

## DEVELOPMENT AND EVALUATION OF ENDOCRINOLOGY PRESCRIPTION SUPPORT APPLICATION

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### ABSTRACT

In recent years, medical informatics has played an integral role in medicine, biology, and public health. The emergence of medical informatics as a discipline is largely due to advances in information technology, and an increasing awareness that biomedical knowledge about patients are essentially unmanageable by traditional paper-based methods.

This study aims to develop a web application to assist endocrinologists in standard therapeutic protocols used in clinical and therapeutic aspects of endocrinology and drugs, and to contribute to a better management of drugs, and patient management recommendations.

We outline key concepts as well as the application development stages of the application. The development of the application consists of defining needs, objectives and target audience, locating stakeholders and identifying their roles, modeling, choosing the most appropriate technology tools to reach the maximum targets, and finally developing the application.

Endocrinology Prescription Support Application (EPSA) was developed for better information diffusion and communication within the endocrinology community. The application is enhanced by dynamic documents using small interactive scripts (JavaScript), e. g. Body Mass Index (BMI) calculation and interpretation.

The use of these systems and their success rely on medical informatics which establishes connection and communication between computer scientists and endocrinologists to develop better integrated systems in their daily practice.

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**Key words:** Endocrinology prescription, Medical Informatics applications, Morocco.

## INTRODUCTION

Medical Informatics incorporates basic principles of telecommunications and medical computer systems, and use of communications software. The emergence of medical informatics as a discipline is largely due to advances in information technology, and to the fact that biomedical records data are now essentially unmanageable by traditional paper-based methods; hence the recourse to appropriate informatics integration into the health care system.

Medical prescription applications are one of the most important applications of medical informatics; the aim of which is to improve medical decisions through the use of information technology [1]

In recent years, North America and Europe have seen real advances in the understanding of medical informatics applications [1- 3].

In contrast, in Morocco, little progress has been registered in the field of medical informatics applications, whether in the area of academic studies, or research. More importantly, there is a significant dearth of health care support systems application and the present study proposes to address that need.

The present study attempts to present a web application, discuss its functionality and development method and evaluate its implementation. The web application in question provides endocrinologists with the therapeutic protocols, used in endocrinology, and offers a series of recommendations to physicians that would assist in patient care management.

The proposed web application was made possible through collaboration between Casablanca Medical Informatics Laboratory and clinical partners at the University Hospital of Casablanca-Morocco.

## METHODS

The present research presents a medical informatics project for managing medical prescription in endocrinology by developing a web-application that assists physicians in patient care management. In what follows, we outline key

concepts as well as the application development stages of the application. The development of the application consists of the following stages:

Defining needs, objectives and target audience

Modeling

Defining stakeholders and their roles

Choosing the most appropriate technology tools to reach the maximum targets

Developing the application

1.1 Defining needs, objectives and target audience

Endocrinology therapeutic prescription faces a number of challenges in the Moroccan context; first, it is very difficult to take good care of patients, requiring well-codified protocols, and good patient health literacy (e.g. diabetes); second, procedures for supplementary tests are constantly changing, which can sometimes make them difficult to manage; third, diseases can sometimes involve several organs require a multidisciplinary approach and finally the large number of patients reduces the time devoted to each patient; this constitutes a major handicap to good prescription and good patient management.

A needs analysis process should be undertaken in order to provide physicians with the necessary information for their prescription in endocrinology, i. e. therapeutic guidelines, drugs prospectus guides and useful tools for patient education (brochures, images, video etc.), to guide prescriptions for better management of prescription errors by offering some prescription strategies and, standardize therapeutic protocols for a better statistical study of the effectiveness of care and medicines.

As for the target audience, the aim of the application is to assist all Moroccan physicians (i. e. endocrinologists, general practitioners and other medical specialists) for a better medical care management.

## Modeling

The application focuses on therapeutic protocols that are alphabetically or thematically indexed, so that they can be accessed with ease. The model adheres to a specific architecture; therapeutic protocols are first indexed alphabetically and/or thematically, then objects are prospectus drugs

referenced in therapeutic protocols and finally objects represent documents related to therapeutic protocols.

