

Research Article

Research on Urban Intelligent Medical Service System Design Based on Multiobjective Decision-Making Optimization Strategy

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Aiming at the problems of difficult medical treatment for urban residents, low efficiency of hospitals, imbalance of medical resources and difficulty to meet the demands of patients, this paper proposes an urban intelligent medical service system based on multiobjective decision-making optimization strategy. Firstly, it analyzes the medical service demands of urban residents and points out that the urban intelligent medical service system should provide comprehensive services for residents; the main demands include basic medical demands, expected medical demands, and health care medical demands. Secondly, based on demand analysis, an urban intelligent medical service system composed of government, community hospital, large hospital, and urban residents is designed. The system has three kinds of system functions: customer business services, basic services, and institutional information services. Then, the overall process of the system before and after treatment of urban residents is introduced. Finally, according to the optimization objectives of the system: low medical cost, fast treatment speed, and high service satisfaction, the corresponding optimization strategies are formulated to optimize the urban intelligent medical system, reduce medical cost, improve treatment speed, and improve customer satisfaction, to better serve urban residents.

1. Introduction

With the rapid development of economy and the continuous improvement of people's living standards, the people will put forward higher requirements for medical services. Medical service is an issue of great concern to all countries, while China is a country with extremely uneven development. For people in remote areas, medical resources are relatively scarce. It is impractical to go to the outpatient department of large professional medical institutions for expert diagnosis and treatment. For areas with better development, the population density is large, and it is also very difficult to make an appointment with an expert. This situation has caused a great consumption of human resources, and at the same time, it cannot meet the demands of patients well.

Looking at the whole medical industry in China, medical institutions generally have the so-called "intelligent" medical service system. In fact, they only have simple service functions such as reservation and query. Such a system is still

far from "intelligent." The internal systems of the hospital have not been integrated, and the data between medical institutions are difficult to share. These problems are also very serious. Despite the deepening of China's medical reform, the long-standing situation of difficult medical treatment, low hospital efficiency, imbalance of medical resources, and difficult guarantee of patients' demands has not been significantly alleviated, which seriously restricts the improvement of the quality of life of the Chinese people [1]. For most residents, real-time, convenient, economic, high-quality, professional, and systematic medical services are the real intelligent medical services in their eyes. The final service object of intelligent medical treatment is patients and residents with health demands. The construction process should follow the principle of "people-oriented" [2]. Such a medical service system is conducive to the harmonious development of society and meets the vital interests of the people.

Therefore, in order to ensure the quality of urban intelligent medical services and improve residents' satisfaction with

intelligent medical services, this paper will start from the residents' demand for intelligent medical services, take this as the center to build the urban intelligent medical service system, and put forward corresponding system optimization strategies according to the residents' objectives and requirements, so that the design of urban intelligent medical system can truly meet the demands of residents.

2. Related Works

Intelligent medical, or WIT120 for short, is to realize the interaction between patients and medical personnel, medical institutions, and medical equipment by building a regional medical information platform for health records and using the most advanced Internet of things technology, to gradually achieve informatization [3]. Intelligent medical originates from the "intelligent earth" strategy proposed by IBM in 2009. It is an advanced manifestation of hospital information system and plays a positive role in the integration of medical resources, the upgrading of medical software and hardware equipment, the humanization of medical model, and the affinity of medical expenses [4, 5]. The development of intelligent medical service system has experienced many stages.

An intelligent medical service system was first used in the information management system of medical institutions to assist the daily operation of medical institutions. Among them, Zhu et al. designed an information management system for monitoring medical infection, which can automatically warn and monitor, manage medicine at different levels, analyze the rationality of equipment use, and take effective control measures for hospitalized infection in time [6]. Yao used information technology and other scientific and technological means to design a set of medical device acceptance guidance management information system, including acceptance things, business management, query results, forms, and other functions, which improved the efficiency of inspection work [7]. Thi et al. pointed out that the management of medical equipment in hospitals in northern Vietnam is very simple and does not use information technology, which is very difficult for the management and effective utilization of medical resources. Based on this, they proposed an application model of information technology in medical equipment management to improve the information management ability of medical equipment [8].

With the development of Internet of things technology, a medical service system began to provide services to users relying on the Internet of things framework. Among them, Gong et al. believed that the emergence of Internet of things technology has promoted the development of medical informatization, and privacy protection is a very important but unsolved problem. Therefore, considering the characteristics of Internet of things and privacy protection, they designed a prototype system based on software and hardware [9]. Ullah et al. designed the intelligent medical comprehensive service platform based on Internet technology, including four layers: sensor layer, network layer, Internet layer, and service layer. All layers cooperate effectively and efficiently and can use smart phones to access the patient health data platform [10]. Adame et al. integrated RFID and WSN technology

to build an Internet of things hybrid monitoring system for medical and health care environment, which can provide the location, status, and tracking of patients and obtain high-quality medical care and intelligent service opportunities [11]. Lu et al., under the complex business background of the medical Internet of things environment, developed the command medical service system in the Internet of things environment based on the open-source project and verified through the experiment of real dataset that the system can promote the rational utilization of medical resources and improve the efficiency of diagnosis process to a certain extent [12]. Akkaş et al. built a health care system based on internet of things technology to detect the vital signs of patients, including the data of pulse rate, plethysmography, and relative oxygen ratio, assist in life, manage chronic diseases, and provide personalized medicine treatment [13]. Cheng et al. developed an intelligent hospital information management system based on internet technology to meet the functions of patient reservation, viewing medical records and hospital news. At the same time, it can also manage the hospital more comprehensively [14]. Onasanya and Elshakankiri used Internet of things technology to build an intelligent health care system for cancer care, increase the choice of existing treatment, and provide more solutions for health care [15].

In the era of rapid development of big data and cloud computing technology, the medical service system is developing in the direction of intelligence, integrating a variety of information technologies to provide remote intelligent medical services. Manogaran et al. proposed a new ecosystem architecture based on Internet of things and big data technology, which can provide a safe intelligent medical monitoring and alarm system [16]. Smys and Raj focused on the analysis of patients with heart disease, built a medical information system using the technology of the combination of Internet of things and big data analysis, and transmitted the data collected by sensors to the cloud through the Internet for analysis and evaluation, to improve the accuracy of health monitoring [17]. Rajabion et al. pointed out that the rapid growth of patient safety and medical care will produce a large amount of data, and cloud computing is one of the important choices to process these data. The in-depth study of the corresponding review mechanism will help to develop more effective medical big data processing technology through cloud computing in the future [18]. Syed et al. used the medical Internet of things and big data analysis technology to provide a novel intelligent healthcare framework to better monitor the physical activities of the elderly, make faster analysis and decision-making, and formulate better treatment suggestions [19]. Zhong et al. designed a telemedicine system based on Internet of things and cloud computing technology to solve the problems of unbalanced distribution and low efficiency of medical resources, which can meet various functions required by telemedicine and enable real-time communication between patients and doctors [20]. Zhou et al. took users as the center, took medical information as the main line, and used big data, Internet of things, cloud computing, and other technologies to establish scientific and accurate information and efficient and reasonably intelligent medical emergency telemedicine auxiliary system service system, which can well alleviate the doctor-patient contradiction caused by

information asymmetry, unreasonable allocation of medical resources, and other problems [21].

