MedData

claim: Open platform for patients with chronic disease!

Politecnico Di Milano
Product Service System Design

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Thesis Title_MedData
Idea Description_MedData is a further online patient medical history recording service open for level 1 hospitals.

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abstract

In China, the chronic diseases are projected to account for 79% of all death in 2005 and this number is increasing from than on. The medical technology about chronic diseases is yet to be improved till now. Along with the development of computer and network technology, digital hospital information systems responsible for hospital administration have strongly developed in China. Nevertheless the digital recording management of outpatients with chronic diseases in contemporary hospital information system remains weak, while a huge demand of shared and easy-to-access outpatient medical history has emerged.

Nowadays in China, level 1 hospitals are the main responsible for prevention and rehabilitation of these patients, under the management of the national 'Administrative Public Health Department'. The 'Administrative Public Health Department' principal tasks are to collect health data from the society and to spread information about new governmental actions related to health, with the purpose of implementing innovative solutions.

In this context, this thesis describes a new service concept, proposed as a solution for solving the problem of data management for patients with chronic diseases in China. The service is called MedData and is thought to start-up in the city of Haerbin. **MedData is a further online patient medical history recording service for level 1 hospitals.**

It mainly consists in an application providing patients with an online personal account to record their medical history, as well as opening access to doctors working in level 1 hospitals. Thanks to the digital application patients can store and organize personal medical history in a time-line or disease catalog. Moreover, doctors can login into the patient account under his permission and record new medical data directly during the medical consulting.

For both patients and doctors, MedData offers a 'searching engine' to search for historical medical information by entering key words into the system.

As an added value patients medical histories could be recorded into a 'patient database cloud' under the management of the 'public health department', so to support the government in gathering healthcare data and contributing to social and medical research.

Reaserch
part 1: Introduction of hospital system
in China & conditions of level 1 hospital

1.Hospital level division standard

Hospitals in china is evaluated into 3 level and 10 grades under the management and supervison of 'administrative public health department'. To understand the evaluation standard could help generate a awareness of hospital system in China.

Hospital evaluation standard is generated depending on the facilities, function and technology conditions of hospitals. This standard is a national unified standard, regardless of background and the ownership of a hospital.

According to the "standard of hospital classification management" document:
After checking by public health department, hospitals are determined for 3 levels, each level is divided into three grades a, b, c. However, among level 3 hospitals, the best hospitals will be assessed to be 'special grade' individually besides a,b and c grade. So the hospitals in China are divided into 3 levels 10 grades, etc.

level three hospitals (best hospitals) is divided into :   special > a > b > c grade

level two hospitals (medium level hospitals) is divides into: a > b > c grade

level one hospitals (primary level hospitals) is divided into: a > b > c grade

' > ' means 'better than'   reference to BaiDu dictionary

2.Deffinition of level 1,2,3 hospitals:

level one hospital:

provides medical treatment, disease prevention, rehabilitation and health care directly to residents living in street community. As a primary health care institution, its main responsibility is to provide primary prevention directly to the citizens in street community; to manage frequently occurring diseases and chronic disease; to make referral preparation for critical patients; to assist the level 2 hospitals in medical services and reasonable distribution of the patients.

level two hospital:

provides medical treatment, disease prevention, rehabilitation and health care directly to multiple resident communities based on city area. As a medium health care institution, its main responsibility is to guide the testing and monitoring of high risk diseases; to accept referral from level one hospital; to provide medical services & technology guidance to level one hospital; to develop the ability of medical education and researching.

level 3 hospital:

provides medical treatment, disease prevention, rehabilitation and health care to multiple resident communities based on province and nation range. As center of medical treatment, education and scientific research of medical prevention technology, its main responsibility is to provide specialized medical services; to study and treat severe illness; to accept referral from level 2 hospital; to provides medical services and technology guidance to junior hospital; to develop and train senior human resources for hospitals; to support medical scientific research project based on province; to participate and guide first or secondary level prevention work.

reference to BaiDu dictionary

3. Definition of 'administrative department of public health'

'Administrative department of public health' is a director department of local hospitals,in charge of food hygiene, the implementation of the professional medical activity, the processing of medical accidents. To understand the responsbility of 'administrative department of public health' could help understand how innovitive health activities could be implemented in China.

Main responsibility of 'administrative department of public health':
① responsible for infectious diseases and chronic non-communicable diseases prevention and control planning, including: 1. monitoring and early warning of infectious diseases; 2.prevention and control of the outbreak and spread of epidemic disease; 3.organizing and carrying out health education and promotion.
② responsible for the local public health emergency management, including: 1.establishing local pre-hospital first aid system; 2.the organization of emergency medical rescue work.
③ responsible for the formulation or authorizing of the hospital evaluation standard; supervision and management for local medical and health institutions.
④ responsible for collecting and releasing local public health and medical information; spreading government affairs to public residents, as well as organizing international cooperation in medical and health area.

reference to BaiDu dictionary

*Map of 'relationship between administrative public health department'
and level 1,2,3 hospitals*

supervisor and management

technology supporting and
patient transfer

The administrative department
of public health (logo)

level 3 hospial

level 3 hospial

level 3 hospial

level 2 hospital

level 2 hospital

level 2 hospital

level 1 hospital

level 1 hospital

level 1 hospital

district 1

district 2

district 3
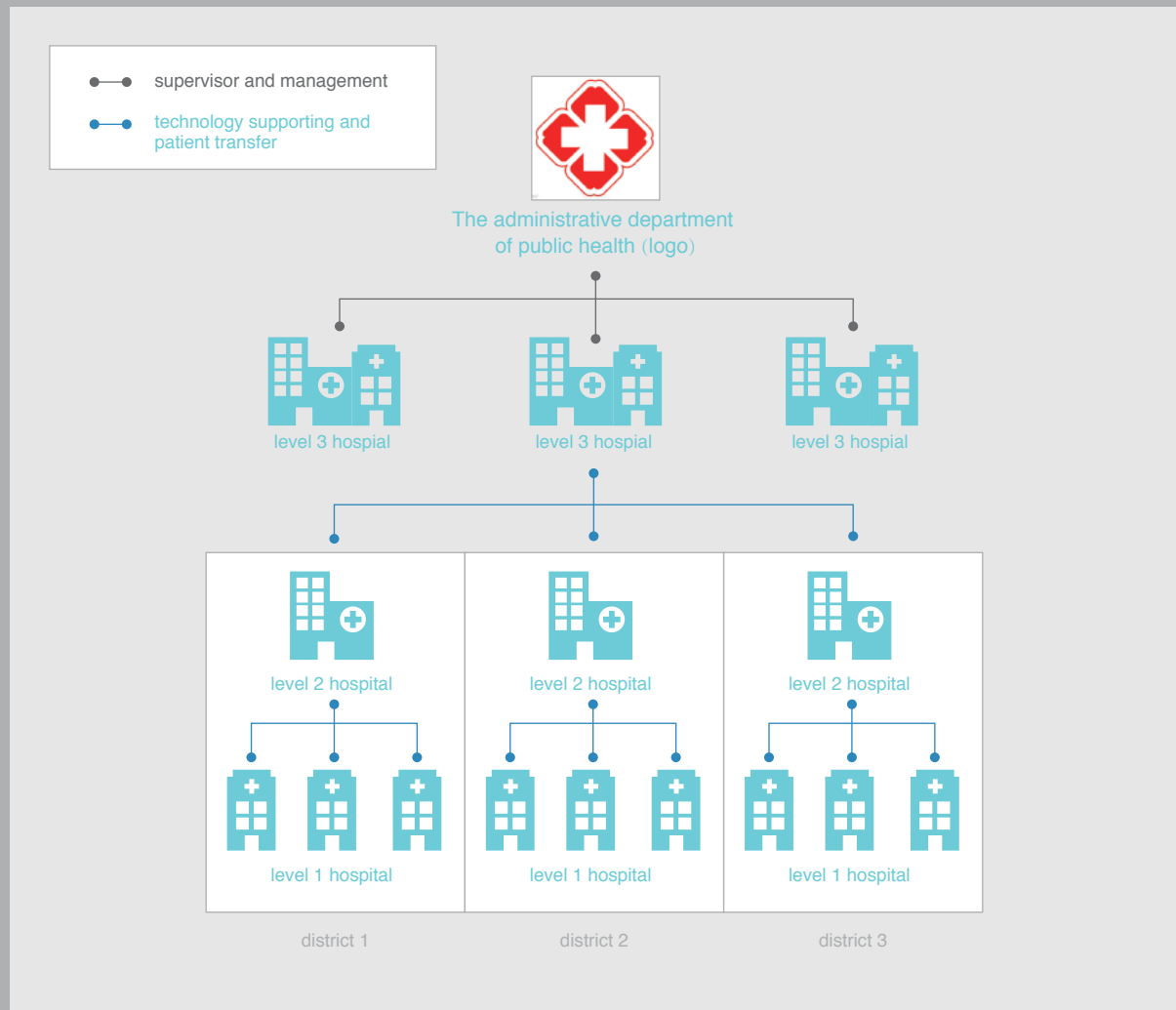
Figure 1

4. 'hospital management system' in China

part 1: Introduction of patient management system

Hospitals that deal with thousands of patients a day face many logistical challenges, including time management and record keeping. Hospitals need effective patient management that deals with patients from admission to discharge, in order to run the operation smoothly. Patient management system includes 4 main parts register, patient information, accurate claims and information exchange.

Registrer
One of the first goals of effective patient management is to have a qualified and experienced registrar. The registrar is the first interaction any patient has with hospital staff. The registrar must be able to answer critical questions and point the patient in the right direction.

Patient Information
Another important aspect of patient management is record keeping. With thousands of patients on file and hundreds constantly being added, any healthcare establishment must have detailed and precise record- keeping. Storing patient information in databases with look-up queries by name, record number and attending doctor allows quick and easy access to the history of any patient. If the record-keeping process is intensive, it may slow down day-to-day business. In addition, not locating patient records promptly will upset and frustrate patients.

Information Exchange
Patient management also involves proper allocation of data and records throughout the different departments. Accurate exchange of information between departments is crucial to any hospital since a patient's assessments require input from multiple professionals in different departments. One example is the transfer of information from the attending doctor to the pharmacist and back to the attending doctor. In order to administer the proper medications and treatment, a hospital must have accurate methods of information exchange.

part 2: Development of hospital information system (HIS) in China

As the development of computer and network technology, digital hospital information system that is mainly responsible for hospital administration is well developed in Chinese hospital. 'A hospital information system (HIS) is an element of health informatics that focuses mainly on the administrational needs of hospitals. In many implementations, a HIS is a comprehensive, integrated information system designed to manage all the aspects of a hospital's operation, such as medical, administrative, financial, and legal issues and the corresponding processing of services.'

A network-structured cooperation of HISs between hospitals has become the future tendency. Initial HIS is more focused on hospital administrative management and financial management in Chinese hospital. However, HIS is on the way to be able to deal with patient management system in China. Because a digitalized patient medical database is convenient for information sharing and open for cooperation between different professionals or departments in one hospital.