### 1.3. Stakeholders and their roles

The application combines clinical information and medical informatics; this requires a clinical team, represented by the medical staff of the Endocrinology Unit, whose missions are to prepare, validate and update medical content, and notify the medical informatics team about essential updates; a medical informatics team, represented by the staff of the Medical Informatics Laboratory; the latter is responsible for modeling information, developing and monitoring the application for updates taking into consideration the user's feedback.

### Choice of Information Technologies

Web technology is the most appropriate means for a wide diffusion of information to distant users. Being developed as a website, the application can easily be integrated into the hospital information system and the health patient record [4].

The application is based on the PHP (Hypertext Preprocessor) as its web server language program;

the arguments for this choice are that PHP is a highly scalable open-source language following the evolution of information technology; it is a very rich language in features giving multiform information processing; it is a server-side debugging language that allows no conflict on the client terminal and easily adaptable to different web browsers.

## RESULTS

### Application Presentation

Endocrinology Prescription Support Application (EPSA) equips Endocrinologists with the necessary tools for a better therapeutic management of patients. The application was developed as a website for better information diffusion and communication within the endocrinology community (Figure 1). The application is enhanced by dynamic documents using small interactive scripts (JavaScript), e. g. Body Mass Index (BMI) calculation and interpretation.

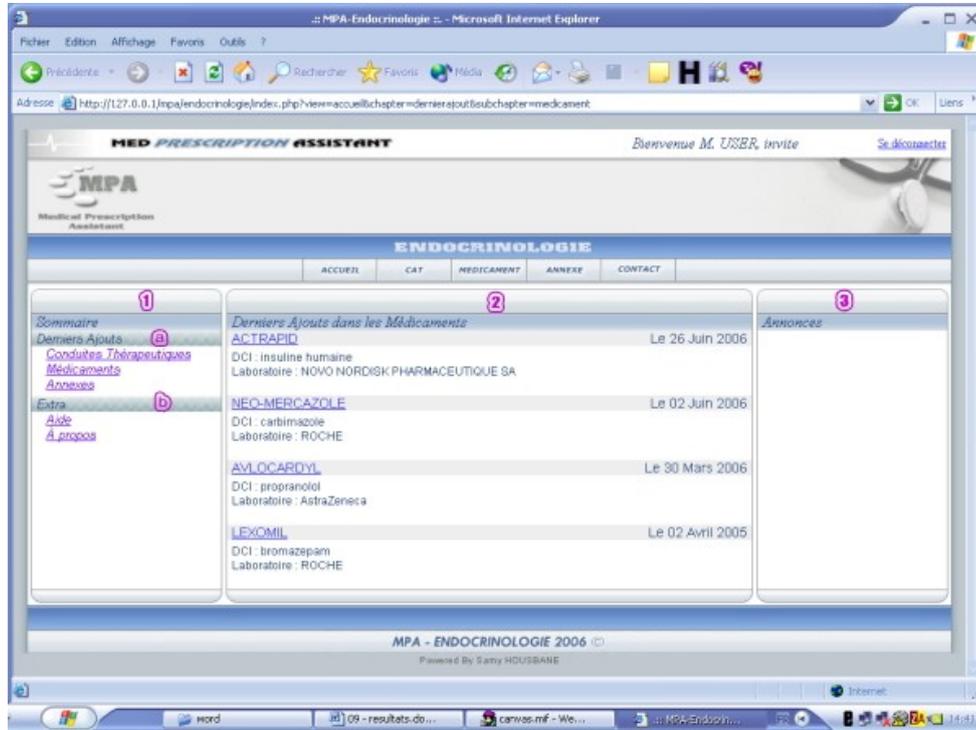
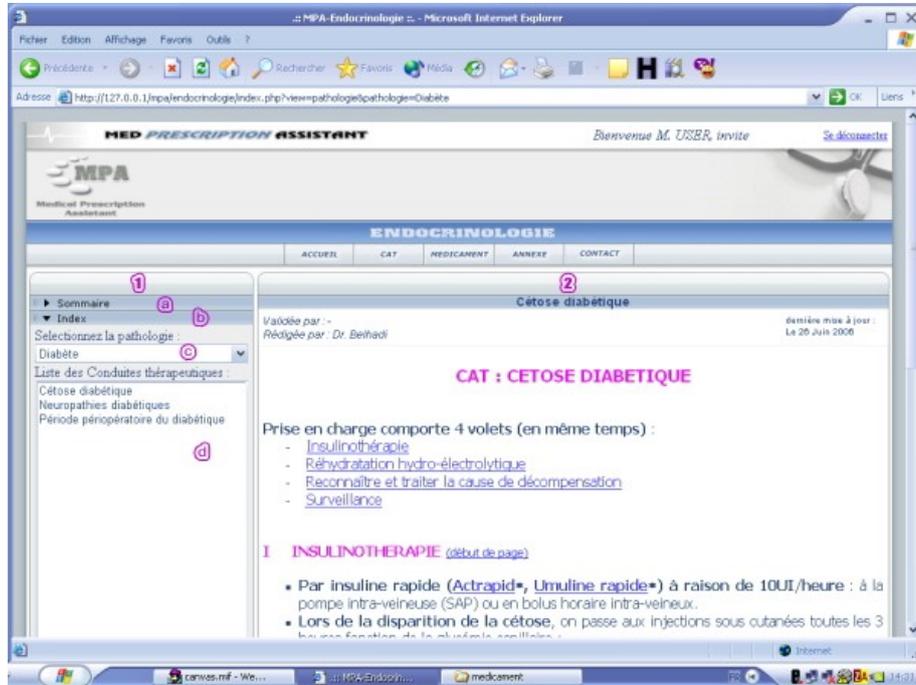