Since IBM put forward the concept of intelligent medical treatment in 2009, it has attracted great attention at home and abroad. Some foreign countries and regions have launched intelligent medical construction plans [22]. At present, some cities in China have completed the construction of intelligent medical service system. For example, Beijing has established an intelligent emergency medical coordination platform, including emergency command center, emergency vehicles, medical staff, and receiving hospitals [23]. Shenzhen has launched the resident health card project, including medical business collaboration, patient-centered family medicine, medical resource service platform, medical information management system, electronic medical record management system, and other services [24]. Hangzhou launched “medical credit payment” to realize the function of diagnosis and treatment before repayment and reduce the trouble of settlement failure and round-trip recharge balance during treatment due to insufficient balance [25]. Most urban smart healthcare did not investigate the main objects of medical services before and after construction, and the results of construction are not necessarily what urban residents need most. At the same time, the goal of intelligent medical development is not only to better treat patients but also to keep people healthy.

To sum up, the design of urban intelligent medical service system based on multiobjective decision-making optimization strategy should carry out the overall design and functional design according to the demands of residents and continuously optimize the system design according to the objectives and requirements of urban residents, to make urban smart medical truly meet the demands of citizens and realize real service for the people.

3. Demand Analysis of Urban Intelligent Medical Service System

3.1. System Analysis. The service object of the urban intelligent medical service system is every resident. Providing perfect medical service to individuals is the product of the development of intelligent medical today. The current intelligent medical system only has simple service functions such as remote reservation and intelligent guidance, which causes great consumption of human resources and cannot meet the requirements. For residents in remote areas, due to the lack of medical facilities, what they need is real-time, convenient, efficient, high-quality, and complete medical services. For residents in well-developed areas, due to the fast pace of life and busy work, it is very difficult to make an appointment with some high-level medical institutions. What they need is convenient, efficient, and intelligent medical services. At the same time, with the continuous improvement of living standards, residents pay more and more attention to health, and it is also very necessary to provide health services for residents. Therefore, the urban intelligent medical service system should provide comprehensive services for residents, so that patients can see a doctor at home, register online according to expert diagnosis, browse health information,

and remote emergency medical rescue calls. The design and research of urban intelligent medical service system are very important for the process of medical service informatization and can contribute to solving medical problems for the society. The overall requirements of the system are as follows:

- (1) Good interface display enables users to query relevant medical data intuitively, quickly, and conveniently
- (2) Due to the large number of users of the system, safe permission management is required
- (3) Service oriented can provide various types of services according to user demands
- (4) Perfect feedback mechanism enables users to feed back problems and suggestions to relevant organizations, to make the system run more healthily
- (5) The information of medical institutions in the system is interconnected, which can quickly know the patient’s condition and provide medical help

According to the analysis of the overall requirements of the system, the urban intelligent medical service system includes medical service requirements and system performance requirements.

3.2. Medical Service Requirement. The main medical service demands of urban intelligent medical service system include basic medical need, expected medical need, and health care medical need. Basic medical demands are the most basic medical need of residents. Expectant medical demands are not only a medical need that cannot be well realized at present but also a medical need that residents look forward to very much. Health care medical demands are to meet the daily health demands of residents. Medical demand of urban residents’ intelligent medical service system is shown in Table 1.

3.3. System Performance Requirement. The users of urban intelligent medical service system are residents, medical staff, and system managers in the area where the medical institution is located. Because the number of users is very large, and with the promotion and optimization of the system, the number of users is bound to increase. Therefore, the system needs certain performance requirements:

3.3.1. Security Requirement. An urban intelligent medical service system contains a large amount of privacy information and institutional confidential information, including basic information and service records of patient users and training set data in intelligent diagnosis system. The above information is our sensitive information and must not be disclosed except for use in the system. The leakage of medical data will not only cause the insecurity of the system and easy to be attacked and destroyed but also cause more serious social impact such as people’s distrust of medical institutions. Therefore, the most important thing for the security of

TABLE 1: Medical demand of urban residents' intelligent medical service system.

Demand type	Demand content
Basic medical demands	Patient information security
	Good hospital service attitude
	Hygienic and comfortable medical environment
	Safe and effective medication
	Rapid and effective response to emergencies
Expectant medical demands	Diagnosis and treatment by experts
	Diversified payment methods of medical expenses
	Short waiting time for registration, medical treatment, and medicine collection
Health care medical demands	Low medical expenses
	Standardized electronic records of citizens' health
	Effective health exercise
	Healthy diet plan
Convenient diagnosis and treatment of daily minor diseases	

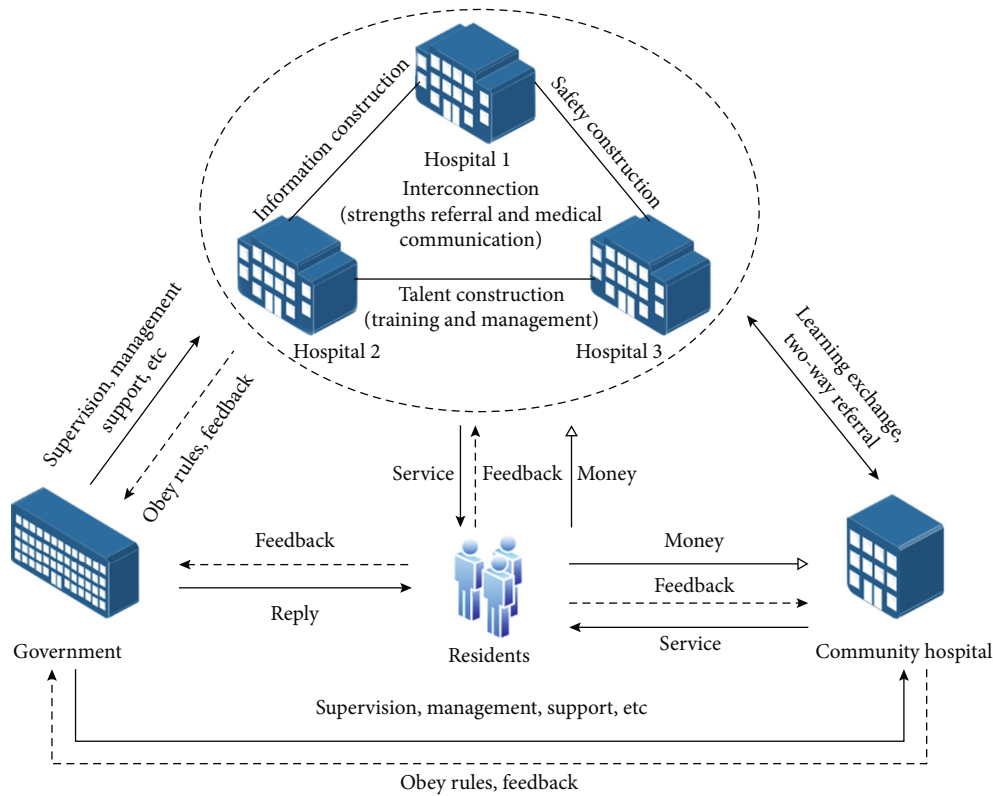


FIGURE 1: Overall system architecture.

the system is the protection of sensitive data and the protection of data interaction in the process of communication.

