2014

Health Care System

DataBase project

Leonid Dubovyi, Valerii Doroshenko, Nadine Kovalenko
Vanier College™
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Business Case: ***Health Care System***

OBJECTIVES OF THE PROJECT

Current Health Care situation in Quebec and the whole Canada requires some changes to allow numerous patients use this Health System more effectively. Every city in Quebec, especially big ones like Montreal, requires reducing the waiting time for patients and fastening the access to medical services. Thus, increasing the efficiency of supporting medical staff will lead to solve this issue. Moreover, it will lead to increasing the efficiency of the work of general staff in hospitals or other health care institutions. In most cases the waiting time depends on the time spent on filling up necessary forms, the time spent on gathering the necessary information about a patient, time spent on checking the availability of doctors or nurses at the time of a patient visit, time spent on making the primary anamnesis and etc. Almost most of that time can be reduced by implementing the proposed project.

Finally, this project allows medical staff and patients to receive and send all necessary information in on-line mode. It will allow patients to fill in on-line forms, to schedule and reschedule an appointment, medical staff and laboratories exchange the information in on-line mode and so on. Those actions are usually performed by the phone or at the patients' presence in hospitals manually. Proposed system can be very useful in cases of planned visits, and when people don't have any urgent cases. But even in such case, process of filling up electronic forms is much more easily for medical staff then filling up the paperback forms.

All information mentioned above, it's only a tip of an iceberg. But even so, many hospitals and clinics are required to adopt the use the computer system which allows sharing information with other health care institutions, such as laboratories and independent specialists. It allows patients to retrieve medical information about their current state, to replace the paperback information with its digital copy.

So far current health care electronic systems are divided on three categories:

- an electronic health record (EHR);
- an electronic medical record (EMR);
- a personal health record (PHR)

An electronic health record (EHR) is built to share information with other health care institutions, such as laboratories and independent specialists. An EHR contains information about all clinicians involved in patient care. Moreover, authorized clinicians can access the information they need, to provide better treatment to a patient.

An electronic medical record (EMR) is a digital version of paper charts in a doctor's office. An EMR contains notes and information collected by and available to clinicians in that office. A fully implemented EMR system allows electronic storage, retrieval, and modification of patient information. It is the chance for departments within the health organization to collaborate providing patients' care. In hospitals and clinics, these federally backed EMR systems will replace hundreds of different applications used by physicians, radiology personnel, and even hospital administration.

A personal health record (PHR) contains the same types of information as a electronic health record—diagnoses, medications, immunizations, family medical history, and contact information for health care workers, but it is designed to be set up and accessed by patients themselves.

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With impact of information technology, the proposed project will join all three variants of the current systems into a unified one. In the common case health records will be made available via large clinical systems in hospitals and health care institutions. And the goal of health record projects is to make personal health information accessible and transportable, which is beneficial to both consumers and health care workers. Hereafter, there is just an example, what kind of information can be gathered through this system:

Data in an electronic medical record

- patient demographics
- medical history, results of examinations and progress of reports of health state and diseases
- medication and allergy lists, and immunization status
- laboratory test results
- radiology images, x-rays, computer topographies' or CTs, MRIs, etc
- photographs, from endoscopy or laparoscopy or clinical photographs
- medication information, including side-effects and interactions
- evidence-based recommendations for specific medical conditions
- records of appointments and other reminders
- billing records
- eligibility
- advanced directives, living wills, and health power of attorney

So now we can see some benefits of the proposed project:

