The Usage of an Informatic System to Improve Monitoring Patients with Diabetes

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Abstract: - The primary objective of the project is to create a medical database that includes all the data needed for efficient monitoring of patients, drawn after meeting the diabetes physicians. For an adequate Diabetes Physicians activity analysis, we obtained data after the focus-groups, data that were interrelated with the analysis of standard type medical forms. The application we used is web-based, realized in PHP-scripts, so it has a great advantage: it can be accessed anytime, anywhere on-line. The data are organized in one database, so that by opening the medical record of one particular patient, you have there summed all his exams, diagnostics, symptoms, prescriptions and investigations. Each diabetes physician has its own username and password. To assure the security and the private character of his data, if the user needs, he has a “change username or password” option available, so he can change them anytime he likes. The user-handbook, the simple, friendly interfaces, the sliding-scenario from a function to another, are strong points for the application, appreciated in the feed-back stage by the diabetes physicians.

Key-Words: - clinical database, informatics system, diabetes physicians, practice management, monitoring patients, focus-groups.

1 Introduction
The idea of realizing an activity optimizing and efficient patient monitoring informatics system for diabetes physicians was drawn after meeting the physicians in this area.

We have designed a database subsequently assuming specifications from diabetes physicians and Diabetes Centre in the county. On its scheme we implemented an application which will gather as many desires of an ideal application for diabetes physicians.

The objectives of the project are:
- Primary objective: to create a medical database that includes all the data needed for efficient monitoring of patients;
- Secondary objectives: to optimize the activity of diabetes physicians practice; to generate the reports for the Diabetes Centre in the county; to identify future development possibilities.

2 Materials and methods
To achieve an appropriate analysis of the diabetes physicians’s activity the data obtained from focus groups were correlated with the analysis of standard medical forms. All data obtained from them will be analyzed and used in the design of the database and then implement in the application.

2.1 “The ideal application for diabetes physicians” focus-group
The meeting-plan with diabetes physicians consisted in making telephonic contacts and establishing the appointments for focus-groups. Themes for focus-groups were “The ideal application for diabetes physicians”. The two focus-groups were scheduled on 12.03.2009 and 15.03.2009, with a presence of 8, respectively 9 subjects. Focus-groups duration was 90 minutes [3].

2.2 “The ideal way of displaying the medical activity within the diabetes physician’s practice” focus-group
The meeting-plan with diabetes physicians consisted in making telephonic contact, establishing the appointments for focus-groups and visiting the diabetes physician’s practice. Themes for focus-groups were “The ideal way of displaying the medical activity within the diabetes physicians practice”. The three focus-groups were scheduled on 15.04.2008, 19.04.2008 and 3.05.2009, with a presence of 6, 9, respectively 8 subjects. Focus-groups duration was 60 minutes.
2.3 Analysis of standard type medical forms
To complete the functional specifications of diabetes physicians the following standard type medical forms were analyzed: medical receipt, receipt for medical exemption, ticket of dispatch, medical certificate, medical prescription and medical certificate of death.

After analyzing the standard medical forms, new attributes were added to the already existing entities, leading to a big part of the encoding needed for standardization.

For an adequate diabetes physician activity analyse, data obtained after the focus-groups were interrelated with the analysis of standard type medical forms. All data obtained after this analysis were reanalyzed and used to project the database and later to implement the application.

The program is realized with PHP, HTML and JavaScript scripts, so that the interaction between the elements of the interface, realizing the bond between the user and the data, stored in the database, is easy.

In the final stage, the program was tested for reliability and examined with critical eyes by diabetes physicians, which had the opportunity to test it and make suggestions for improvement.

3 Results

3.1 Informational flow
The diabetes physicians practice informational flow, presented in Fig. 1, was established after analyzing the main diabetes physicians’ activities, the standard type medical forms and their informational content, the diabetes physicians and Diabetes Centre in the county specifications [1].

3.2 Database
As a result of the complex analysis, we established the entry-data, which afterwards will be processed by application used. All data will be stored in one single database, but in different tables, according to their purpose. There are several primary-keys, these enforce to the column attached a unique value. Most cases are represented by an identification field (ID_Consultatie, ID_Diagnostic, etc.) with auto increment function for speed optimization [2].

The entry data are inserted manually by each user (diabetes physicians). The user accounts, so as each diabetes physician’s data are created and filled in directly in the specific table of the database, by her supervisors.

The database was structured modular, containing 10 modules: Users, Patients, Appointments, Consultations, Consultation Register, Medical Certificates, Prescriptions, Reports and Deceases.

The Users module contains data about each user (diabetes physicians). Within this module the database supervisors define the usernames and passwords, as well as all the specific medical practice data where the physician is carrying on his activity.

The Appointments module was incorporated in the application considering time management optimization, by the schedule of all medical visits for doctors working in polyclinic.

Observation charts are used in the hospital and consultations registers are used in polyclinic, this way doctors can access the database both from the polyclinic and the hospital, after of course the database is completed, depending on how patients are interned or as coming to advice for Diabetes program established by the Ministry of Health.

The Patients module contains the demographic and insurance type data about all the patients, but also their general information: medical case history, risk factors, etc.

In Consultations Module we cumulated all consultations rendered to a patient, as well as the dates about symptoms indicated by the patient, the diagnose given and the way of finalizing the consultation (send to supplementary investigation, sick-leave certificate, prescription, medical receipt, establishing a final diagnosis).