-Traditional method of patient information management
Still now most hospitals with independent HIS keep using traditional recording method to manage in-hospital patient medical cases - paper documents. For out-patient with chronic or frequent occurring diseases, hospitals are usually not responsible for patient information storage. Usually, patients have to manage their out-hospital medical history on personal casebooks. However, below is a free service 'Patient File Room' for patients with diabetes in city Fu Yang.

FuYang Hoapital
'Diabetes Patient File Room'
http://www.tnbyy.com/cms/article.php?action=show&id=189

Anhui fuyang diabetes hospital (level 1 hospital) is a comprehensive hospital that is specialized in diagnosis and treatment of diabetes & other complications related to diabetes.

-Independent HIS & patient management system
Most level 3 & 2 hospitals that could afford HIS will develop an independent HIS by cooperation with out-source like computer technology studios. This would mean that HISs are independent without cooperation online. So patients have to repeat the registration process in HISs in different hospitals.

In addition, traditional patient information management system based on paper documents is independent as well. so patient has to experience complex procedures to make information transformation between hospitals. Additionally, patients have to store and manage their out-patient medical history on different casebooks from hospitals, as a hospital usually has an independent out-patient casebook.

-Extension of HIS
Usually, an independent HIS from out-source computer technology studios costs 400 thousand Yuan, it is difficult for level 1 hospitals and few level 2 hospitals with small scale of financial investment to develop a independent HIS. A report shows that the extension rate of HIS among level 3 hospitals in China is up to 36% in 2010.
http://blog.sina.com.cn/s/blog_63f550ab01011xxe.html

5. Conditions of level 1 hospital

(why do I focuse on level 1 hsotapil)

-Level 1 hospital has no HIS

Depending on the hospital level evaluation, level 1 hospital usually has a small scale of medical and health resource, and most of level 1 hospitals cannot afford an independent HIS (hospital information system) according to the report published by 'world wide software' in 2011.

http://blog.sina.com.cn/s/blog_63f550ab01011xxe.html

-Level 1 hospitals have important roles in chronic disease prevention and treatment

Level 1 hospital is responsible for transfer emergent patients to level 2 hospital according to the complexity of diagnosis, managing frequently occurring diseases and prevention & treatment of chronic diseases for residents in street community distribution. (In additionally, level 1 hospital has no ability to deal with in-hospital operation.)

-Level 1 hospitals have big customer bases for collecting health data in the area of chronic disease

As the total number of level 1 hospitals is much more than that of level 2 or 3 hospitals and these level 1 hospitals are reasonable arranged to resident areas in city, there is rarely queuing problem in level 1 hospitals. And the fees of medical consulting in level 1 hospital is much less than that of level 2 or 3 hospitals, most citizens are more pleasure to got to level 1 hospitals for daily consulting of chronic diseases.

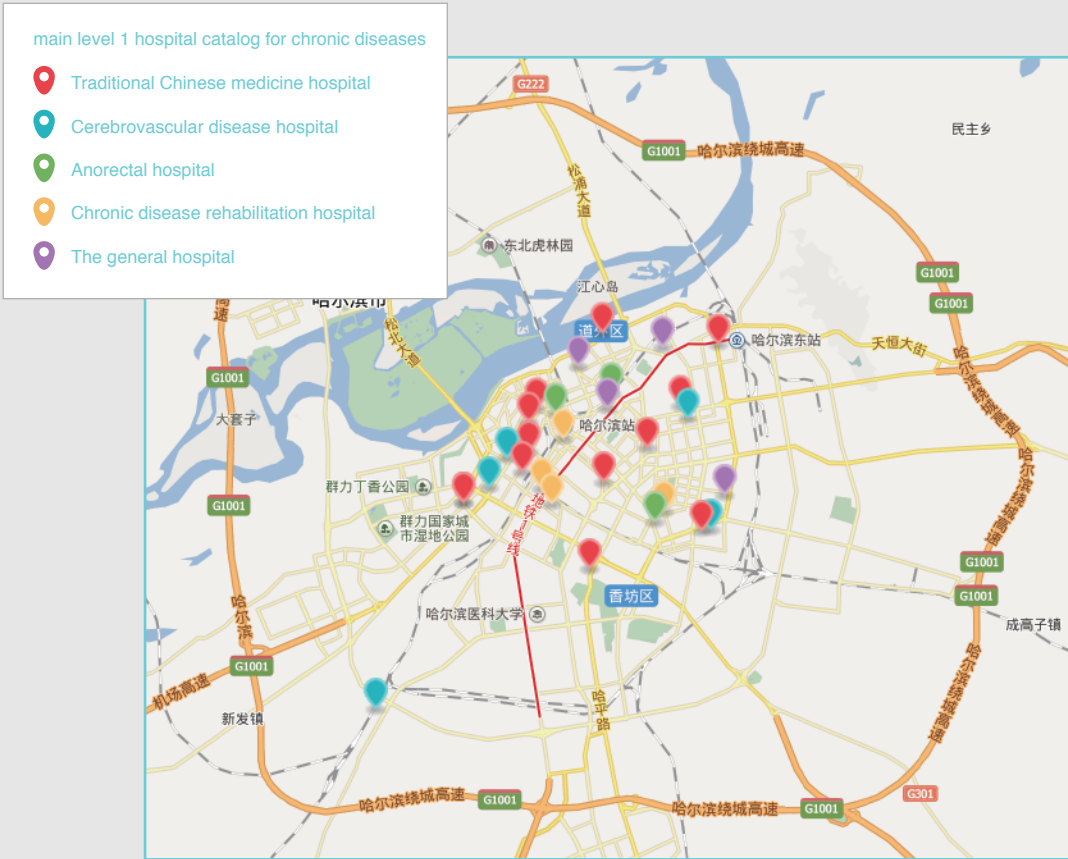*-There is frequent out-patient medical history transformation between different level 1 hospitals*

Different level 1 hospitals has different medical researching fields which we can see from the map below， which means patients with chronic disease have to visit different hospitals for better treatment according to advantage fields of different level 1 hospitals in city Haerbin.

map of level 1 hospitals arrangement of Haerbin city

Why do I focus on the city Haerbin?

Haerbin is a capital city of Hei Long Jiang provice that has a big experiment space of innovitive activities relative to public health. And Haerbin is my hometown where I will conduct my research about level 1 hospitals.

main level 1 hospital catalog for chronic diseases

📍 Traditional Chinese medicine hospital

📍 Cerebrovascular disease hospital

📍 Anorectal hospital

📍 Chronic disease rehabilitation hospital

📍 The general hospital

Area arrangement map reference to Baidu map
map drawing tool_www.dituhui.com

Figure 2

part 2: Customer segment

1. The conditions of patients with chronic diseases in China

In China, chronic diseases are projected to account for 79% of all death:
-Total projected deaths in China in 2005 is about 9,427,000
-Total projected deaths due to chronic disease in China in 2005 is about 7,471,000

WHO projects evaluates that over the next 10 years in China:
Over 80 million people will die from a chronic disease; deaths from infectious diseases, maternal and perinatal conditions, and nutritional deficiencies combined will increase by 2%; death from chronic diseases will increase by 19% - most markedly, deaths from diabetes will increase by 50%;
http://www.who.int/chp/chronic_disease_report/media/china.pdf

Projected deaths by cause, all age, in China, 2005

Communicable, maternal and perinatal, nutritional deficiencies 10%

Other chronic diseases 8%

Diabetes 1%

Chronic resipiratory diseases 17%
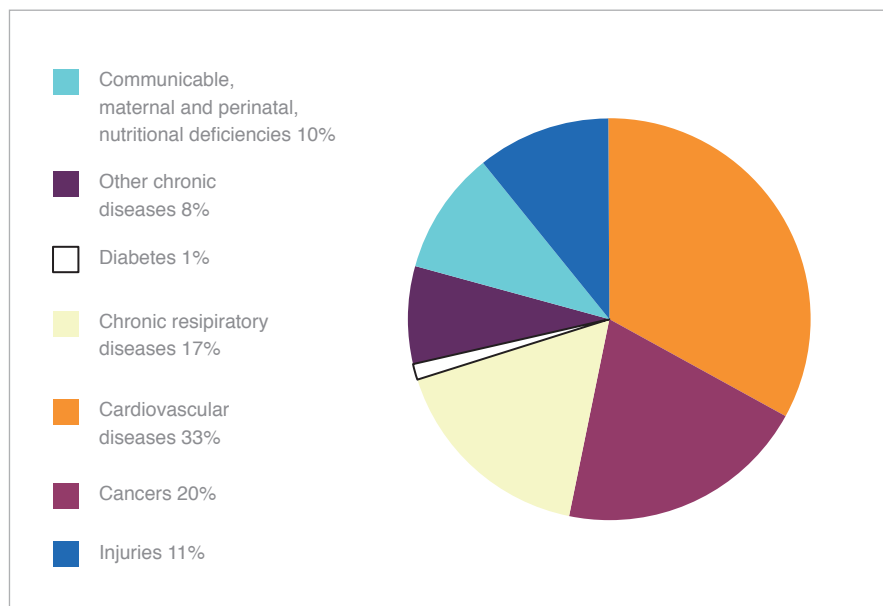
Cardiovascular diseases 33%

Cancers 20%

Injuries 11%

Figure 3

2. Most diffuesd chronic diseases

High blood pressure (HBP) 高血压

"Blood pressure" is the force of blood pushing against the walls of the arteries as the heart pumps blood. If this pressure rises and stays high over time, it can damage the body in many ways.

HBP is the main risk factors for the incidence of stroke and coronary heart disease. More than half of the cardiovascular disease is associated with high blood pressure in China. According to a 2002 survey, Chinese adults' (over 18 years old) hypertension prevalence rate reaches 18.8% according to the investigation of hypertension prevalence everywhere on the rise in 2010.

http://myhealthyfriends.blogspot.it/p/blood-pressure.html

Dyslipidemia 高血脂

A disorder of lipoprotein metabolism, including lipoprotein overproduction or deficiency.2010 national survey shows that, the prevalence (serum total cholesterol (TC) > 6.22 / L) of men and women over the age of 18 were 3.4% and 3.2% respectively, the prevalence (serum triglyceride (TG) > 2.26 / L) of men and women were 13.8% and 8.6% respectively.

reference to 'China 2013 report of cardiovascular disease'

Chronic kidney disease (CKD) 慢性肾病

Chronic kidney disease is also known as chronic renal disease, is a progressive loss in renal function over a period of months or years. According to a survey of chronic kidney disease (CKD) (conducted during 2009-09 to 2010-09 in 13 selected provinces and 47 204 adults in China), the total prevalence rate of chronic kidney disease reaches 10.8%, among them, the prevalence (glomerular filtration rate (eGFR) < 60 ml/min / 1.73 m2) of chronic kidney disease was 1.7%, and the prevalence (urinary albumin and creatinine ratio > 30 mg/g) of chronic kidney disease was 9.4%. The population of chronic kidney disease reaches nearly 120 million.

http://www.baike.com

Chronic respiratory diseases 慢性呼吸道疾病

Chronic respiratory diseases are chronic diseases of the airways and other parts of the lung. Respiratory diseases affect all ages-children, teens, adults and seniors. Most of these diseases are chronic in nature and all have a major impact not only on the individual with the disease, but on the family, the community, and the health care system.