1. Health Care System (HCS) reduces the possibility of medical errors
2. Features, such as integrated drug databases, symptom checks, and drug interaction verification, help physicians prescribe correct medications and right dosages.
3. HCS improves patient care and treatment, lower administrative costs, and improve billings and collections.
4. Increasing the number of patient visits per day is taken into account in order not to reduce the quality of care.
5. Duplicating of tests and clinical assessments is reduced
6. According to "The Health Level Seven International. Introduction to HL7 Standards" gathering of information is used according to the standards.
7. HCS increases physician efficiency, reduces costs and promotes standardization of treatment and patient care. Physicians find themselves with more time to focus on patient care as they eliminate paperwork, speed up medical charting, receive lab test results electronically, and make prescriptions electronically.
8. HCS provides the good level of privacy, which is executed according to the right of privacy for all Canadian citizens who interact with health professionals.
9. As physicians and support staff spend less time conducting and tracking paperwork, they are able to see more patients. HCS also allows physicians to complete and to document patient encounters more quickly, thus increasing their ability to provide more qualified care and take care of more patients.

10. One of the top benefits of electronic health records is serving more patients which naturally increases the flow of patients served as well as statistical information. Electronic patient records provide physicians with the necessary documentation to support claims sent to insurance companies, Medicare, and Medicaid.
11. HCS can also provide prompts to physicians based on inputs of patient major complaints and/or risky demographic factors.

PROJECT ALTERNATIVES

There are some current alternatives (EMR and EHR):

1. **Epic®.** Is presented in two variants of software: for hospitals and for laboratories. This system mostly belongs to the EHR – systems, because it communicates with different medical institutions within medical network.

2. **Cerner®.** Presents only one variant of software. This software mostly belongs to the EMR – systems, because this system was developed mostly for gathering information about patients within the same hospital, clinic or other medical institution.

3. **MEDITECH®.** This is complete EHR-system. The main point of this system is the workflow documentation between medical institutions.

All mentioned above systems are mainly concentrated on only one type of medical systems. As a matter of fact, our project is able to take the niche of medical software market, providing the combination of systems, and becoming the basis of further project's development. According to the most recent research[1] only 6% from 21,202 respondents said they plan to remain without an EHR. And adding some very useful features as working directly with patients, connecting all three systems in one and so on is very valuable competitive advantage for the whole system.

IMPLEMENTATION PLAN

We are planning to develop the system which combines all three systems simultaneously from the beginning. This project is going to be based on Web-technology (i.e. one relational database, access to the information through Internet, involving SaaS-technology and cloud-technology in the future). We have chosen this approach because it is much more affordable for small clinics and hospitals, which face budget limits. Moreover, even it allows big clinics and hospitals use existing staff eliminating the need for the additional personal for dealing with hardware and server issues.

According to the recent research, mentioned above, "easy to learn" and "easy to implement" were among the most important factors that respondents consider the most important, because these factors are marked their introduction in both the EHR and EMR systems. Users appreciated EHRs that are based on more "intuitive" work because they allow them to figure out aspects of operation more easily when instructions and constant technical support are not available.

[1] Medscape EHR Report 2012: Physicians Rank Top EHRs between 21,202 respondents across 25 specialties.

A key factor is appearance a useful end product. Both EHR and EMR systems ultimately need to present information in a way that is easy to understand, easy to work with, and is user-friendly. Interactivity with other office systems is also critical. When the EHR operates with other systems, these office functions can be made more efficient.

Taking all these into account we are trying to develop “easy to understand” interface, including help system and to divide the system on small parts, which are very simple to use and operate with.

EXECUTIVE SUMMARY

Goal:

- developing Web-based Health Care System which connects three categories of systems, already existing in the market;

Advantage:

- reducing the possibility of medical errors;
- improving patient care and treatment, lowering administrative costs;
- increasing staff work’s efficiency;
- increasing access to information from multiple venues of the health system;
- reducing communication time between medical institutions, within the institution between staff as well as between a medical institution and a patient;

Expenses:

- supplying the computer systems if needs;
- startup budget for implementing this system

SWOT Analysis

Strengths:

- ✓ User friendly interface with minimum time for training
- ✓ The data is stored and systemized
- ✓ Access to data is fast, easy and made in different paper, electronic forms
- ✓ It doesn't need extra software
- ✓ The System satisfies demands of the doctors, medical assistants , nurses, laboratory staff and patients
- ✓ Increases the productivity of all the participants in patient treatment
- ✓ Program is going to be developed for using through Web-access (Web – application)
- ✓ Reduces the waiting time for clients due to the decrease of the paperwork level