3.3.2. Stability Requirement. The urban intelligent medical service system provides services to residents at any time, so it should operate around the clock. If the server is interrupted, various services to residents will be stopped, which will cause a very bad user experience. Therefore, when the server has problems and cannot work normally, it can timely monitor and quickly restore the normal operation of the

server, to ensure that the system can provide continuous and reliable uninterrupted service. It is also necessary to have fault-tolerant treatment for various misoperations to avoid affecting the correctness of the business, to ensure the stability of the system.

3.3.3. Ease of Use Requirement. Ease of use requires that the operation interface of the system is simple, the process is simple and easy to understand, and it is easy to use and feasible in operation. Users and managers do not need to

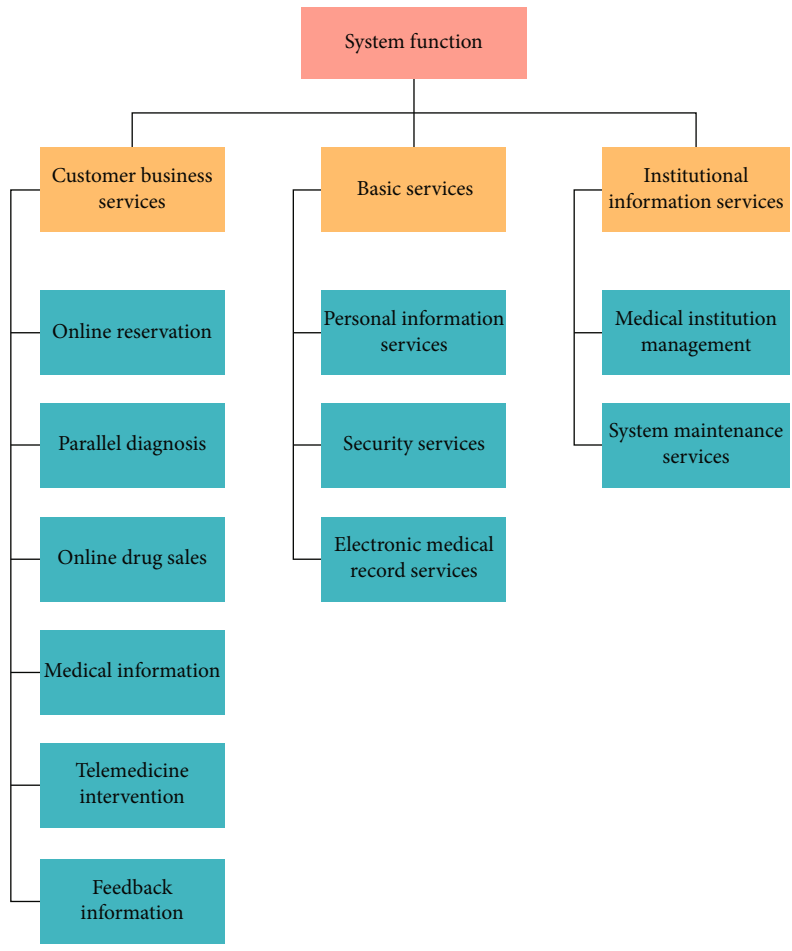


FIGURE 2: The system function diagram.

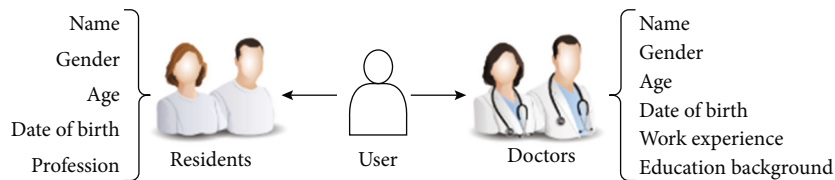


FIGURE 3: The personal information of system users.

download and install a special desktop client. They can get the service by using the browser.

4. Design of Urban Intelligent Medical Service System

4.1. Overall System Design. Based on the analysis of the demands of urban intelligent medical service system, the overall architecture of the system is designed, as shown in Figure 1.

The system consists of four parts: government, community hospital, large hospital, and urban residents. In the urban intelligent medical service system, the government is responsible for the supervision, governance, standardization, and support of hospitals and community hospitals to main-

tain the normal operation of order. As the main carrier of providing medical services, hospitals play an important role in the system, providing medical services directly to urban residents, and the interconnection between medical institutions in the region realizes the sharing of medical resources and data. Community hospitals provide medical services to urban residents, issue referral certificates to patients when necessary, go to large hospitals for treatment, and learn from large hospitals at the same time. The information between large hospitals is interconnected. They strengthen personnel training and management, strengthen the exchange of referral medical care, and provide medical services and feedback for urban residents. Urban residents can seek medical help from community hospitals or large hospitals and pay corresponding treatment fees. If they have problems, they can

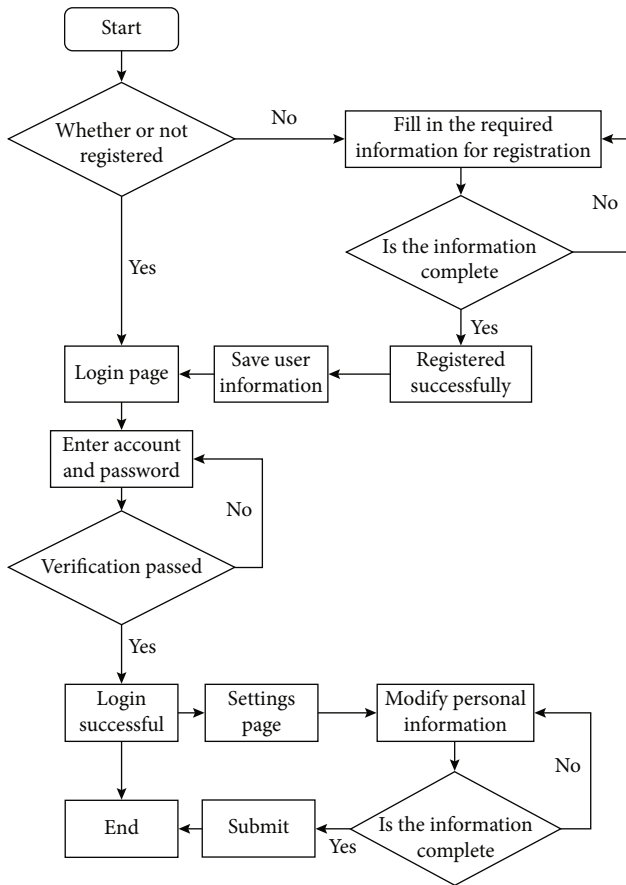


FIGURE 4: System login flow chart.

feed back to community hospitals, large hospitals, or the government.