http://www.baike.com

Coronary heart disease (CHD) 慢性冠心病

Coronary heart disease (CHD) is a disease in which a waxy substance called plaque (plak) builds up inside the coronary arteries. These arteries supply oxygen-rich blood to your heart muscle. From 2009 to 2007 the prevalence of chronic coronary heart disease is increased by 8.1%, of which the incidence of men and young people rise more rapidly in China. The largest rise happens during male aged from 35 to 44, which reaches 30.3%.

reference to 'China 2013 report of cardiovascular disease'

Diabetes 糖尿病

Diabetes describes a group of metabolic diseases in which the person has high blood glucose (blood sugar), either because insulin production is inadequate, or because the body's cells do not respond properly to insulin, or both. In China, the 2010 chronic disease investigation (18 adults over the age of 98, 658) shows that the adult diabetes prevalence was 11.6%, and the prevalence of male and female reaches 12.1% and 11.0% separately.

http://www.baike.com

Overweight/obesity 超重和肥胖

The terms "overweight" and "obesity" refer to body weight that's greater than what is considered healthy for a certain height. Overweight and obesity in recent 10 years further appears a increasing trend. In 2010 China's chronic disease monitoring projects show that excess weight rate, obesity rate and overweight & obesity rate of adults reached 30.6%, 12.0% and 12.0%, respectively, significantly higher than those in 2002.

http://www.baike.com

3. Age of the customer segment ranges from 45 ~ 59

The director of Chronic disease prevention and Chinese medical control association branch, Wei HuaZhao reports that, in 2010, Chinese labor population aged from 16-59 is about 998.43 million, among them, hypertension prevalence rate of population aged 18-44 was 18%, the diabetes prevalence was 5%, the overweight prevalence rate was 27%; Among 45 to 59 aged group, the hypertension prevalence rate was 48%, the diabetes prevalence was 13%, the overweight prevalence rate was 37%. The above index, compared with the 2002 survey data, has a obvious increasing.

http://www.cpma.org.cn/Article_Print.asp?ArticleID=3898
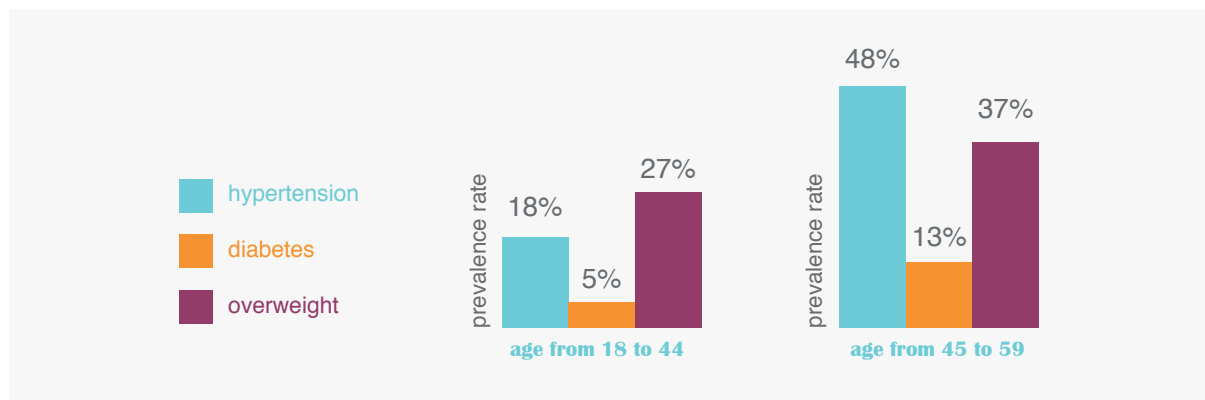
Figure 4

4. Life style of customer segment
(main reasons for prevalence of chronic diseases)

1.having unhealthy diet habbit

2.lacking regular exercise

3.smoking tobacco often

4.under long-term high psychology pressure

http://www.cpma.org.cn/Article_Print.asp?ArticleID=3898

5. Customer segment discription

Age: 45-59 years old
Identity: social labor

Characteristics of target customer

-They lack exercise and out-space sport;

-They risk from long-term chronic disease or have health awareness to prevent chronic disease

-They regularly visit community hospitals for health testing & medical treatment associated with chronic diseases;

-They usually have high working pressure from society or working environment;

part 3: Customer journey in level 1 hosptal

1. Important touch points during customer experience (in level 1 hospital)

- Triage desk

Triage station is settled at the entrance of hospital. Triage (/ˈtriːɑːʒ/ or /triːˈɑːʒ/) is the process of determining the priority of patients' treatments based on the severity of their condition. Nurse works at triage desk simply tell patients which department they should register for according to patients' symptoms.

PS: sometimes nurse working at triage desk will give a primary health test like the thermometer measurement to patients, in order to triage accurately.

-information desk

Information desk is settled at the entrance of hospital, sometimes stays together with triage station.

Information desk will basically show the introduction of the hospital and doctors on duty. Some hospitals' information desks put a simplified customer journey map for patients to understand the steps they should follow during medical consulting.

1. Important touch points during customer experience (in level 1 hospital)

-outpatient paper casebook

Personal casebook for outpatient is the private medical history recording document that is stored and organized by patient himself. Hospitals rarely keep recording the medical history of outpatient medical consulting.

PS: The medical history or (medical) case history of a patient is information gained by a physician by asking specific questions, either of the patient or of other people who know the person and can give suitable information (in this case, it is sometimes called heteroanamnesis), with the aim of obtaining information useful in formulating a diagnosis and providing medical care to the patient.

-registration station

In the medical field, "patient registration" can refer to two different topics. One involves the collection of data about new patients to start generating a patient record. The other involves collecting information to use in computer-assisted surgery.

Patient registration when entering a new hospital, clinic, or treatment center is routine. Patients will need to fill out an admission form with basic information about them and their medical history. In addition, they will need to provide contact information.

2. Patient medical experience (customer journey in level 1 hospital)

To help understand what are the opportunities and problems of exsisting patient information manage-ment system of level 1 hospital, firstly I research the customer journey of medical consulting in DaDong hospital located in Haerbin.

## 1) Main actor introduction
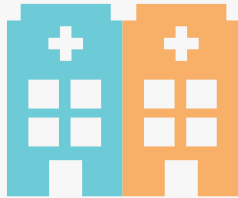
introduction of hospital DaDong

Hospital DaDong is a level 1 hospital located in DaoLi district, Haerbin city. Hospital DaDong is more advanced in heart related disease.

introduction of customer - patient A

It is first time for patient A to visit a doctor in hospital DaDong. He travels long distance to reach hospital DaDong since hospital DaDong is more advanced in heart related disease.

## 2) Customer journey for out-patient
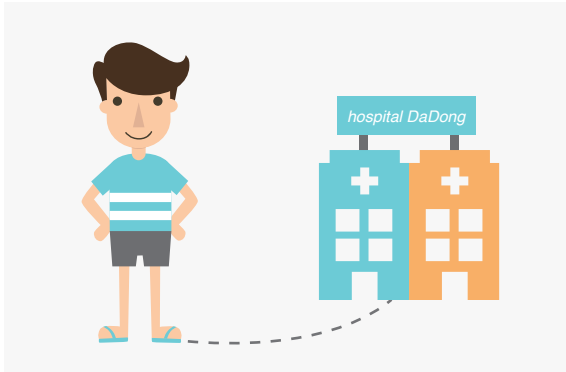
Step 1
Patient A travels long distance to DaDong hospital for medical consulting.
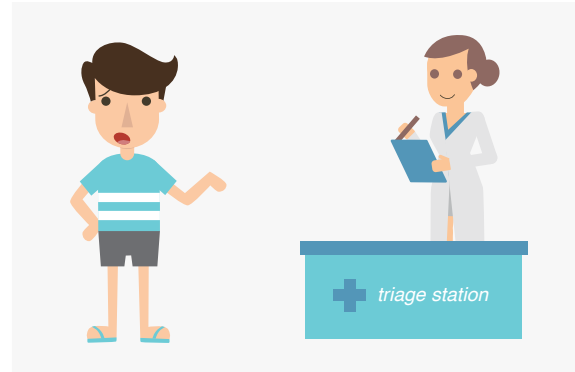
Step 2
Patient A goes to triage station for advice about which department he should register for. Nurse works at triage desk gives out a reasonable advice according to the symptoms patient A describes
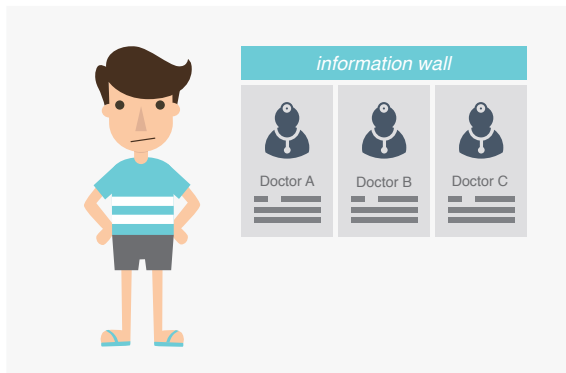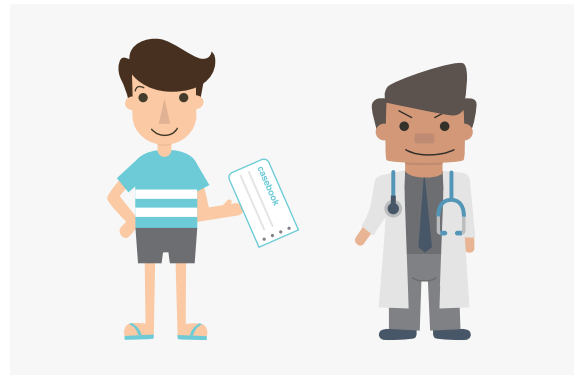
Step 3
Patient A goes to the information wall to select a doctor working in the department that patient A will register for according to the introduction of different doctors.
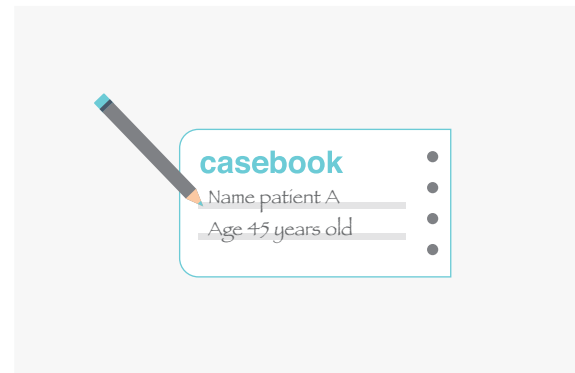
Step 4
Patient A fills a *new casebook* for hospital A with his personal information.

Step 5
Patient A goes to the registration window and gets registration paper for doctor A.