Weaknesses:

- ✓ Increases budget spending on developing and implementing this project
- ✓ Might need the modernization of equipment
- ✓ Needs improving some basic software components if the old ones are in use
- ✓ Might cause conflicts with current using software of the company and demands extra efforts to get over them
- ✓ Might cause patients issues if this program is going to be implemented in other software

Opportunities:

- ✓ Can be supported, updated or implemented in other projects
- ✓ All the data, including particular company cases, can be covered with this program
- ✓ Information can be accessed elsewhere, even in other countries and during the vacations abroad.

Threats:

- ✓ Changing the demands to the performance of Web application in Web Browsers can invoke non-displaying pages and improper functioning of the system
- ✓ The program highly depends on the Internet connection
- ✓ Appearance of the competitive software could impact the distribution of the program
- ✓ In general, it can be widely used within the hospitals all over the country, but application has to be approved by government institutions.

Questionnaire: ***Health Care System***

People to be interviewed

1. GPs
2. Nurses
3. Medical Assistants
4. Lab Staff
5. Patients

QUESTIONNAIRE FOR A NURSE:

Multiple choices.

1. How do you determine your level of computer literacy?
   a. Advance.
   b. Intermediate.
   c. Beginner.
   d. Starter.
2. Which of the following programs do you use the most?
   a. Word
   b. Outlook
   c. Excel
   d. Access
   e. Other specify _____
3. How long does it take you to learn something new?
   a. 1-3 days
   b. 3-5 days
   c. a week
   d. more than a week
4. How do you collect the patient's information?
   a. Personally by questioning her/him
      (If chosen provide a sample, please)
   b. Patient fills in a form (If chosen provide a sample, please)
   c. Other specify _____
      _____
5. How do you track the patients' tests?
   a. Receive them with a courier in paper form
      (If chosen provide a sample, please)
   b. Receive electronically
   c. Patients collect them and hand them in personally
   d. Other ways Specify_____
6. How do you collect information about patient state during his/her visit?

a. Paper-based form (If chosen provide a sample, please)
b. Questionnaire (If chosen provide a sample, please)
c. Paper-based description in a free form
d. Any other Specify_____

7. How long does it take you to find out the patient case according to records in her/his file?
   a. Just a glimpse
   b. Less than 5 min
   c. More than 10 min
   d. Other specify
8. Are the patients' files organized just as you like them to be?
   a. Yes
   b. No

Open-ended questions.

1. Haw many patients use your services daily_____?
2. Haw many patients use your services weekly_____?
3. How many appointments are scheduled for you a day?
4. How does the missed appointment influence on your day schedule?
5. How long does a patient's visit last?
6. How long does it take to full fill the patient's file after a visit?
7. How long does it take you to make notes about patient condition during her/his visit?
8. How do you determine what hospital or what special doctor the patient has to be sent to?
9. How do you track the patient's schedule of treatment, tests and vaccination?
10. What medications do you have a right to prescribe to a patient? Provide a list, please.
11. Who provides you with the list of medications?
12. How would you like a patient's file to be organized?

    Describe in detail, if possible provide any forms.

QUESTIONNAIRE FOR A GP:

Multiple choices.

1. How do you determine your level of computer literacy?
    a. Advance.
    b. Intermediate.
    c. Beginner.
    d. Starter.
2. Which of the following programs do you use the most?
    a. Word
    b. Outlook
    c. Excel
    d. Access
    e. Other specify _____
3. How long does it take you to learn something new?
    a. 1-3 days
    b. 3-5 days
    c. a week
    d. more than a week
4. How do you collect information about patient state during his/her visit?
    a. Paper-based form (If chosen provide a sample, please)
    b. Questionnaire (If chosen provide a sample, please)
    c. Paper-based description in free form
    d. Any other Specify_____
5. How do you track the patients' tests?
    a. Receive them with a courier in paper form
    b. Receive electronically
    c. Patients collect them and hand them in personally
    d. Other ways Specify_____
6. How long does it take you to find out the patient case according to records in her/his file?
    a. Just a glimpse
    b. Less than 5 min
    c. More than 10 min
    d. Other specify
7. Are the patients' files organized just as you like them to be?
    a. Yes
    b. No

Open-ended questions.