Figure 1 : Application – Home web page

The application contains three web pages: the first webpage represents therapeutic protocols for

endocrinology disorders indexed alphabetically and/or thematically (Figure 2);



**Figure 2 : Application – Therapeutic protocols webpage**

The second webpage represents drugs prospectus including information about drugs referenced in therapeutic protocols (Figure 3).

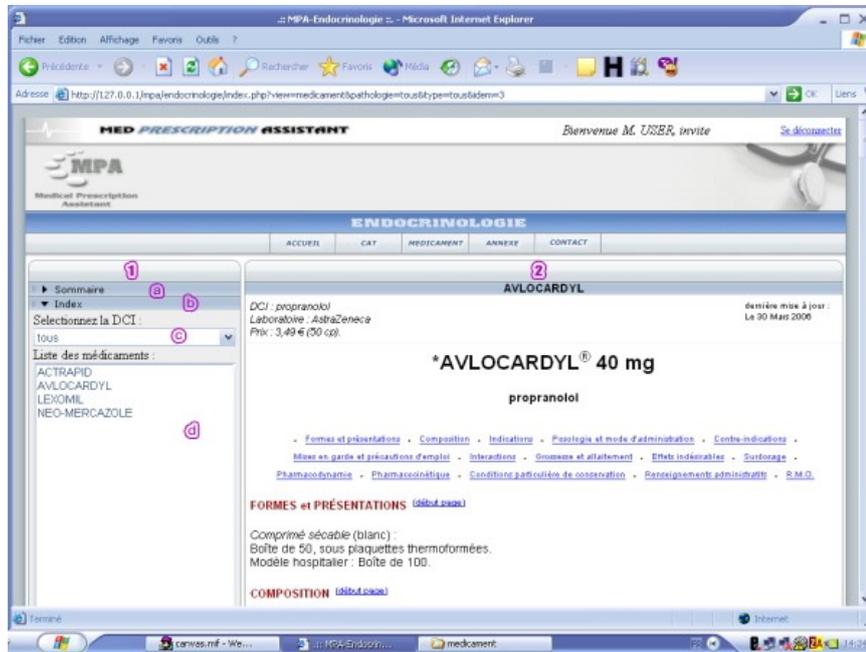


Figure 3 : Application – Drugs prospectus web page

The third webpage contains all associated documents such as brochures, images, audio, video, charts, diagrams, flowcharts, etc. (Figure 4).