Based on the demand analysis of urban intelligent medical service system, the system needs to realize three types of medical service, including customer business service, basic service, and institutional information service. Customer business services include online reservation, parallel diagnosis, online medicine sales, medical information, telemedicine intervention, and feedback information. Basic service is the basis or prerequisite of business services, including personal information service, security service, and electronic medical record service. Institution information services provide medical institution management and system maintenance service. The system function diagram is shown in Figure 2.

4.2. Detailed System Design

4.2.1. Personal Information Services. Personal information services provide the functions of listing, filling, adding, modifying, and searching personal information. The personal information service function is applicable to all registered users in the system. The basic information mainly includes name, gender, age, date of birth, and profession. Doctors have more personal information than patients, including medical work experience and medical education background, which can be used by patients to judge their profes-

sional ability without knowing doctors. The personal information of system users is shown in Figure 3.

All functions of the system require the user to log in and use it. When using it for the first time, the user needs to register and fill in various information according to the prompt. The system will assign a unique user ID to the user, and the filled data can be modified at any time. Then, enter the login page and enter user information such as account number and password. After submission, the login is successful if it is verified, and the user can choose other services. The flow chart is shown in Figure 4.

4.2.2. Security Services. The urban intelligent medical service system carries many important sensitive data, such as patients' basic information, diagnosis, and treatment data. If the privacy information is leaked, it will cause extremely serious consequences, such as identity theft, identity information leakage, and being falsely lent, which will cause great reputation and economic losses to the victims. Therefore, the core of system security is to protect the relevant data of urban intelligent medical service system from various forms of theft, destruction, and tampering. Security measures should be deployed from the physical, network, system, application, and data levels to meet the security objectives and relevant security requirements stipulated by the state.

4.2.3. Electronic Medical Record Services. Electronic medical record services include four parts: medical record index object, medical record object, operation index, and allergy index. The setting of medical record index comprehensively shows the whole process of patient's condition diagnosis in terms of time, to provide support for future diagnosis and research. If the patient is newly diagnosed, the doctor needs to start a new medical record index entry for the patient and fill in the first diagnosis symptoms into the medical record index. Otherwise, the index related to the patient should be found in the patient's original medical record index. Doctors need to fill in medical records after a diagnosis and completely record the patient's symptoms, diagnosis conclusions, patient signs, and other routine medical information. The allergy index and operation index reflect the patient's allergy history and operation history, which is very important for the doctor's diagnosis. When giving the doctor's order, the doctor will avoid the medicine allergic to the patient and consider the situation according to the previous operation before the operation. The electronic medical record information is shown in Figure 5.

4.2.4. Online Reservation. Online reservation service is a self-help online selection of appropriate medical services for patients, which is conducive to reducing queuing troubles and calming patients' emotions, and can maximize the utilization of medical resources. Medical services need to be announced in advance by doctors to form a list for patients to choose the services they need. Patients can carry out intelligent diagnosis. After the patient selects his uncomfortable part on the human body diagram, he selects the symptoms and severity of the part, selects the department according to the results of intelligent diagnosis, and then selects the

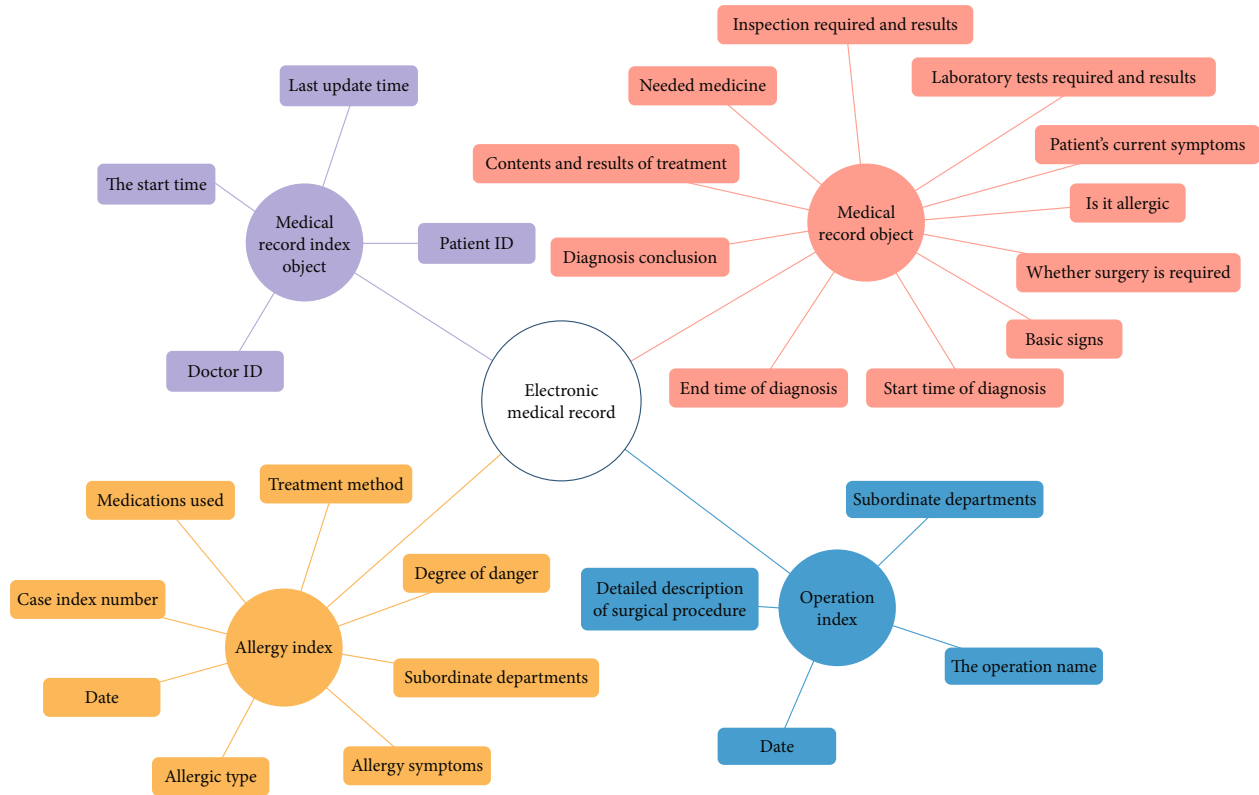


FIGURE 5: The electronic medical record information.

doctor in the department to make an appointment. After successful submission, the system returns the appointment results. The flow chart of online reservation service is shown in Figure 6.