In the Medical Certificates Module we united all medical certificates (supplementary investigations, sick-leave certificate, prescription, medical receipt) given out to a patient as a finality of a certain consultation.

In the Prescriptions Module are reunited all prescriptions of a patient, tight in touch with the finality of a certain consultation.

Each polyclinic consultation carried out by the diabetes physicians must be registered, thus we
created a separate module, entitled Consultation Register. The Deceases Module contains all necessary data so the diabetes physicians can emit, in the case of the death of a patient, the death certificate. The Reports Module achieves the reports diabetes physicians have to make to Diabetes Centre in the county on the strength of the data existing in the modules previous presented.

3.3 Application used

In the moment in which the application is accessed, a login page web is displayed, presented the in Fig. 2:

The primary account customization is done by the database supervisors, following by telephonic contact to the user in regard to communicate his username and initial password. From the login page the user has also access to special functions for his account, so he can: change the username and the password, obtain his account data on contact email, in case he forgot them, change of practice data.

After login, is opened the application’s main page which contains a menu with application’s all functions: to check the Consultation Register or observation charts, to check the patient’s register card, to insert a new patient, to initialize a consultation, to make an appointment, to generate the report for the Diabetes Centre in the county and to select the patients according to certain search norms.

By initiating a consultation the user can make a choice between a series of reasons for presentation: symptoms, examination of balance-sheet, prescription, supplementary investigations, and medical receipt. In the consultations page the user has the possibility to review a series of the patient’s risks and enter supplementary ones. Finalizing the consultation gives the user the possibility to choose between: diagnosis, supplementary investigations, prescription, receipt, sick-leave and nutritional diet.

All these can be found for each patient in his register card. Another important function is accessible from the patient’s register card, namely, the possibility to fill out the results of the results for supplementary investigations.

From the patient’s register card are also available the functions for patient’s death.

4 Discussions

One of the objectives suggested and fulfilled by this project was to create a medical database which contains all the information in an organized way, necessary to efficient pursuit patients, but also for the monthly indispensable report for the Diabetes Centre in the county. Thus, the database contains information about the patient and all his medical data. The information is organized in categories, so that their retrieve is easy.

The possibility of addition, reviewing and pursuing the patient’s risks and their evolution were appreciated in particularly way in the feedback part by the diabetes physicians. This possibility permits the pursuit of progresses or regresses incident to patient’s life style. We considered necessary this pursuit especially in actually present interests where an important percentage of current pathology presents the habitual and occupational risks.

Of significance to the diabetes physicians is the patient’s compliance (for instance if he went for supplementary investigations as recommended). The application permits easily to check this fact through the display in patient’s register card of all the supplementary investigations whereat the patient
brought no result. Thus, a noncompliant patient can be followed and assured that these investigations are necessary or even vital for his health.

5 Conclusions

5.1 General conclusions

The application can be accessed anytime, anywhere, because it is web-based. Through the programming mode adopted (PHP scripts [4], database based on a MySQL server [5]), the application can be used by anyone, even if the PC he owns is not last generation.

Because the application is projected and programmed in freeware software its costs are substantially reduced (the licenses-costs are completely eliminated), the program is in reach for every physicians that owns a PC.

The simple, intuitive interfaces, the structured mode of organizing the information, as well as the Romanian language version of the application, makes it indeed useful to any diabetes physician who wants a simple access to absolute any information about his patients and about the activity that takes place in the physician’s practice.

The user-handbook, the simple, friendly interfaces, the sliding-scenario from a function to another, are strong points for the application, appreciated in the feedback stage by the diabetes physicians.

5.2 Future research and development directions

In consideration of the modular design of the application, the possibility of including other modules is available. One of the additional modules that can be included is the Bio Statistical Data Module which will be developed along with the Public Health and Medical Informatics Department of the University of Medicine Transylvania Brașov. This module will have as objective to create the possibility of advanced patient data processing for the diabetes physician, to create correlation analysis between the disease and its symptoms and to realize regressions.

Another additional module is the Maintenance Functions Module that will include: the possibility of a security copy, the possibility of creating data archives, the data import and export.

The other development possibility is to enhance and extend the existing modules:

- For User Module: to send a validation link on the user's email in case of changing account data;
- For Patients Module: to import and export the patients with all their data, developed in case that patients switch physicians for users of similar application;
- For Appointments Module: to alert the diabetes physician that a patient didn’t respect his appointment, through the correlation of appointments with Consultations module and to alert the patient, through email, that they have an appointment and ask to confirm it;
- For Consultations Module: to correlate the reasons with the consultations type, to expand consultation standardisation for complex reports in order to develop scientific papers, to correlate the patient’s state of health evolution by comparing an annual balance-sheet to other through the development of a standard of evaluation and an alarm which will alert the physician;
- For Prescription Module: to calculate the totals compensate value of monthly prescribed drugs according to the Health Insurance House norms;
- For Sick-leave Module: to calculate the number of sick-leave days granted to a patient;
- For Deceases Module: to correlate the decease causes with personal and heredocolateral antecedent, also with the conditions of life; to standardize the decease causes with the aim of using them in statistics and prevention;
- For Reports Module: to expand the module through the addition of reports to another house of assurances or institution of assurances in the conditions of extending of the private medical assurances.

References:

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