1. Haw many patients use your services daily_____?
2. Haw many patients use your services weekly_____?
3. How many appointments are scheduled for you a day?
4. How does the missed appointment influence on your day schedule?
5. How long does a patient's visit last?
6. How long does it take to full fill the patient's file after a visit?
7. How do you determine what hospital or what special doctor the patient has to be sent to?
8. How would you like a patient's file to be organized?

   Describe in detail, if possible provide forms if any.

QUESTIONNAIRE FOR A MEDICAL ASSISTANT:

Multiple choices.

1. How do you determine your level of computer literacy?
    a. Advance.
    b. Intermediate.
    c. Beginner.
    d. Starter.
2. Which of the following programs do you use the most?
    a. Word
    b. Outlook
    c. Excel
    d. Access
    e. Other specify _____
3. How long does it take you to learn something new?
    a. 1-3 days
    b. 3-5 days
    c. a week
    d. more than a week
4. How do you collect the patient information?
    a. Personally (If chosen provide a sample, please)
    b. Patient fills in a form (If chosen provide a sample, please)
    c. Other
    Specify_____
    _____
5. How does a patient receive notifications about an appointment?
    a. Phone call from an assistant
    b. E-mail
    c. Text-message
    d. They don't receive any notifications
6. How do you determine patients to a doctor or a nurse within your hospital/clinic?
    a. Live line
    b. According to their condition
    c. Any doctor who is free takes the patient
    d. Other
    Specify_____
    _____

7. How do you collect general information about a patient during his/her visit?
    a. Paper-based form (If chosen provide a sample, please)
    b. Questionnaire (If chosen provide a sample, please)
    c. Paper-based description in free form
    d. Any other
    Specify_____
    _____
8. Are the patients' files organized just as you like them to be?
    a. Yes
    b. No

Open-ended questions.

1. How many patients use your services daily_____?
2. How many patients use your services weekly_____?
3. How many appointments do you have to schedule a day?
4. How long does it take you to schedule an appointment?
5. How many appointments do you have to reschedule a day?
6. How long does it take you to reschedule an appointment?
7. Do patient miss their appointments?
8. How often does it happen?
9. What is the main reason of missing?
10. How would you like a patient's file to be organized?

    Describe in detail, if possible provide forms if any.
11. What information does any patient file consist of? If it is possible provide a form of it.
12. How do you determine what hospital or what doctor the patient has to be sent to?

QUESTIONNAIRE FOR A LAB STAFF:

Multiple choices.

1. How do you determine your level of computer literacy?
    a. Advance.
    b. Intermediate.
    c. Beginner.
    d. Starter.
2. Which of the following programs do you use the most?
    a. Word
    b. Outlook
    c. Excel
    d. Access
    e. Other
    Specify_____
    _____
3. How long does it take you to learn something new?
    a. 1-3 days
    b. 3-5 days
    c. a week
    d. more than a week
4. How many tests do you generally deal with during the day?
    a. Less than 1000
    b. More than 1000
    c. If possible provide with a precise number_____
5. How do you write down the results of the tests?
    a. Fill in a form (if checked provide a form, please)
    b. Write in a free form
    c. Other specify_____

Open-ended questions.

1. How do you receive the tests prescribed and sent them back?
2. How much time do you usually need to write down the results of a test?

QUESTIONNAIRE FOR A PATIENT:

Multiple choices.