4.2.5. Parallel Diagnosis. The system provides online diagnosis function for doctors and patients, that is, parallel diagnosis. Parallel diagnosis service provides text interaction service and supports visual interaction at the same time. Both patients and doctors can initiate parallel diagnosis communication. After the communication is completed, a diagnosis record will be generated, including patient ID, doctor ID, date, and time of diagnosis start and communication content. The interaction diagram of parallel diagnosis is shown in Figure 7.

4.2.6. Online Medicine Sales. Online medicine sales service provides convenient online medicine purchase services for patients, who can buy medicine without leaving home. After seeing a doctor, the patient buys medicine on the single line according to the prescription issued by the expert. Online medicine information is shown in Figure 8.

4.2.7. Medical Information. Medical information provides residents with health information, announcement notice, and hospital introduction. Health information is aimed at promoting a healthy life and providing residents with health and health care information. The announcement notice provides residents with information such as process introduction, expert symposium, and precautions. Hospital

introduction introduces the situation of the hospital. The content of medical information is shown in Figure 9.

4.2.8. Telemedicine Intervention. Telemedicine intervention is to provide online medical intervention services when patients encounter an emergency and doctors or medical institutions cannot provide timely assistance. The patient requests the doctor for rescue through the telemedicine intervention system and sends a help request. The request information includes the description of the symptoms. The doctor on duty of the emergency center can check the uploaded first aid information. Combined with the patient's electronic medical record, the patient can know what first aid suggestions the patient needs at present and send help suggestions to him or remote video call guidance through the system. Help and advice mainly provide suggestions for emergency rescue of patients, help patients correctly dispose of wounds at the first time, and provide other first aid information and guidance. Telemedicine intervention is shown in Figure 10.

4.2.9. Feedback Information. Feedback information service is mainly used to feed back problems, suggestions and satisfaction evaluation to hospitals and governments. After receiving the feedback, the hospital and the government should reply and solve the problem in time. The interaction diagram of feedback information service is shown in Figure 11.

4.2.10. Institutional Information Services. Institutional information services provide medical institution management and system maintenance functions, including online

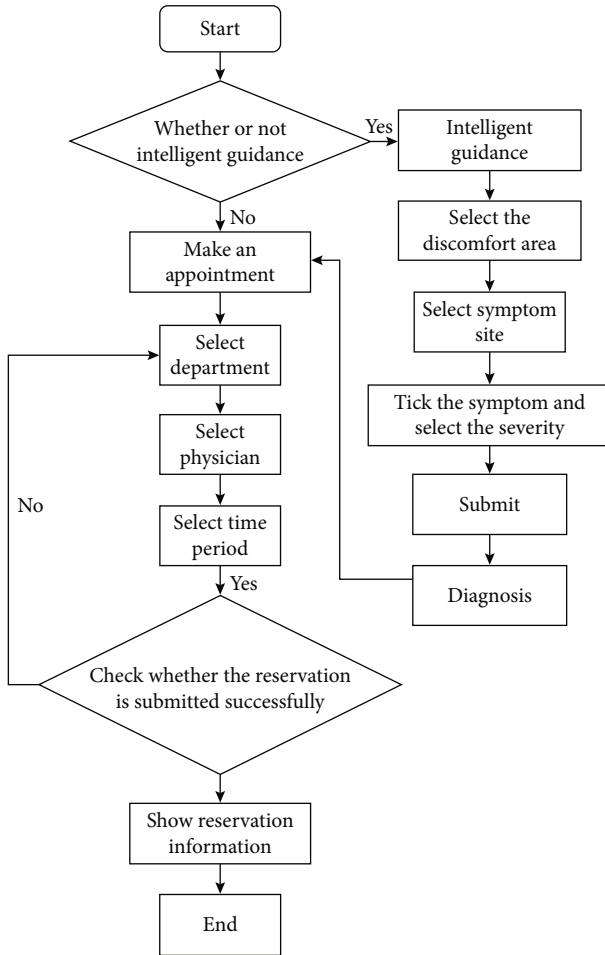


FIGURE 6: The flow chart of online reservation service.

reservation management, physician management, department management, medicine management, user management, medical information management, and feedback information management. The institutional information service function is shown in Figure 12.

- (1) Online reservation management: it mainly checks whether the reservation has expired. If it has expired, the reservation will be deleted.
- (2) Physician management: it mainly refers to the change of doctors in departments and the modification of personal information of medical staff.
- (3) Department management: it is mainly used to add and delete departments.
- (4) Medicine management: it is mainly to strictly input and manage the medicine name, classification, batch, number, inventory, and other information to ensure the adequacy and safety of medicine.
- (5) User management: it is mainly to click and count into the user management page in the background management system. In order to ensure the security

of user information, all patient information can only be viewed by the administrator. The administrator can view the patient, but in the privacy protection, the patient information cannot be modified. The patient can be pushed to the inspection report process.

- (6) Medical information management: it mainly publishes medical information, deletes, or modifies announcements.
- (7) Feedback information management: it mainly views the feedback information and enters the reply content.

4.3. *System Flow Chart.* The flow chart of urban intelligent medical service system includes the processes before, during, after, and outside the treatment of patients. The flow chart is shown in Figure 13.

Patients need to log in to the system and verify their identity before treatment. During treatment, they can consult experts online or make an appointment online and then go offline for treatment. They can also make an emergency medical assistance call. After treatment, they can buy medicine according to the prescription issued by the doctor. They can buy medicine online or offline, and the doctor can also implement referral according to the patient's condition and the matching of hospital resources. In addition to medical treatment, users can operate personal information services and can also obtain medical information, feedback information, etc.

5. Multiobjective Decision-Making Optimization Strategy

In the urban intelligent medical service system, residents can obtain complete medical services. After receiving the services, they can give information feedback to the whole service system through satisfaction evaluation, asking questions, making suggestions, and making demands. After receiving the information, the government or medical institutions solve the feedback information through an effective path, to optimize the system. Community hospitals are interconnected with large hospitals to provide auxiliary medical services for residents through government supervision and support. Residents feedback the medical service activities provided by the community through certain ways. Residents can give feedback on the medical service activities provided by large hospitals and can also feedback problems and suggestions to the government.

