~ PATIENT MANAGEMENT SYSTEM FOR HOSPITALS ~

Criteria	TA/Grader	Instructor
Presentation		
Overall		

Yusuf Doğan 21702970

Kardelen Ceren 22003017

Konur Alp Yıldızkan 21802580

Efe Can Tepe 21903187

Eylül Badem 22003079

Emre Uğur 22002802

Requirements Stage

(version 2.0)

6 April 2021

1. Introduction

The ongoing pandemic has shown us that easy and quick communication between hospitals, doctors and patients is, in addition to being practical in day-to-day life, essential for saving time and in some cases lives. In one word, it is indispensable. Even though in the past such communication was done on paper and patient files were stored in physical archives, with the advance of information technologies it has now become unacceptable to not take advantage of the effectiveness of online, instant communication software currently abundant in the market. The alternative we offer to such programs is a full-fledged management system specifically designed for hospitals that will ensure fast and effortless communication with the patient database. A doctor will rapidly access all the necessary information about their patient including previous visits (to any hospital), illnesses, medication etc. to be able to give the correct diagnosis more efficiently. Moreover, they will be able to edit the patient's files to add their diagnosis, to prescribe medication along with other purposes. The patient will also benefit from this tool by checking their own hospital visits, prescriptions, vaccines

and so on using a different, patient-oriented interface. All in all, this management software will make both the doctors' and patients' lives easier.

2.   Details

2.1   General Info

This management system will be a desktop app.

The system will recognize three different user types (and will restrict what they may access accordingly) depending on the option chosen from the log-in menu: admin (one for each hospital), doctor, patient. Admins will have access to every file (of doctors and patients in every hospital), a doctor will have access to all the patient files (in every hospital) and a patient will only be able to see their own medical information. "Access" here means being able to view. Editing privileges are specified according to user type below.

There will be a drug and disease database added into the software. Admins will be able to add, delete or edit these drugs' and diseases' info for their own hospital. While looking through them, any doctor or admin will be able to filter these drugs and diseases depending on different subjects (dermatologic, neurological, respiratory etc.). Drugs and diseases may be individually searched by name. Drugs' side effects, along with any known clashes with other medicine are listed.

There will be a scheduling system in the app that patients and doctors can use to schedule appointments.

All the users will receive notifications in the app in case their file is updated.

2.1.1 Patient Notation

The app will use a special notation which is created by us for representing the patients data that can be exported to other applications (that uses the same notation system).

This notation will be similar to FEN notation that is used in chess for representing pieces' location on the board. (i)

2.2   Data

2.2.1 Hospital Data

Hospitals will have information including but not limited to:

a. General information: Name, address

b. Departments (such as cardiology, oncology, neurology…) along with their equipment info

c. ICU (Intensive Care Unit) bed capacity along with their occupancy percentage. This occupancy percentage will be calculated by dividing the number of people currently in ICU beds by the ICU bed capacity. Every user type has access to this information however individual ICU patients' names can only be seen by that hospital's doctors and admin.

2.2.2 Patient Data

Patients will have information including but not limited to:

a. Demographic information: Name, age, sex, birth date, death date (if applicable), nationality, ID number, religion and occupation (as one's profession may affect which diseases they are more likely to contract)

b. Contact information: Phone number, address, e-mail of the patient and of their emergency contacts (along with the relationship to the patient)

c. Medical information:

    i. Blood type, chronic and genetic diseases, current medication (dosage and frequency included), allergies, vaccinations (and immunizations), phobia, organ donation info

    ii. (Along with relevant diagnosis and physician information) Past illnesses, injuries, surgeries, hospitalizations, pregnancies

    iii. Family health history: If blood relatives are in the database, they will be shown here with their chronic and genetic diseases – clicking on their name will redirect to a page where their detailed information can be seen if the user has access to it. If patient's relatives are not in the database small notes added by the doctor such as "Mother – alive, has diabetes type 2" are shown. Moreover, system will inform the user if a married couple has incompatible blood types which is very important in case of a possible pregnancy

    iv. Patient's social history (ii) (substance use -alcohol, tobacco, drugs-, diet, sleep…)

    v. ICU (Intensive Care Unit) usage past and present with hospital info

    vi. If dead, then reason of death, time of death

d. Insurance information

e. Patient's own notes

2.2.3 Doctor Data

Doctors will have information including but not limited to:

a. Demographic information: Name, age, sex, birth date, nationality, ID number, specialty

b. Contact information: Phone number, address, e-mail

c. Current and past patients assigned to them

d. Past diagnoses, surgeries, prescriptions etc.

e. Schedule

2.3 Scheduling

There will be a scheduling system in the app which allows patients to list available doctors in a specific date and time, schedule or postpone an appointment. Doctors will be able to see their own schedule for the day/week/month and set the time interval they will be receiving patients. Admins will see every doctor's schedule in their hospital and set lunch times.

In case a doctor needs to cancel an appointment, a notification will be sent to the patient who may choose to postpone or cancel the appointment or choose another doctor.

2.4 Statistics

The system will provide statistics and graphs to the user. The content of these statistics will be determined by what the user will have access to. In addition to default graphs (that the admin will have chosen), the user will be able to create graphs by choosing what they would like to see represented. The graphs will be either line graphs or bar graphs, whichever makes more sense given the data.