1. How do you determine your level of computer literacy?
    a. Advance.
    b. Intermediate.
    c. Beginner.
    d. Starter.
2. Which of the following programs do you use the most?
    a. Word
    b. Outlook
    c. Excel
    d. Access
    e. Other
    Specify_____
    _____
3. How long does it take you to learn something new?
    a. 1-3 days
    b. 3-5 days
    c. a week
    d. more than a week
4. How would you like to receive notifications about your appointment?
    a. Phone call from an assistant
    b. E-mail
    c. Text-message
    d. Other
    Specify_____
    _____
5. How do you determine patients to a doctor or a nurse within your hospital/clinic?
    a. Live line
    b. According to their condition
    c. Any doctor who is free takes the patient
    d. Other
    Specify_____
    _____

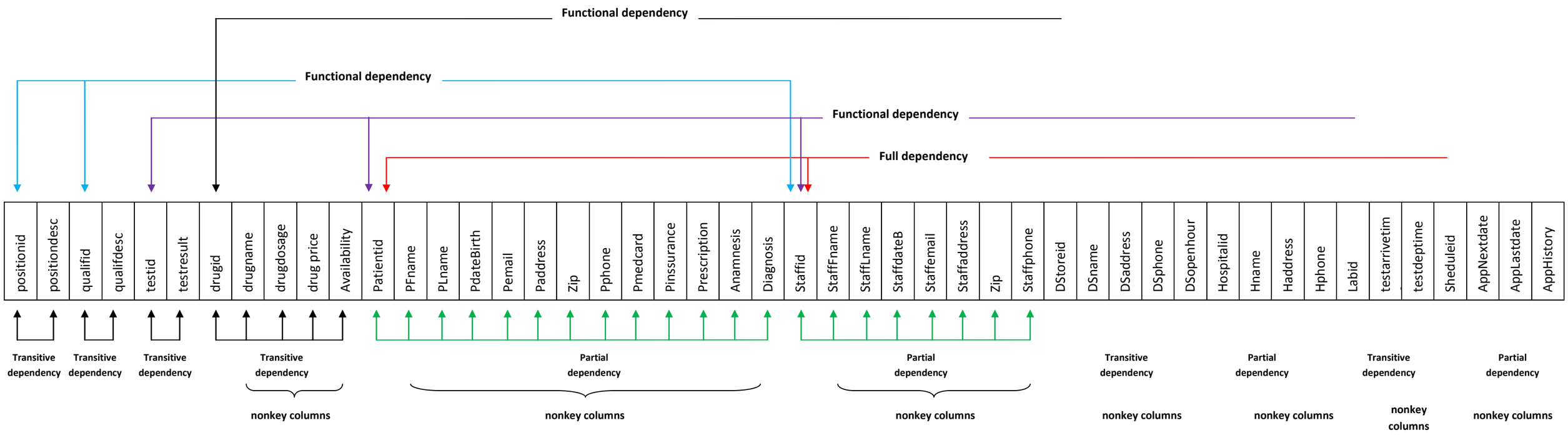
Open-ended questions.

1. Have you ever missed an appointment?
2. If yes, how many times did it happen?

3. What was the main reason of missing?
4. How often do you visit a GP?
5. How long do you usually wait for the appointment?
6. Have you ever lost, asked for a copy of a prescription?
7. How long does it take you to find the prescribed medication?