This paper uses the multiobjective decision optimization strategy to study the system design and puts forward the corresponding optimization strategy according to different optimization objectives to achieve the optimal design of the system. From the perspective of the demands of urban residents, the optimization objectives mainly include three aspects: low medical cost, fast medical treatment speed, and high service satisfaction. Based on the optimization objectives, the corresponding optimization strategies are formulated as follows:

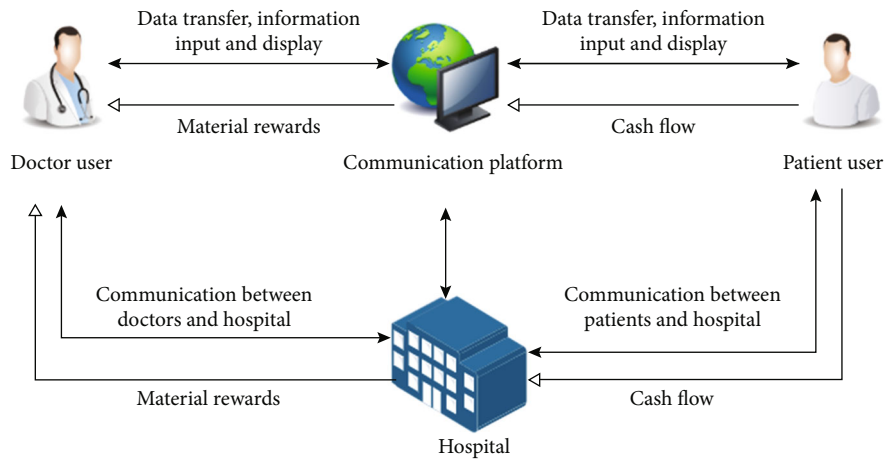


FIGURE 7: The interaction diagram of parallel diagnosis.

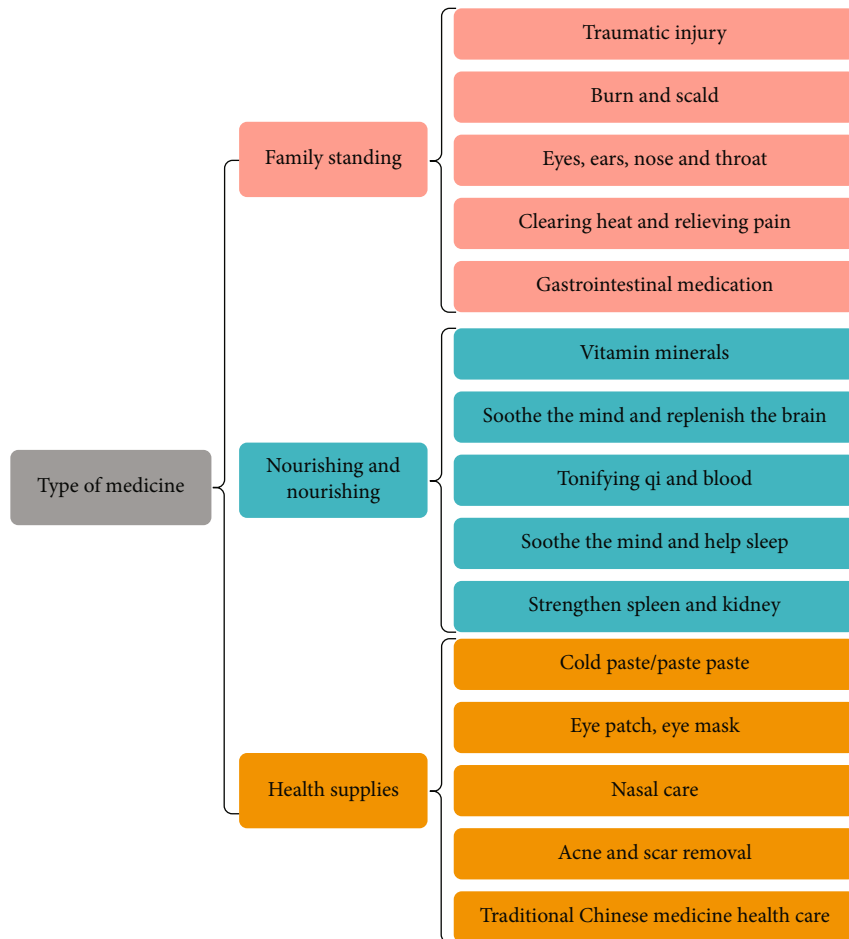


FIGURE 8: Online medicine information.

(1) Reduce the cost of medical treatment and reduce the economic pressure of urban residents

Optimize online consultation. If it is a minor disease, patients can consult experts online. After the experts prescribe, they can buy medicine online, to stay at home and

reduce the cost of medical treatment. If it is a serious disease and needs offline treatment, patients can make an appointment with experts from relevant departments after accurate intelligent guidance before registration, to reduce the misdiagnosis rate. At the same time, the diagnosis and treatment information of patients should be interconnected among

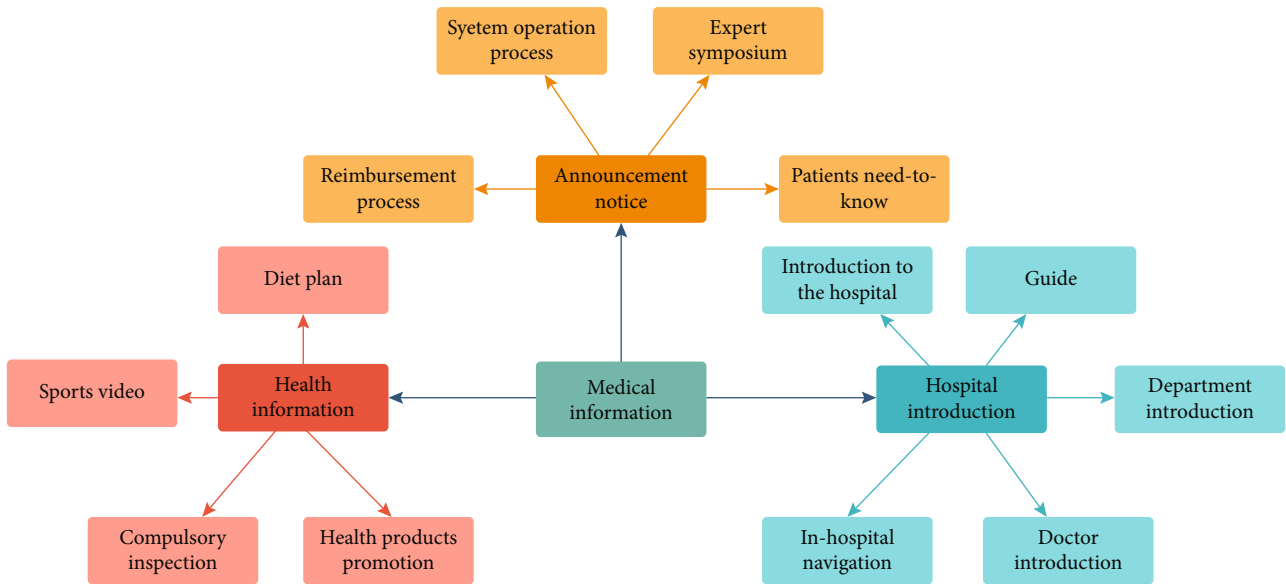


FIGURE 9: The content of medical information.