Available choices for these graphs **for admins and doctors**:

(In all of the choices mentioned below, the user will be able to choose which patient's data will be viewed through a filtering system. For example, the data they choose could be for one specific patient (or specific patients), for all patients or for patients in a particular age range, with a particular occupation, disease, allergy and so on. In addition, the user can choose which hospital's patients should be represented. They can choose a specific hospital, specific hospitals (based on name or location) or all hospitals in the country (or rather in the system))

- Hospital visits over time
- A specific disease seen in patients over time
- A specific drug prescribed over time
- Surgeries over time (the type of surgery can be stated)
- Deaths over time (reason of death can be specified)
- Known substance use over time
- ICU (Intensive Care Unit) availability over time (for this one only the hospitals viewed can be filtered)

Available choices for these graphs **for patients**:

- Hospital visits over time
- Medication use over time

2.5 User Type Details

2.5.1 Admin

Admin privileges will be given to one user per hospital and only they will be allowed to change hospital data (except the data that is calculated automatically). Admin will be able to view all doctors' and patients' demographic and contact information in every hospital. However, they will only be able to edit the doctor files of their own hospital (and add doctors to their own hospital) and they will not be able to edit any patient files.

2.5.2 Doctor

Doctors will be able to see other doctor's names and specialty. They will also view all patients' names but not their other data in all hospitals. (To see all their data, they must assign

the patient to themselves as detailed below – which creates an official trail that they accessed that patient's data so the doctor will be held accountable if need be)

They will be able to assign a patient to themselves or refer any patient (i.e., assign a patient to another doctor from any hospital).

If a new patient comes by (who doesn't have their data on the system), the doctor will be able to add this patient to the system's database. This will be done through a form for the doctor to fill in. (For this patient a random password will be created which will be given to them through their doctor – all users can change their password whenever they please)

Mechanism of this patient's file is simple: each patient has one record of their information. This copy can be seen by the doctors assigned to them by default. Moreover, the doctor may share their patient's info with their colleagues from any hospital.

If a patient comes, the doctor will search for the patient by name. If the patient isn't registered, doctor will create their file as mentioned above. If the patient is registered but not assigned to the doctor, doctor will assign the patient to themselves. If the patient is registered and also assigned to the doctor then the doctor will see the option to create a new consultation. Upon choosing this option, the doctor will be able to write their observations, diagnosis (if any) and prescriptions (if any). Prescription can be sent to patient's phone via SMS. Doctor may also refer this patient to another doctor (with or without unassigning themselves) by choosing the doctor from the list or by dragging a doctor's name to the patient's file.

Doctors can also add surgery information (past or future).

Each consultation and surgery will show the relevant doctor(s). Clicking on their name will redirect to a page with the doctor's information.

Doctors will not be able to edit sections of the patient file they haven't created (i.e., a doctor will not be able to change another's doctor's prescription or consultation notes)

Doctor can request transferring the patient to another hospital. In that case system automatically evaluates and lists hospitals from most suitable to least suitable by looking at these criteria:

- The proximity of the hospital

- Relevant equipment situation in the hospital

- If necessary, the ICU occupancy

- Availability of the doctors at that hospital (of the relevant department)

Doctors will also have a window for visualizing patients' certain medical data through a graphical human body representation. For example, if the patient broke their left arm, there will be a sign on the image's arm to remind the doctor that there had a been a problem before. Doctor can click the sign for further information. Diseases that affect the body as a whole will have their little signs above the body. Information on the graphical body can be added manually by the doctor but by default the system will place signs on the body depending on the data the doctor has already entered.

If the doctor tries to prescribe a drug that is known to have side effects with a known condition or another medication that the patient has, the system will automatically warn the doctor. However, the doctor will have the ultimate call.

2.5.3 Patient

Patients will only be able to access their data rather than all the data of the hospital. It will be possible for the patient to do these:

- Download their data as a pdf file

- Edit their contact information

- Create graphs based on their own data

- Get information about doctors and hospitals

- See their minor children's data

- Request to be reminded of the medicine they have to take regularly at the correct time by SMS

- List available doctors in any hospital in a given time frame and in a specified department and schedule an appointment.

In addition to the scheduling method above, the patient may choose for the system to find them the most suitable hospital depending on:

- Proximity to user's location (their location will be typed manually)

- The department of the hospital the patients wants to go (For example if the patient has a heart problem, the system will not recommend a hospital without a cardiovascular department)

- Available time for the patient (input by the patient)

- Insurance situation of the patient (will look first for the hospitals that accept that type of insurance)

Patient may also add notes about themselves to remember at the doctor's office. This note-taking field can be thought as a simple notepad. Only the patient can see this information, however while the seeing the patient the doctor may send a request to send these notes. In that case, an SMS with an access password will be sent to the patient's phone which the patient will relay to the doctor. Upon entering this password to the system, the doctor will be able to access patient's notes. Each password can only be used once and the system will generate a new password each time.

4. Summary & Conclusions

All in all, our hospital management system will be seamlessly integrated into the needs of the modern health system. Our aim is to solve real world problems. Many hospital programs in the market only provide one type of interface, which creates a confusing atmosphere. With these two interfaces (Patient and Doctor) we aimed to make a user-friendly software which will be used in all the hospitals in Turkey.

Works Cited

(i)   https://en.wikipedia.org/wiki/Forsyth%E2%80%93Edwards_Notation

(ii)   Srivastava, Sneha Baxi. "The Patient Interview." *Fundamental Skills for Patient Care in Pharmacy Practice*, by Sneha Baxi Srivastava and Colleen D. Lauster, Jones & Bartlett Learning, 2014, pp. 17–19.