Step 6
Patient A goes to doctor A's consulting room and meets with doctor A. Patient A shows doctor A his casebook and registration paper.
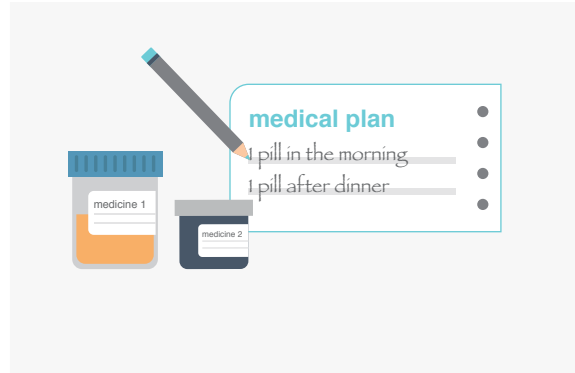

Step 7
Patient A tells doctor A his symptoms and doctor records the main *symptoms* after communication with patient A in casebook.
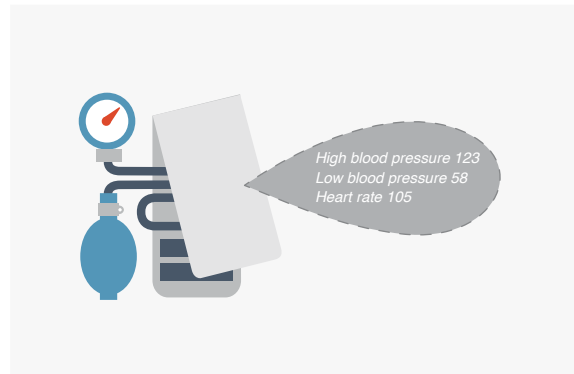
Step 8
Doctor A makes a primary test for patient A and records the *testing results* on paper casebook.
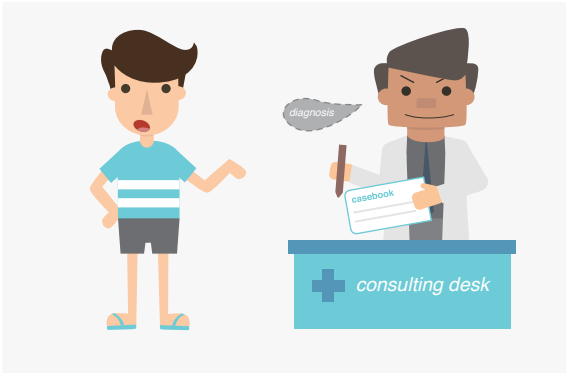
Step 9
After testing, doctor writes the *diagnosis* down to the casebook.

Step 10
Then doctor A makes a medicine plan for patient A and records the *medicine plan* into the casebook.

Step 11
Doctor A advices patient A to reduce eating meat and fried food, then he records the *health plan* into the casebook.

Step 12
Patient A goes back home and put the new casebook together with his other casebooks on bookshelf.

3. Opportunities and problems
(of out-patient recording system in level 1 hospital)

-Problem:Medical information organization (recorded on paper casebooks)

As every hospital has independent casebook, patient has to store and organize casebooks from different hospitals. So patient medical history can not be well organized in a timeline or medical catalog on one paper casebook. It is also not easy to search certain medical history cases in paper casebooks.

-Opportunity:

A easily organized   digitalized database that provides a searching engine drived by 'key words searching' to help patient fast find target medical case among huge personal medical data base could be a possible solution.

*-Unpredicted damages and lost of personal casebooks during storage*

Actually, paper document is easily to be damaged during storage at home. And these casebooks with patients' medical history are possible to be lost without copying at home. However there is almost no data recording service for outpatients in hospital data base system. This means these medical histories will forever be missing when the personal out-patient casebook is lost.

-Opportunity:

The possible solution could be the information cloud that could keep long-lasting and safe recording of personal medical information that occupies small space.

3. Opportunities and problems
(of out-patient recording system in level 1 hospital)
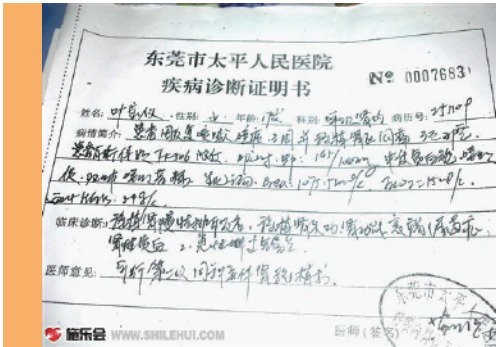
-hard reading handwriting

The handwriting is usually hard to be recognized for patients especially in Chinese medicine hospitals. Usually patient has to follow complex procedures of taking medicine. A clear and format recording method is very important for patients to check the medicine & health plan alone at home.

-Opportunity:

A easily recognized medical recodding could be a digitalized medical recording that is generated by texted computer font and organized forms.

-Information sharing of personal medical history on paper casebook

A paper data recording can not be easily shared online and open access to others. It is inconvenient for patients to show his medical cases to other professionals or their relatives. It is also difficult to generate a big scale of out-patient medical database of citizens for the administrative public health department to lunch research and medical study according to the health condition of Chinese residents. This big scale database consisted of shared individual out-patient medical history could also contribute to the development of medical technology and becomes a information background for administrative public health department to carry out new health related principles and activities.

-Opportunity:

A open and easy-to-accessed online personal digital medical history could help cooperation and information trans-formation between different hosptals and public health department.

MedData service
part 1: The MedData service

1. The big idea
core value of the big idea

MedData

claim: Open platform for patients with chronic disease!

Descripetion

MedData service is an open online service for patients to store digitalized personal out-patient medical data associated with chronic disease in personal MedData account, that could open access to doctors working in level 1 hospitals. Doctors could log into the personal medical history database through the permission of MedData account owner. Patient medical data will be recorded in 'patient database cloud' and help public health department to conduct or lunch research and study about chronic diseases.

2.Information system

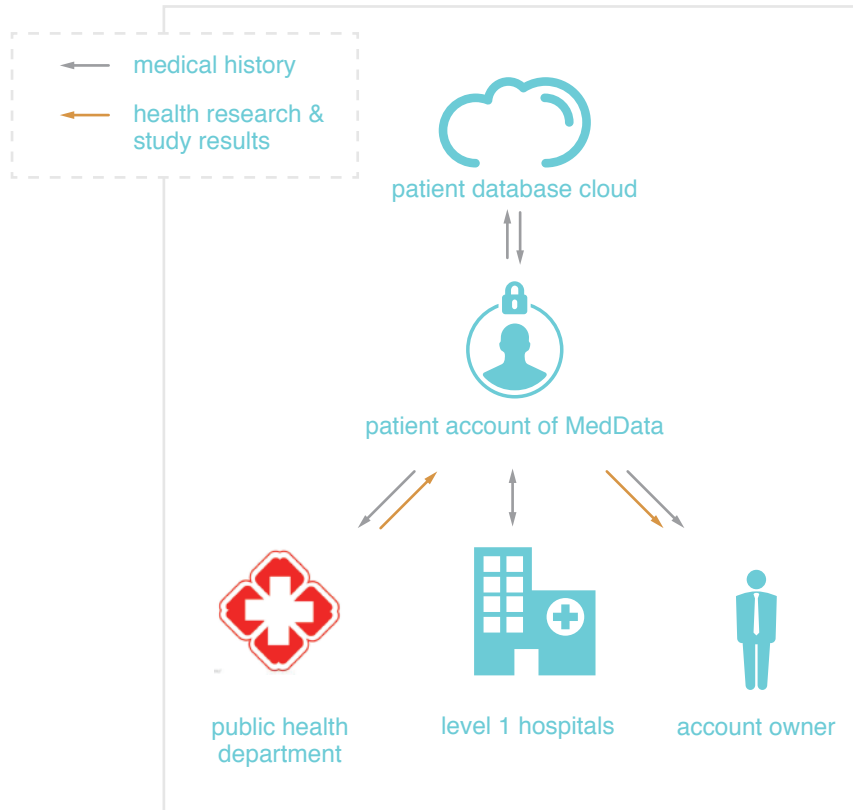*(Below is a information flow between the main stakeholders)*

Figure 5

Introduction of main stakeholders of MedData

public health department

The 'Administrative Public Health Department' principal tasks are to collect health data from the society and to spread information about new governmental actions related to health, with the purpose of implementing innovative solutions.
In MedData service, public health department plays the main role of implementing the service in level 1 hospitals and promoting the service to target customer.
Public health department accepts the medical history associated with chronic disease from users who are willing to share personal medical history, and sends the research and study results to these users as feedback.

level 1 hospitals

Nowadays in China, level 1 hospitals are main social department that are responsible for prevention and rehabilitation of patients with chronic diseases, under the management of the national 'Administrative Public Health Department'.
In MedData service, doctors working in level 1 hospitals could check personal medical history in personal account after logging under the permission of account owner (through the computer platform of MedData service).
Doctors are also responsible for recording medical data into personal account during medical consulting.

account owner

Users of MedData service have no access of recording medical data into their own account. They could only check the medical history and choose to share their medical data to doctors and administrative public health department (through application of MedData service on mobile phone).
As a feedback, they could recieve research and study results from public health department for free.

3. The important information

(Blow is an outpatient casebook of chinese medical hospital)

medical history

hospital introduction

date

symptoms

medical plan

hospital stamp

health plan

门诊病历
Outpatient casehistory

doctor signature

personal information

Figure 6

3. The important information

1) What is the information on paper outpatient casebook

Usually, in personal paper casebook, there is personal information, *medical history* with the doctor's signature and the hospital introduction on the first page of casebooks.

-Personal information
Personal information on paper casebook helps doctor ensure about the identity of a visiting patient. In MedData service personal information could help improve the security of the account information.

-Doctor signature
Doctors' signature under the medical case could help patient remember the doctor for subsequent consultation; on the other hand, the signature could be an evidence for medical accidents. In addition, in MedData service the signature from doctor could be an important 'key word' to search for a set of subsequent visit medical cases from the same doctor.

-Hospital introduction
Hospital introduction on paper casebook helps patient get acknowledged about the professional fields of hospital. Besides, in MedData service the information of hospital could be an important 'key word' to search for a set of subsequent visit medical cases from the same hospital.

2) What is medical history (out-patient)

A historical medical case is mainly consisted by patient diagnosis, symptoms, testing results and health & medical plan.

-Symptoms

Symptom is an important basis for doctor to make testing plan for different patients. Patient and doctor should have a efficient and accurate communication about the symptom by oral discripetion. A symptom is a departure from normal function or feeling which is noticed by a patient, indicating the presence of disease or abnormality. To express an accurate symptom patient should get a knowledge base of the disease. And a primary health test could help patient make suitable triage before registration in hospital.