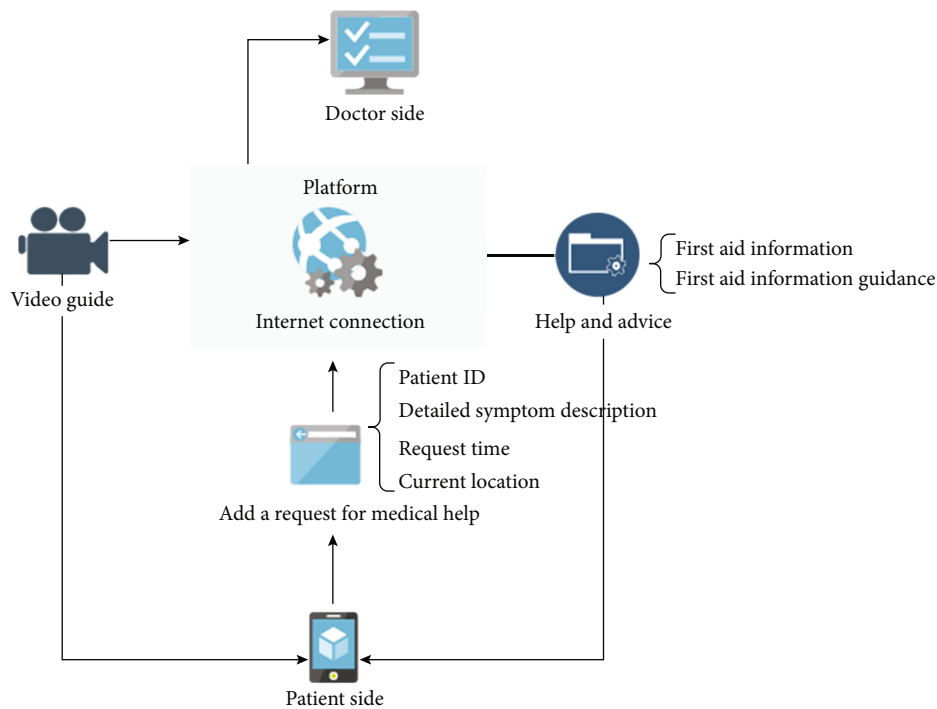


FIGURE 10: Telemedicine intervention.

various medical institutions, so that doctors can obtain the treatment data of patients at any time, which can avoid repeated examination and reduce the cost of seeing a doctor. There should be a reasonable medicine use supervision system, which can standardize the diagnosis and treatment service behavior in the links of medicine purchase, entry, and use, avoid large prescriptions, and reduce the medicine cost in the treatment process. Through health lectures, active disease prevention, and effective disease intervention, it can

reduce medical costs, reduce the prevalence of chronic diseases, effectively control the development of existing diseases, and promote the rehabilitation of diseases. Doctors should fully grasp the health status of residents, send personalized health information to residents through the system, such as reminding patients with chronic diseases to take medicine, drink water, and exercise, and comprehensively monitor, analyze, evaluate, prevent, and maintain healthy people, subhealthy people, and sick people.

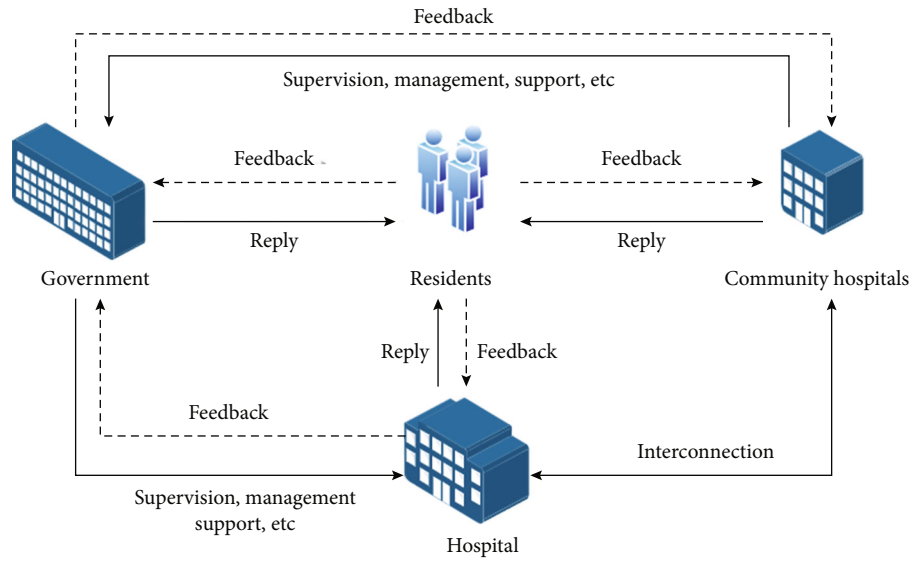


FIGURE 11: The interaction diagram of feedback information service.

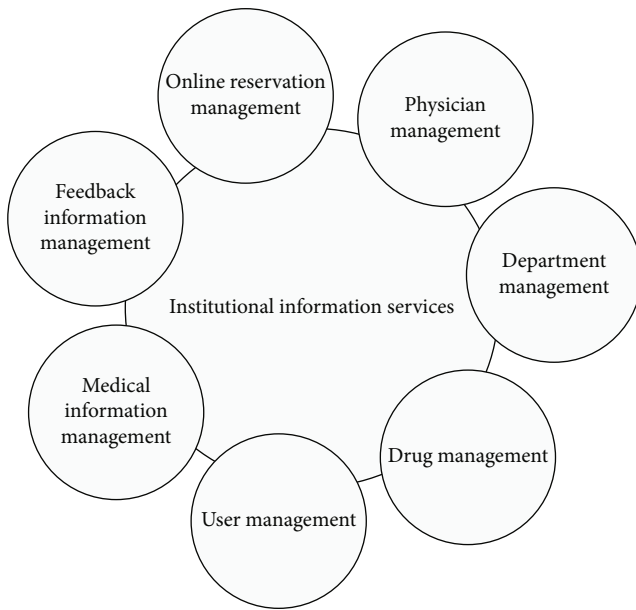


FIGURE 12: The institutional information service function.

(2) Improve the speed of medical treatment and increase the convenience of urban residents

To improve the response speed of the system, including browsing the system home page, clicking on various functions, intelligent diagnosis, and analysis, to facilitate urban residents to quickly obtain medical services. Due to the large number of users, the service is usually characterized by short time, many requests, and less content in a single request. Therefore, the load capacity of the server should be strong to ensure that the system does not crash. The system shall have fault-tolerant treatment for various misoperations to avoid affecting the correctness of business and ensure the stable operation of the system. When consulting doctors online, the doctor on duty should be online all the time, be

ready to provide services to patients at any time, and reply in time. According to the appointment time, the appointment patients should be reminded of the time, to facilitate the offline treatment of patients and reduce the waiting time. When the patient visits, the doctor can timely understand the patient’s past medical history, past medication, allergy history, and operation history by accessing the patient’s electronic medical record, to make a quick and accurate judgment and improve the speed of seeing a doctor.