Norm forms

1. First Normal Form (1NF).



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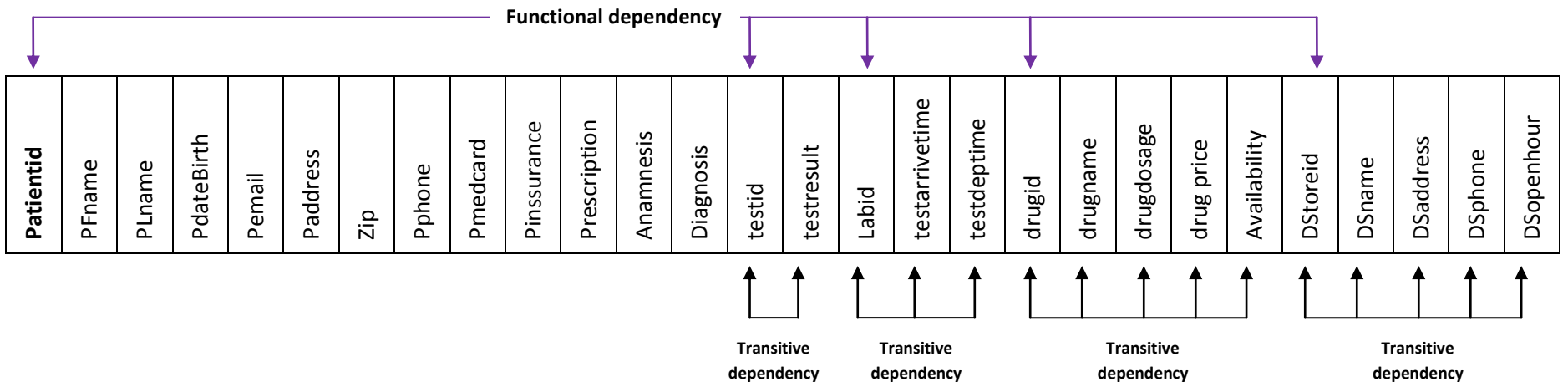
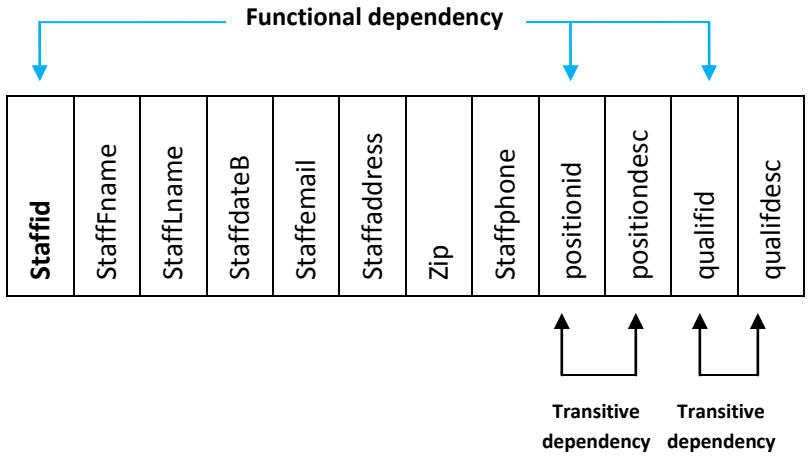
2: Tables in 2NF (No partial dependency)





Hospitalid	Hname	Haddress	Hphone

Sheduleid	AppNextdate	AppLastdate	AppHistory

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3: Tables in 3NF (No transitive dependency)

Position

positionid	positiondesc

Qualification

qualifid	qualifdesc

Tests

testid	testresult

Drugs

drugid	drugname	drugdosage	drug price

Patient General Information

Patientid	PFname	PLname	PdateBirth	Pemail	Paddress	Zip	Pphone	Pmedcard	Pinssurance

Staff Information

Staffid	StaffFname	StaffLname	StaffdateB	Staffemail	Staffaddress	Zip	Staffphone	**positionid**	**qualifid**

Drug Stores Information

DStoreid	DSname	DSaddress	DSphone	DSopenhour	**drugid**

Hospital Information

Hospitalid	Hname	Haddress	Hphone	**Staffid**

Laboratory

Labid	testarrivetime	testdeptime	**Hospitalid**	**Patientid**	**Staffid**	**testid**

Schedule

Sheduleid	AppNextdate	AppLastdate	AppHistory	**Patientid**	**Staffid**

Patient Treatment

Sheduleid	**Patientid**	Prescription	Anamnesis	Diagnosis	**Hospitalid**	**Staffid**	**testid**

Availability

DStoreid	**drugid**	availability