-Testing results

Testing program includes device testing, lab testing, as well as primary testing by doctor and nurse in hospital. Medical test results could be a important and accurate basis for doctor to make the diagnosis.
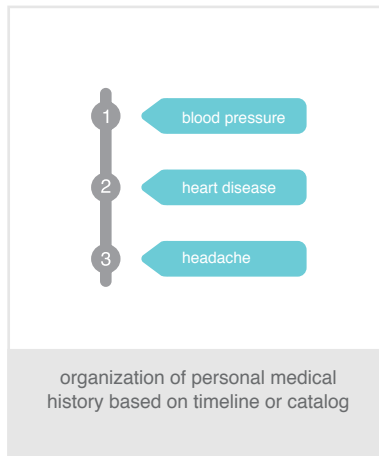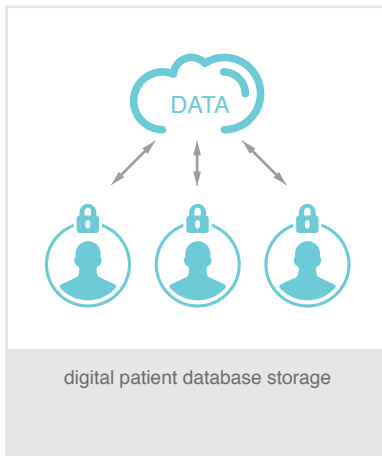
-Health and medical plans

Medical plan includes the medicine list and the using method of the medicines, and health plan includes the arrangement of exercise, diet and daily resting. After a period of following the medical and health plan, patient usually should go back to subsequently visit the doctor for updating the plan according to recovery condition.
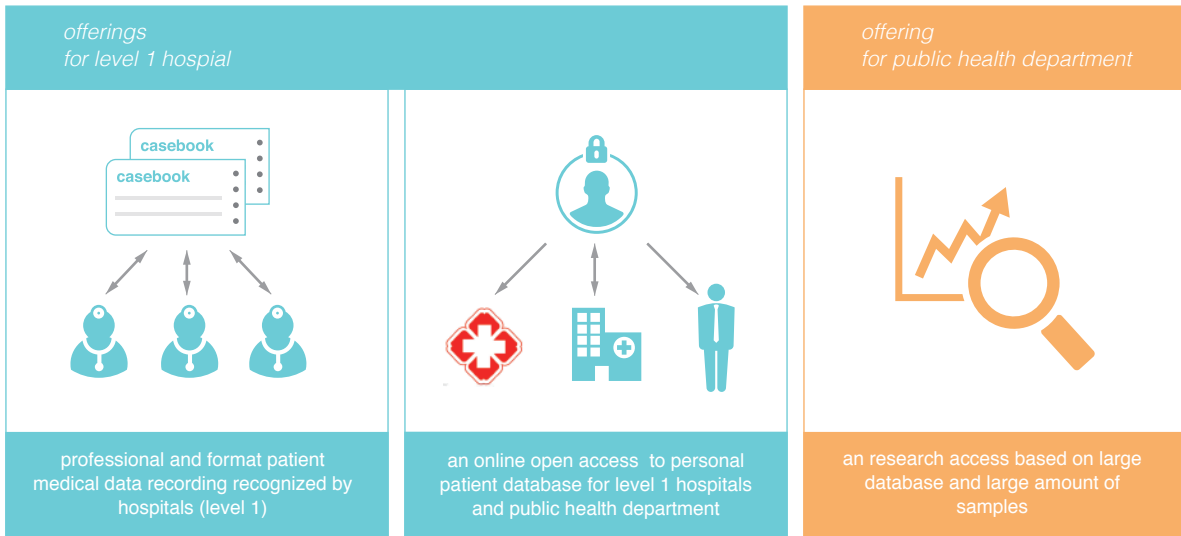
-Diagnosis

Medical diagnosis is the process of determining which disease or condition explains a person's symptoms. It is simply called diagnosis when the medical context is implicit. The information required for diagnosis is typically collected from a history and physical examination of the person seeking medical care. Often, one or more diagnostic procedures, such as diagnostic tests, are also done during the process.

4. Offerings for target customer

medical history

health research & study results

DATA

digital patient database storage

1	blood pressure
2	heart disease
3	headache

organization of personal medical history based on timeline or catalog

History searching

an searching engine for medical case among personal medical history database

patients opens their medical data to public health department will recieve study and research results for free

4. Offerings for level 1 hospital & public health department

medical history ←

offerings for level 1 hospial		offering for public health department
professional and format patient medical data recording recognized by hospitals (level 1)	an online open access to personal patient database for level 1 hospitals and public health department	an research access based on large database and large amount of samples

5. Customer journey of MedData service

1) Main actor introduction

introduction of patient information
Zhao Li 赵丽 is a 54 years old female
She has lived in Haerbin for more than 50 years.
She regularly visits community hospitals during the last 10 years.

Health condition:
She has high blood pressure (HBP), coronary heart disease and leg venous congestion caused by long-term overload working.

2) Customer journey-part 1
patient gets in touch with MedData
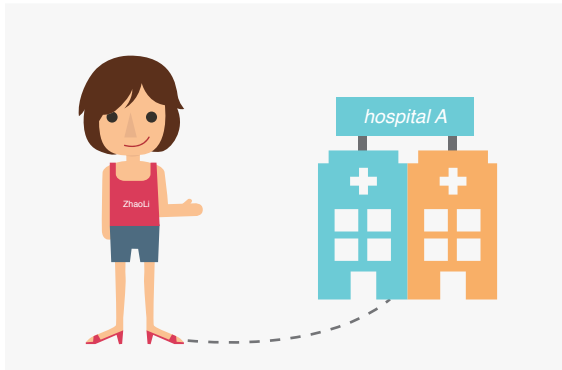
Step 1

ZhaoLi goes to hospital A for medical treatment about heart related disease.
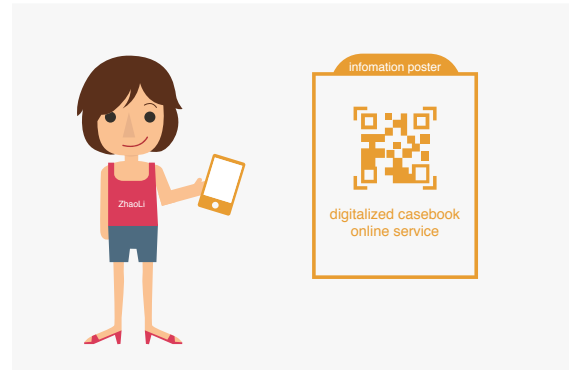
Step 2

ZhaoLi gets into the hospital and know about the digital patient casebook service via the *poster* showed at information wall.

Step 3

ZhaoLi reads the introduction on the poster and starts to have interest in this service. She scans the *OR code on poster* by her smart phone. Then she download the app of MedData service.
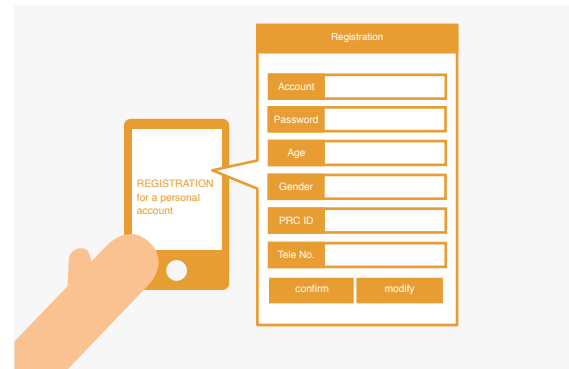
Step 4

She gets into the *registration page* of the service. Than she finishes the registration process and get a personal database account.

2) Customer journey-part 2

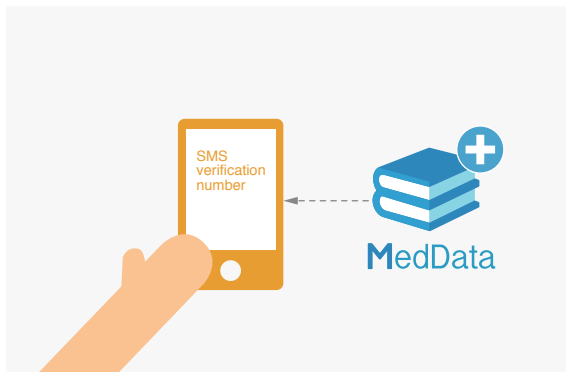### doctor gets access to personal database by permission of account owner
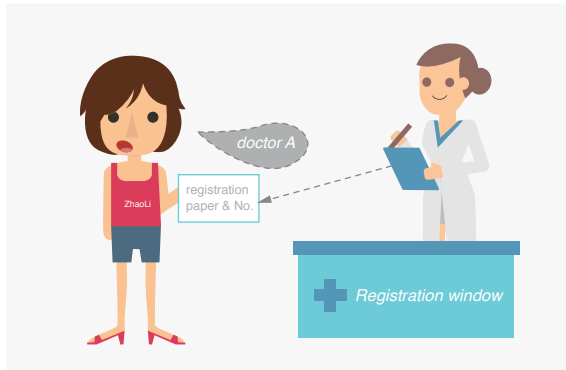
step 5
ZhaoLi goes to registration window and gets a registration paper with registration number for doctor A.
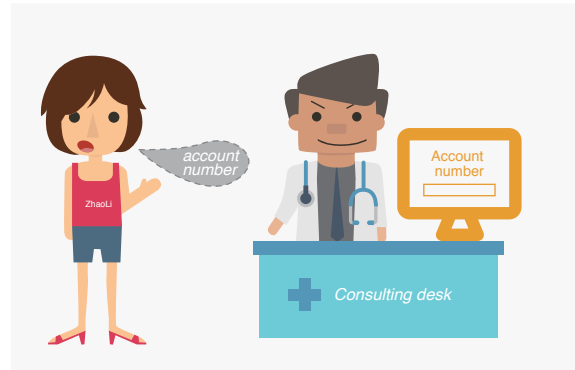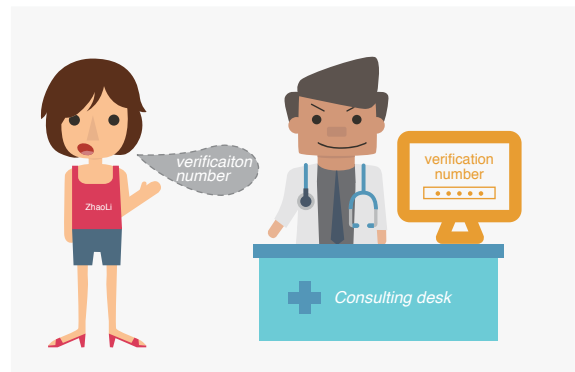

Step 6
ZhaoLi goes to consulting room and meets with doctor A. Doctor A asks what is ZhaoLi's *account number* only.
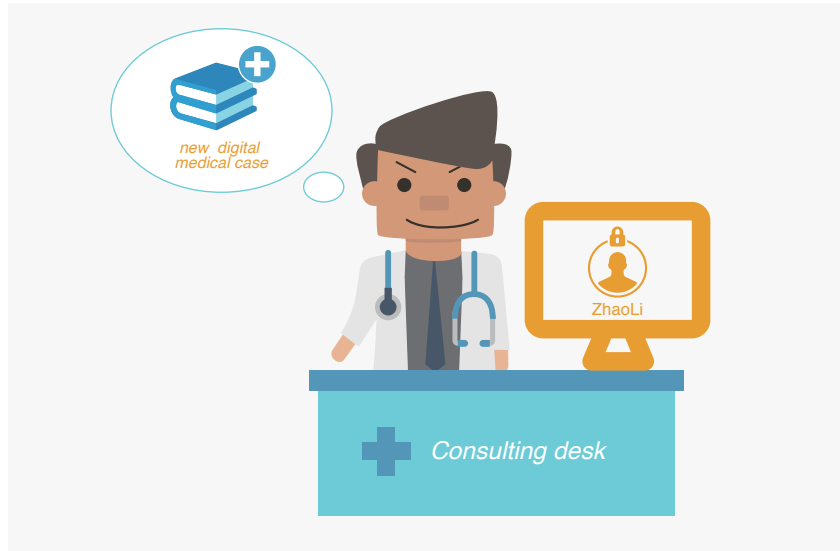