(3) Provide comprehensive services to improve the satisfaction of urban residents

Realizing the interconnection between medical institutions and the government is a way for the government to realize the supervision and management of hospitals. The government should establish a sound and sound policy system for medical treatment in the medical system. This will promote the construction of hospitals, help hospitals update and upgrade medical equipment in a timely manner, ensure the advanced nature of medical equipment, and improve the level of medical equipment in hospitals. On the other hand, it can urge medical staff to take their work seriously and improve the quality of diagnosis and treatment in the hospital to a certain extent. There should be a good medical environment, including natural environment and humanistic environment. The natural environment is mainly the light, temperature, and health of the hospital, and the humanistic environment is the culture of the hospital, the service attitude, and moral level of medical personnel. If the medical staff in the hospital are high-quality and capable, the service quality of the medical staff must be impeccable, and they must be serious and responsible for their work. They can constantly adjust the treatment plan according to the demands of patients, have a good service attitude, work efficiently, and respond to the complaints of relevant parties in time, which will greatly improve the patient’s sense of medical treatment. The information between community

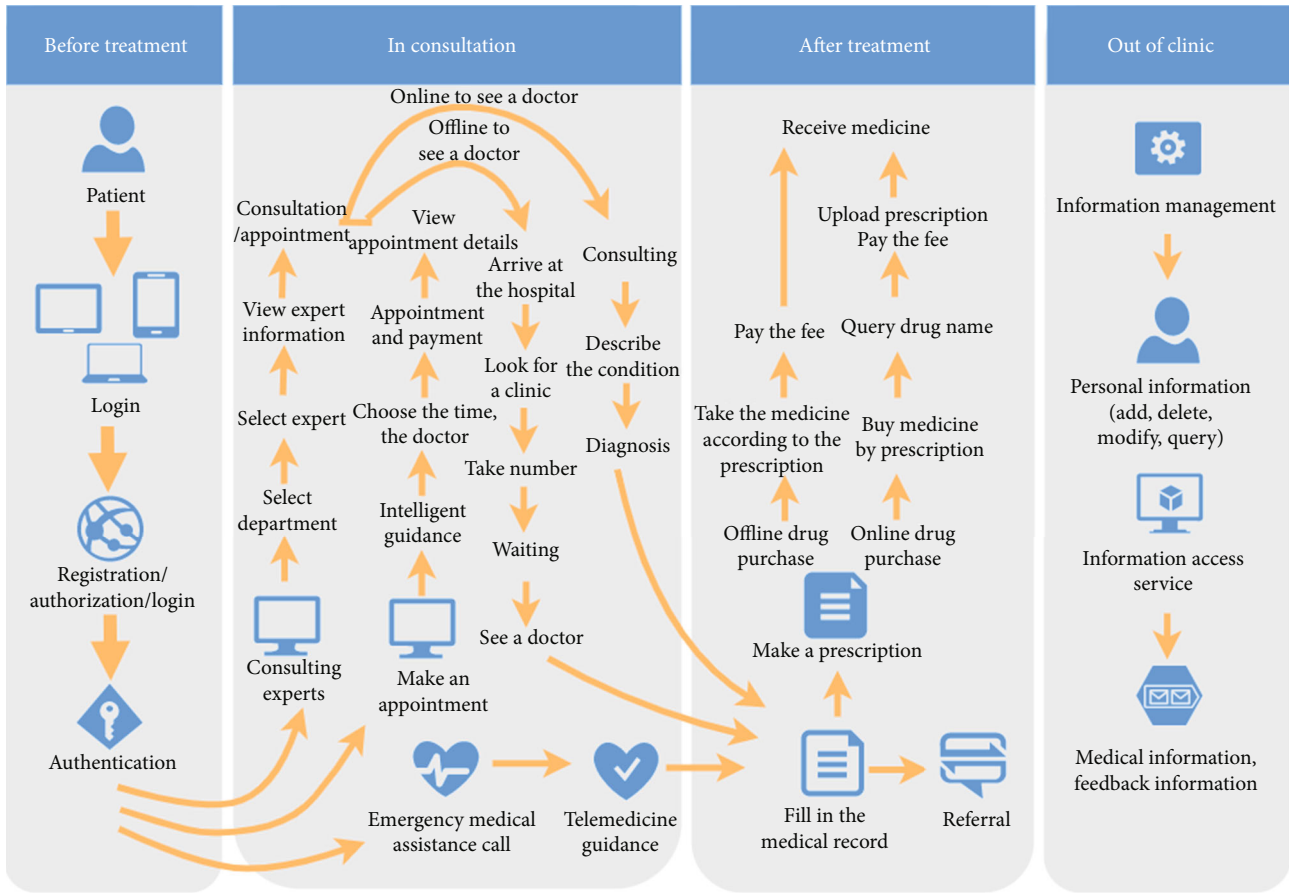


FIGURE 13: Flow chart of urban intelligent medical service system.

hospitals and large hospitals, large hospitals, and large hospitals should be interconnected, and electronic medical records should be established to facilitate patient referral and realize the integration of patient information. The system shall respond to the emergency call of patients in time and carry out telemedicine intervention to provide help and suggestions for patients. Medical departments and the government should make timely response and rectification to the requirements, complaints, and suggestions of urban residents and optimize the urban intelligent medical system to better serve urban residents.

6. Conclusion

This paper designs an urban intelligent medical service system based on multiobjective decision-making optimization strategy. The system is composed of four parts: government, community hospital, large hospital, and urban residents. It plays a great role in promoting the improvement of medical service quality and level and people’s health level in the city. The overall design and functional design of the system are based on the basic medical demands, expected medical demands, and health care medical demands of urban residents. Among them, basic medical demands include patient information security, good hospital service attitude, hygienic and comfortable medical environment, and safe and effective medication; Expectant medical demands include rapid and

effective response to emergencies, diagnosis and treatment by experts, diversified payment methods of medical expenses, short waiting time for registration, medical treatment and medicine collection, and low medical expenses. Health care medical demands include standardized electronic records of citizens’ health, effective health exercise, healthy diet plan, and convenient diagnosis and treatment of daily minor diseases. According to the demand analysis, the system needs to realize three types of medical services, namely, customer business service, basic service, and institutional information service. Among them, customer business services include online reservation, parallel diagnosis, online medicine sales, medical information, telemedicine intervention, and feedback information. Basic services include personal information services, security services and electronic medical record services. Institution information services provide medical institution management and system maintenance services. From the perspective of the demands of urban residents, the optimization design of the system is to meet the multiobjective decision-making optimization of low medical cost, fast medical treatment speed, and high service satisfaction. According to the objectives, the corresponding optimization strategies are formulated: reduce the cost of medical treatment and reduce the economic pressure of urban residents. Improve the speed of medical treatment and increase the convenience of urban residents. Provide comprehensive services to improve the satisfaction of urban

residents. According to residents' demands and optimization objectives, urban intelligent medical service system should be continuously optimized to better serve urban residents. Future research can focus on the key issues that have not been completed in this field, that is, the quantification and distribution form of medical resources.

Data Availability

The labeled dataset used to support the findings of this study is available from the corresponding author upon request.

Conflicts of Interest

The author declares no competing interests.

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