.

In the second module, a glossary includes more than forty items covering all the topics treated in the above sections and in chapter two.



Figure 3: The picture of the patient heart disease with the evidence of the remarkable points was the kernel of the chapter my heart.

## 2.4. My heart

This chapter represents the kernel of the media. It contains the discharge report written by the patient’s cardiologist, enriched by the schematic picture of his/her heart (Figure 3). Each crucial alteration is briefly described and discussed in terms of “evidence”, “causes”

and “treatment”. To this purpose, each alteration reported in this chapter is linked to the modules dedicated to provide detailed information on diagnosis, therapy, and follow-up.

## 2.5. Diagnosis

In this module the diagnostic process is described by the list of medical tests that the patient underwent during hospitalization. Test results are reported and discussed, explaining the alterations found and defining the overall functional state of the patient’s heart (Figure 4).

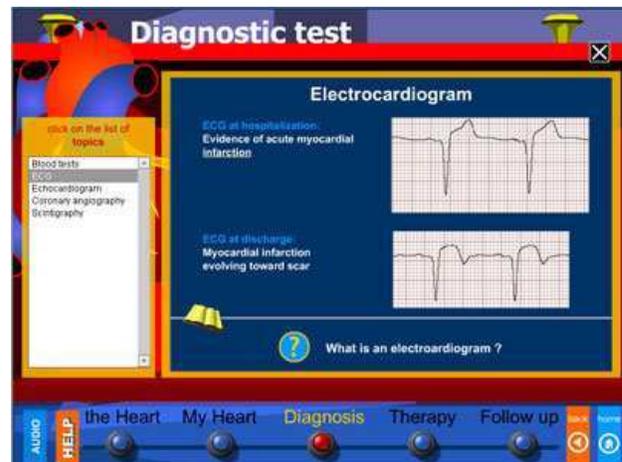


Figure 4: The module on diagnosis contains the results of the tests the patient underwent during hospitalization.

## 2.6. Therapy

The “therapy” module describes the treatment suggested to the patient at the time of discharge from the hospital, the mechanism(s) by which each measure is supposed to work in combating the disease, the possible side effects and how they can be limited (Figure 5).

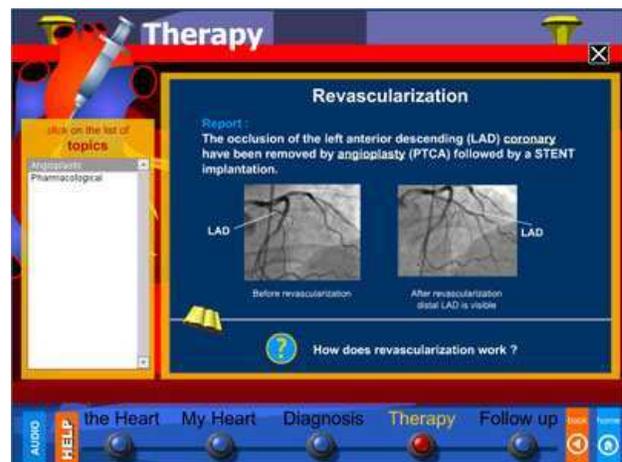


Figure 5: The module on therapy contains the info about the invasive and the pharmacological strategy.

## 2.7. Control and prevention

This last module is a reminder of the indications and suggestions the patient received by his specialist on diet, lifestyle, and so on, as well as future testing and medical controls.

## 3. Discussion

The project was conceived considering the communication obstacles that often interfere with physician–patient communication, which are apparent from the very first lines of a typical discharge letter: “We hereby discharge in the date of...Mr XY of years Z with the diagnosis of: anterior acute myocardial infarction with total occlusion of the proximal tract of the descending artery revascularized by primary angioplasty and stent implantation, global compromising of left ventricular function...”.

Very commonly, medical matter and jargon are totally “obscure” to the patient who remains for this reason the passive counterpart of the physician-patient relationship. To overcome this limitation, medical jargon and matter require to be “translated” and organized in a plain but still scientifically rigorous knowledge. Leaving the patient alone in the ocean of information—internet included— is not the solution, as plain language, correct and complete information are not warranted and, more importantly, are not specifically addressed [4]. Addressing them to a health educational tool, not patient-specific, could be a first important step forward.

The learning process has to be gentle in terms of approach number of questions and topics, level of complexity, psychological involvement and time consumption. With this background, our choice was to build a “certified” tool containing a minimal set of concepts and information limited to the patient’s disease, its causes, therapy and long-term perspectives. My heart program was designed as a closed system not requiring any medical background to be understood and limited to a predefined level of complexity. Different kinds of user,

according to their interest and background, are free to choose at each time the pathway most appropriate to their knowledge. Of course, once the patient has gained awareness of his/her cardiac disease, he/she could go on to explore additional informative sources.

## 4. Conclusion

This project, aims to reduce the gap in communication between healthcare providers and users, by offering an all-in-one multimedia instrument for describing the patient disease, basic medical concepts, through graphics, animations, and a plain yet authoritative language. By providing patients with the basic notions and technological means to be aware of their health status, they can truly be part of the decision process.

Although this is only one example of how computer technology can aide in the medical setting, it appears to be a promising yardstick in the improvement of healthcare communication.

## References

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