Step 7
After doctor A enters into the account number, MedData service sends *verification number* to ZhaoLi's mobile phone by SMS according to the account information she inserted during registration of her own account.
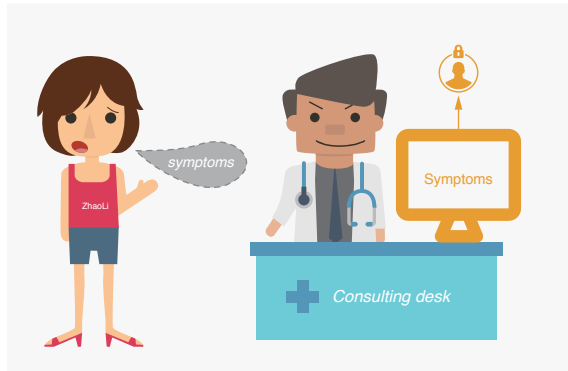

Step 8
ZhaoLi tells the verification number to doctor A. Doctor A enters the verification number into MedData platform.
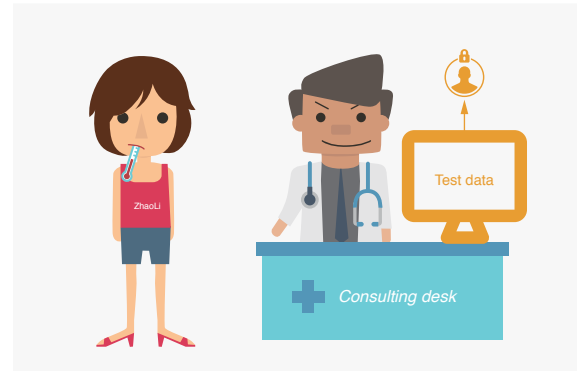
Step 9 Finally, doctor A logs in ZhaoLi's database account.
And creates a new digital medical case in ZhaoLi's account
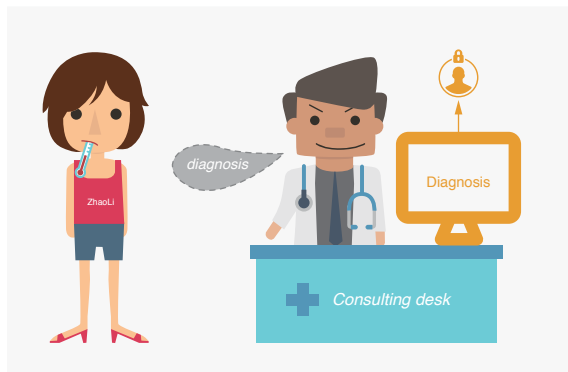
3) Customer journey-part 3
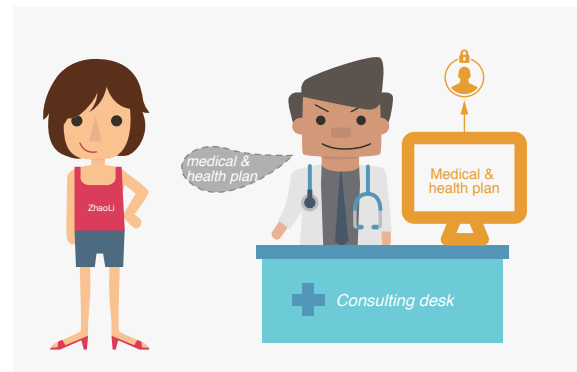
the process of recording medical data into account

step 10
After communication about the *symptoms* of ZhaoLi, doctor fills the main symptoms into her digital account.
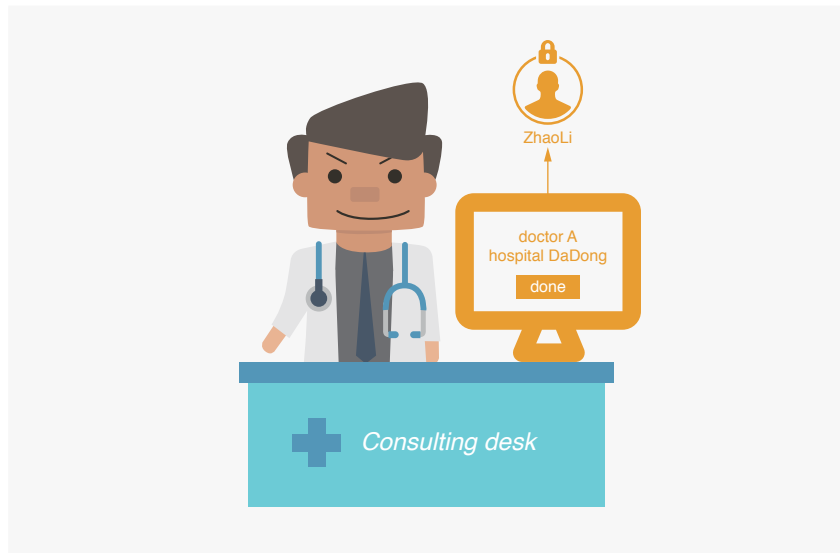

Step 11
After doctor A makes a set of primary tests for ZhaoLi, doctor A records the *tests results* into her account.

step 12
Doctor A records the *diagnosis* into ZhaoLi's account.

step 13
Doctor A makes a *medical & health plan* and records the plan into her account. Then ZhaoLi could check her new medical plan in her MedData account on phone.
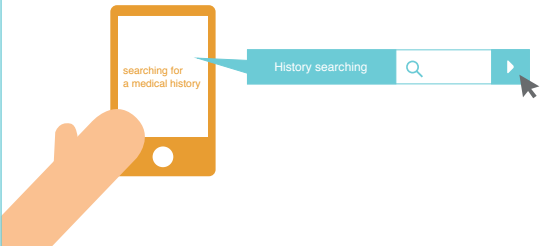
step 14 Finally after filling into the signature and hospital information, doctor A finishes this medical case and log out ZhaoLi's account.
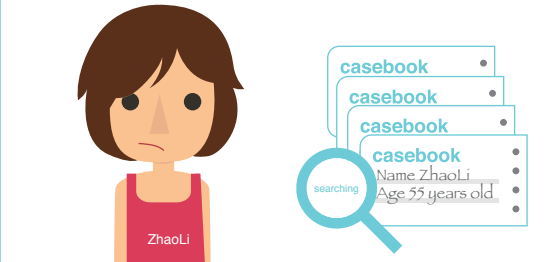
3) Customer journey-part 4 comparision

1.ZhaoLi searches for a history medical case

MedData service

searching for a medical history

History searching 🔍 ▶

step 14
ZhaoLi could search a medical history by timeline or keywords in catalog of medical history cases by key words searching.

paper casebooks

ZhaoLi

casebook
casebook
casebook
casebook
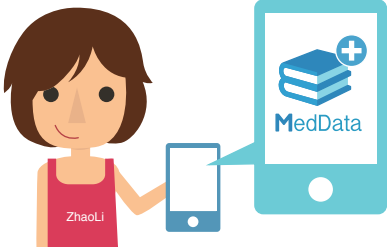Name ZhaoLi
Age 55 years old
searching

step 14
She does have to search a medical history in mass casebooks page by page and miss some useful cases probably.

3) Customer journey-part 4 comparision
2.ZhaoLi shares a medical case

MedData service

step 15

ZhaoLi shares his medical history to different doctors by taking his mobile phone instead of mass casebooks.
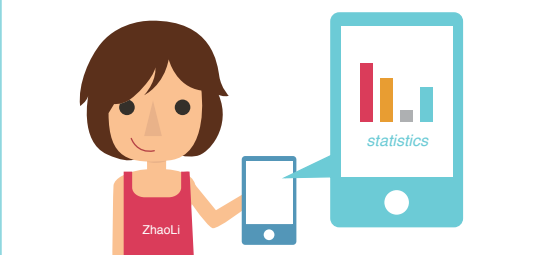
paper casebooks

step 15

ZhaoLi has to bring paper casebooks to different doctors but forgets her casebooks at home.

3) Customer journey-part 4 comparision
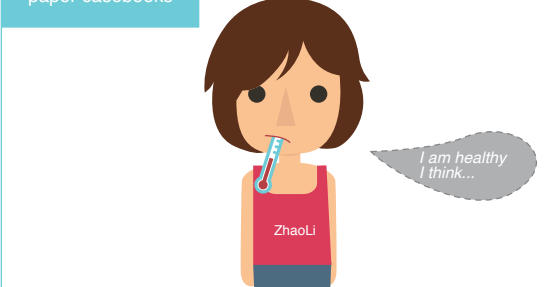
3.ZhaoLi shares her personal medical history to public health department

MedData service

step 16
ZhaoLi shares her medical history to public health department and receives feedbacks from public health department for free.

paper casebooks

I am healthy I think...

ZhaoLi

step 16
ZhaoLi has no awareness of public health conditions and the knowledge of chronic disease, so she does not pay attention to prevention of chronic disease.

6.Prototype

Service interface (for the user)
Step 1: patient registration

login page

Account

Password

Enter | Registration

registration page

Upload picture

Account 799964

Password ● ● ● ● ● ●

Next step | modify

registration page

Age

Gender

PRC No.