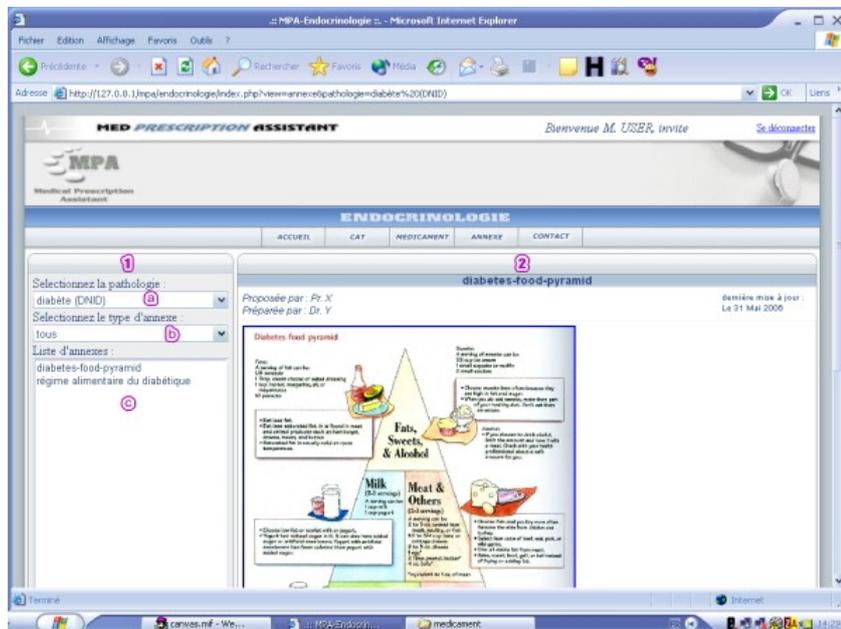


Figure 4 : Application – Related documents web page

## Applicability

In order for a physician to check a diabetic ketoacidosis therapeutic protocol, its drugs (insulin) and some related documents for patient education (type of foods allowed or forbidden), she/he should perform the following: First, she/he should open a web-browser and type the application address for starting the application (Figure 1); then, open therapeutic protocols webpage by clicking its icon (Figure 1); third, click the link corresponding to diabetic ketoacidosis disease in the alphabetical menu or the thematic menu (Figure 2), and finally, read information about the disease and access the other documents (drugs or annexed documents) by following their links (Figure 3, Figure 4).

## DISCUSSION

### Application positioning

Information systems, databases, computer files facilitate decision-making by improving access to relevant data and putting them in perspective. Nevertheless, they differ depending on the type of problem, method of intervention, the nature of the interaction, the field of study and the method adopted [4- 7].

Decision-support system can deal with two given problems [8] : a classification problem or diagnosis and an optimization problem.

Our application (EPSA) serves to solve the problem raised in 2; its purpose is to indicate which approach is the most effective (e. g. a therapeutic strategy) in light of the objective and constraints (cost, risk, difficulty, environment).

### Application Evaluation

The first feedback for the application use was undertaken by physicians in the Endocrinology Unit; they suggested the application content should not be public, so it will not encourage auto-medication. Therefore, we used the application on intranet with a log-in form instead of the internet. The second issue raised was that the medical content needs to be exhaustive; the Endocrinology Unit is understaffed; this does not allow them to elaborate and validate more therapeutic protocols. A second evaluation will be undertaken a year later; its purpose would be concerned with the assessment of therapeutic clinical management; the quality of health care, and patients' satisfaction. Such assessment would constitute another avenue of

research to be pursued and eventually published [6; 9].

## CONCLUSION

Decision-support systems have a promising future ahead of them provided that an appropriate methodology is adopted, and technological tools are implemented. The use of these systems and their success rely on medical informatics which establishes connection and communication between computer scientists and physicians to integrate information systems in physicians' daily practice. The physicians' adherence to medical informatics has numerous advantages; it puts at the disposal of the physicians the necessary medical knowledge for its prescription in Endocrinology and assists its patient health management by a whole range of recommendations. In brief, it contributes to a better medical prescription in Endocrinology with a view to promoting health informatics projects and their use in health care.

Finally, we hope that such a framework can be implemented in patient-care settings, thus contributing to public health promotion and disease prevention in the Moroccan context. Involving multiple stakeholders and other healthcare providers, in addition to physicians, may help reduce the time and cost involved with implementing these strategies.

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