TELE No.

confirm | modify
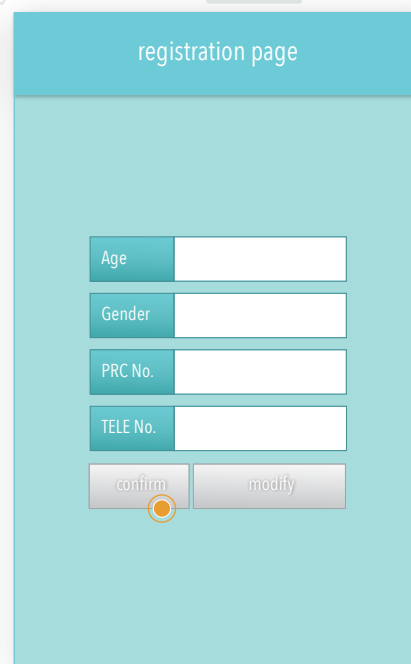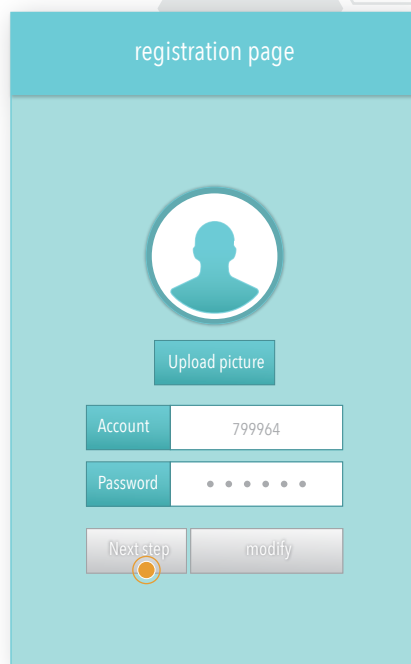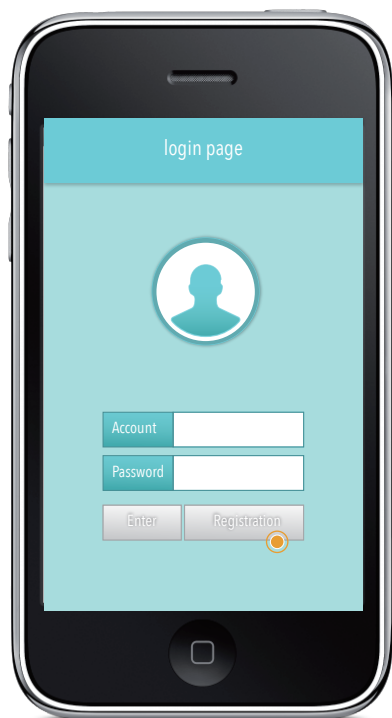
6.Prototype

Service interface (for the user)
Step 2: patient pravicy setting

main list

◀

- account information
- medical case searching
- privacy setting

privacy setting

◀

open data to public health department

off	on

back to the main list

6.Prototype

Service interface (for the user)
Step 3: patient medical history searching

main list

- account information
- medical case searching
- privacy setting

medical history searching

key words 🔍 ▶

- medicine list
- doctor/hospital
- testing data
- diagnosis
- medical case

back to the main list

medical history searching

key words 🔍 ▶

testing data searching result	
date	testing data
01/02/2015	Blood pressure testing
	High pressure 123; Low pressure 58; **Heart rate:** 105 times/min

enter the medical case ▲

| 05/10/2014 | Dyslipidemia | ▼ |
| 09/10/2014 | Dyslipidemia | ▼ |

back to the main list

6.Prototype

Service interface (for the user)
Step 3: patient medical hitory searching

Screen 1: medical history searching

◀ medical history searching

| key words | 🔍 blood pressure | ▶ |

testing data searching result

date	testing data
01/02/2015	Blood pressure testing
	High pressure 123; Low pressure 58; **Heart rate:** 105 times/min

| enter the medical case | ▲ |

| 05/10/2014 | Blood pressure | ▼ |
| 09/10/2014 | Blood pressure | ▼ |

back to the main list

Screen 2: 01/02/2015 high blood pressure

◀ 01/02/2015 high blood pressure

| ◀ | testing data searching result | ▶ |

Blood pressure testing
High pressure 123;
Low pressure 58;
Heart rate: 105 times/min

back to the medical history searching

Screen 3: 01/02/2015 high blood pressure

◀ 01/02/2015 high blood pressure

| ◀ | diagnosis | ▶ |

reason	diagnosis
○ over load working; ○ unhealthy diet and drinking; ○ unregular sleeping time;	long -term high blood pressure

back to the medical history searching
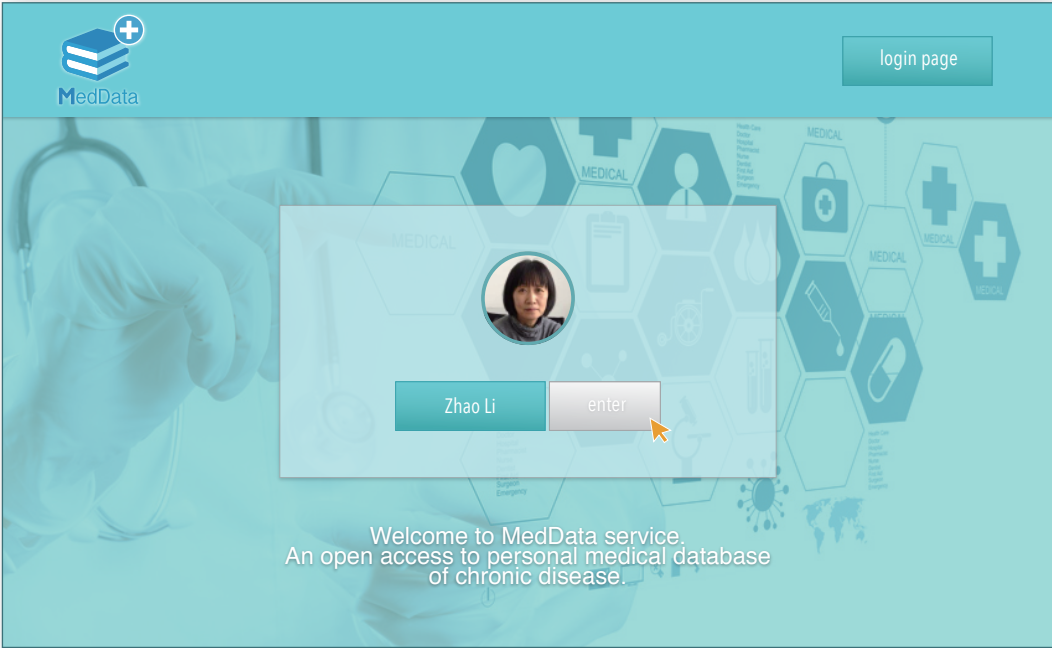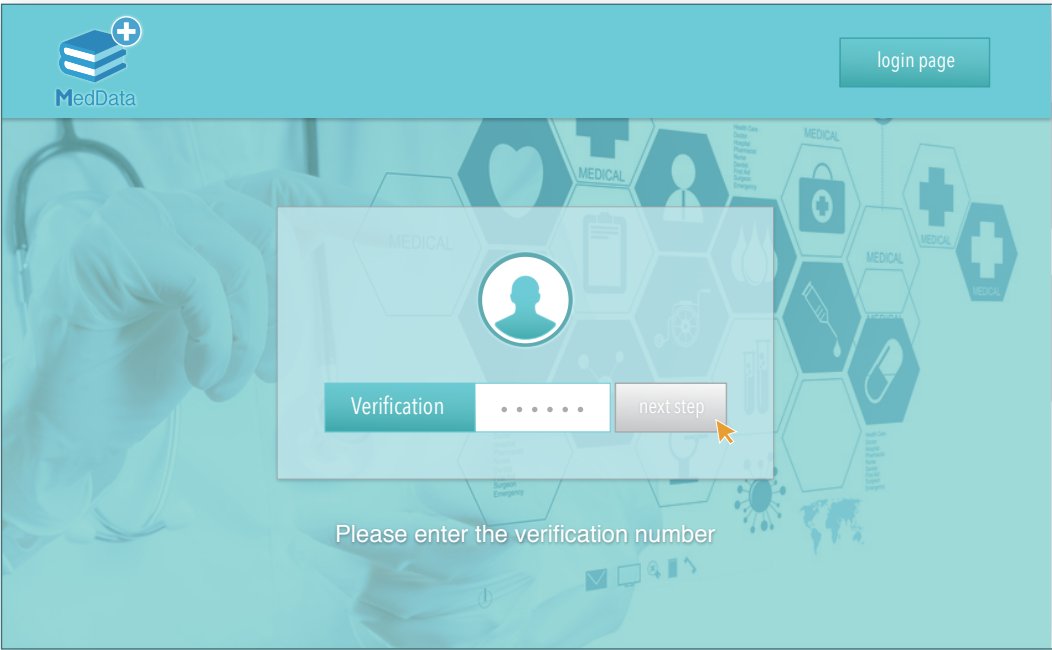
6.Prototype

Service interface (for the doctors)
step 1: doctor logs in patient personal online database account under the permission of the account owner

MedData

login page

Account   799964   next step

Please enter the patient account number

MedData

login page

Verification [• • • • • •] next step

Please enter the verification number

MedData

login page

Zhao Li   enter

Welcome to MedData service.
An open access to personal medical database
of chronic disease.

6.Prototype

Service interface (for the doctors)
step 2: doctor checks the patient account information

6.Prototype

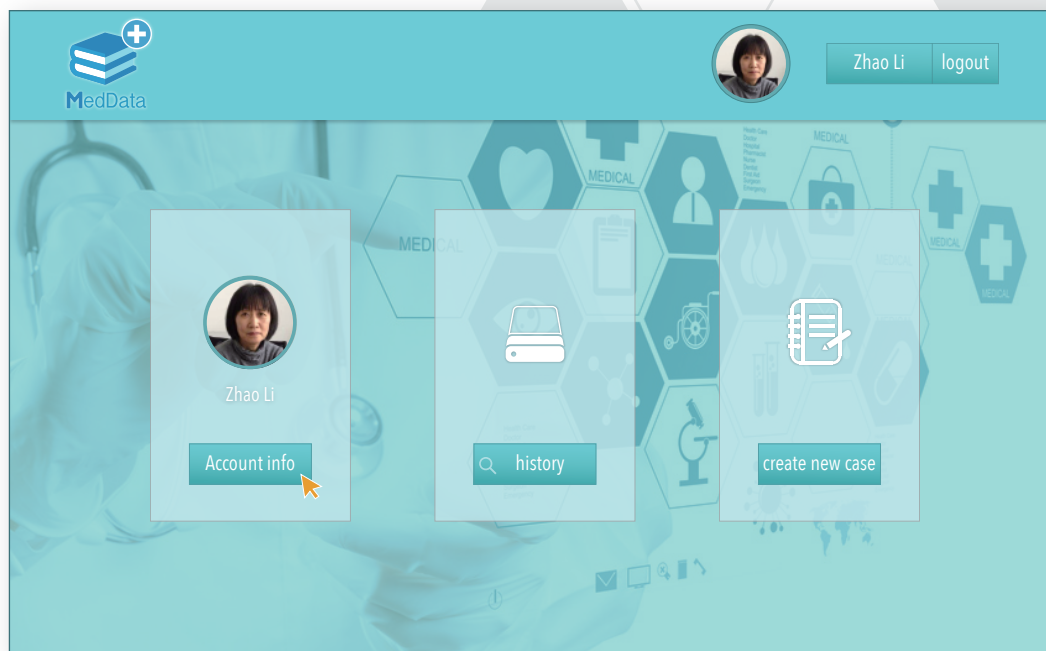## Service interface (for the doctors)
step 2: doctor checks the patient account information

MedData

Zhao Li   logout

Patient infomation

Medical allergy history

Zhao Li

back to home

Gender   Female
Birth 01/01/1960
Age 55
PRC 230102XXXXXXXX2423
Tele 0086 139XXXX7550
Adress HeiLongJiang Haerbin
DaoLi district GuangHua
community block 10 room
403

Antibiotics allergy   +

Cephalosporin class:
non-steroidal anti-inflammatory agent

Symptom: scarlet fever erythema

6.Prototype

Service interface (for the doctors)
step 3: doctor records the medical information into patient account

Panel 1

MedData

Zhao Li   logout

Date 01/01/2015

symptoms
testing data
diagnosis
medical plan
health plan
organize
cancle

B *I* U A· A · *F*· Tт· ☰· ☰·
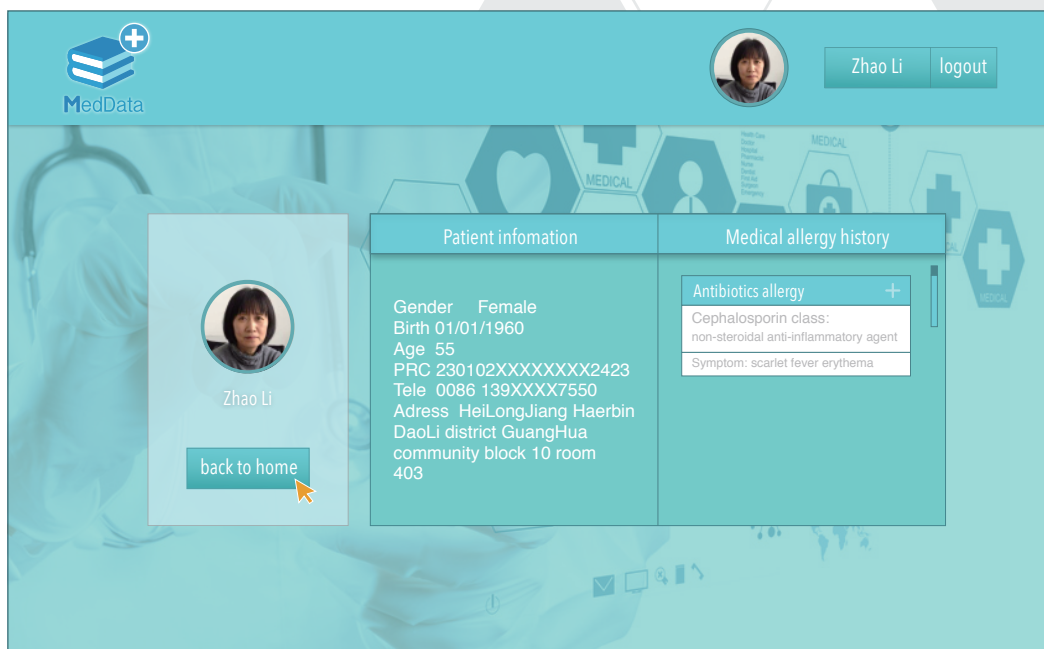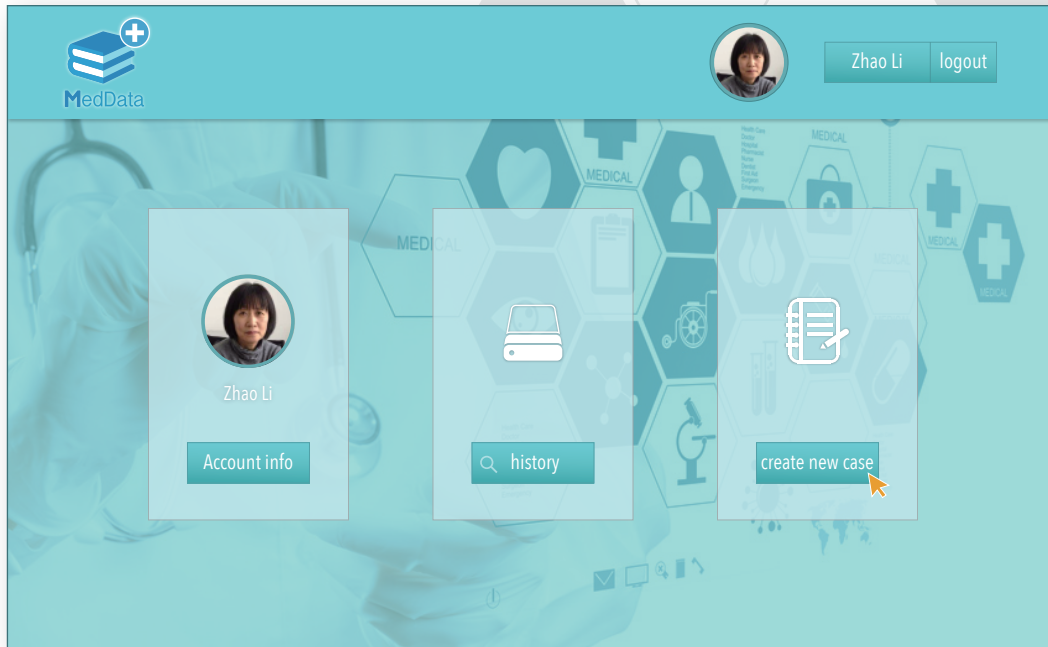
○ **Headache or nausea and v...ng;**
○ **Dizziness, tinnitus;**
○ **Memory decline;**

save   edit

Panel 2

MedData

Zhao Li   logout

Date 01/01/2015

symptoms
testing data
diagnosis
medical plan
health plan
organize
cancle

primary test	lab test	device test

B *I* U A· A · *F*· Tт· ☰· ☰·

Blood pressure: |
High pressure 123;
Low pressure 58;
Heart rate: 105 times/min

save   edit

Screen 1

MedData

Zhao Li   logout

Date 01/01/2015

- symptoms
- testing data
- diagnosis
- medical plan
- health plan
- organize
- cancle

B *I* U A A F Tr ▤ ▤

medical	amount	use
Asprin	12 pills	1 pill / time 2 times in morning and evening

save   + add a medicine

Screen 2

MedData

Zhao Li   logout

Date 01/01/2015

- symptoms
- testing data
- diagnosis
- medical plan
- health plan
- organize
- cancle

B *I* U A A F Tr ▤ ▤

reason	diagnosis
○ over load working; ○ unhealthy diet and drinking; ○ unregular sleeping time;	long -term high blood pressure

save   edit

6.Prototype

Service interface (for the doctors)
step 3: doctor records the medical information into patient account

MedData

Zhao Li   logout

Date 01/01/2015

symptoms

testing data

diagnosis

medical plan

health plan

organize

cancle

Case informaiton - confulsorty

Final diagnosis	high blood pressure	+
Main doctor	Doctor. Wang
Cooperate hospital	DaDong hospital

Notice:
After the medical case is uploaded the information of the case
will not be able to be modified.

upload

6.Prototype

Service interface (for the doctors)
step 4: doctor searches for a medical history in patient account
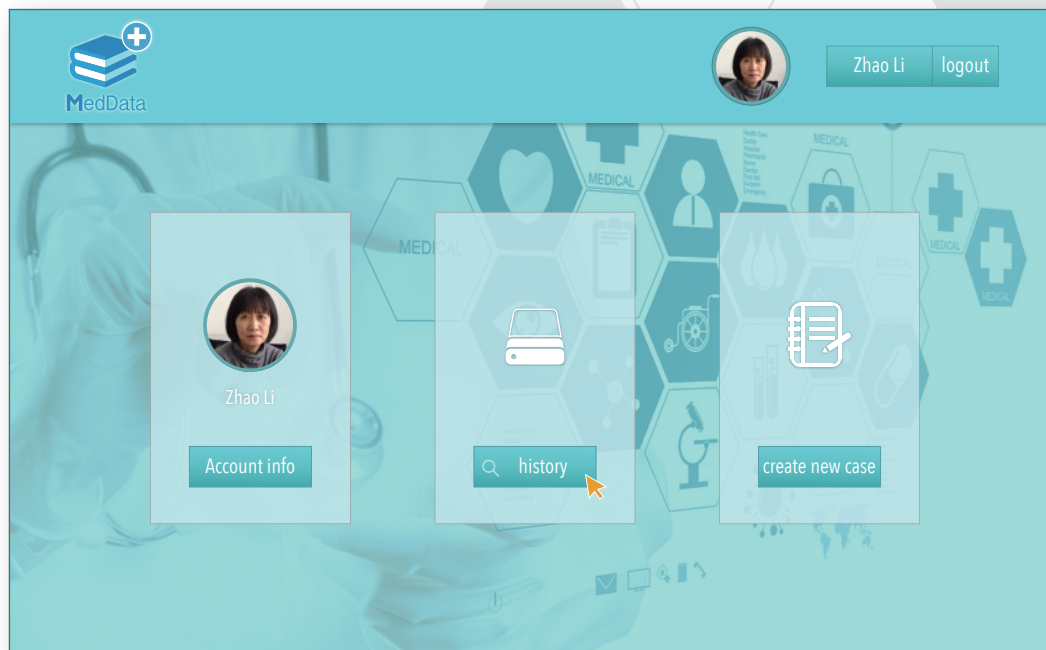
MedData

Zhao Li   logout

Quick searching list

key words   🔍 _____ ▶

medicine list

doctor/hospital

diagnosis

symptoms

medical case

medicine list searching result

date	medical	amount	use
01/05/2015	**Asprin**	12 pills	1 pill / time 1 time in morning and 1 time in the evening
01/04/2015	**hydrochloro-**	15 pills	1 pill / time 1 time in morning
12/03/2015	**hydrochloro-**	10 pills	1 pill / time 1 time in morning

◀ 2/15 ▶   [_____] Go

MedData

Zhao Li   logout

Quick searching list

key words   🔍 hydrochlorothiazide   ▶

medicine list

doctor/hospital

diagnosis

symptoms

medical case

medicine list searching result

date	medical	amount	use
01/04/2015	**hydrochloro-**	15 pills	1 pill / time 1 time in morning and 1 time in the evening
12/03/2015	**hydrochloro-**	10 pills	1 pill / time 1 time in morning
09/01/2015	**hydrochloro-**	10 pills	1 pill / time 1 time in morning

◀ 2/15 ▶   [_____] Go

MedData

Zhao Li logout

Quick searching list

key words 🔍 ▶

medicine list

doctor/hospital

diagnosis

symptoms

medical case

medicine list searching result

date	medical	amount	use
01/04/2015	**hydrochloro-**	15 pills	1 pill / time 1 time in morning and 1 time in the evening
12/03/2015	**hydrochloro-**	10 pills	1 pill / time 1 time in morning
09/01/2015	**hydrochloro-**	10 pills	1 pill / time 1 time in morning

◀ 2/15 ▶   Go

MedData

Zhao Li logout

Date 01/01/2015

symptoms

testing data

diagnosis

medical plan

health plan

organize

cancle

Case informaiton - confulsorty

Final diagnosis	high blood pressure
Main doctor	Doctor. Wang
Cooperate hospital	DaDong hospital

back to search

P54

Haerbin DaDong Hospital

MedData

claim: Open platform for patients with chronic disease!

PLEASE SCANE THE QR CODE INORDER TO DOWNLOAD THE APP FOR PATIENTS

USE MEDDATA TO RECORD YOUR MEDICAL HISTORY
AND GET RIDE FROM THE TROUBLE COUSED
BY PAPER CASEBOOKS!

Reference

reports
'China 2013 final report of cardiovascular disease'
'report of chronic disease in china' 2005.06 from Charls organization

website
www.baidu.com
www.dituhui.com
http://www.tnbyy.com/cms/article.php?action=show&id=189
http://www.who.int/chp/chronic_disease_report/media/china.pdf
http://www.cpma.org.cn/Article_Print.asp?ArticleID=3898
http://myhealthyfriends.blogspot.it/p/blood-pressure.html