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# Health Care System Decentralization Via Uberization, Concepts and Expected Efficiency Outcomes

**Armen Muradyan**
Rector Yerevan State Medical University after M. Heratsi
**Hakop Aganyan**
President and founder of Aganyan Inc
**Suren Manukyan**
Inventor, Aganyan Inc. Los Angeles
**Vagarshak Pilossyan**
Internal Medicine, Van Nuys, Los Angeles, USA
**Leon K. Kiraj**
Dentist, Infinite Dental Wellness, Los Angeles, USA
**Inga Aganyan**
Student and academic writer, Los Angeles, USA
**Silvia Aganyan**
UCLA undergraduate student researcher
**Robert Avetisian**
Engineer at Solar Hydrogen Holdings Inc
**Ruben Hovakimyan**
Economist Aganyan Inc. Los Angeles
**Gagik Hakobyan** ( prom_hg@yahoo.com )
Yerevan State Medical University after M. Heratsi

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# Abstract

**Background:**

According to statistical studies, about 3.6 million Americans miss medical appointments each year because of difficulties with transportation to a healthcare facility, and the impact of missed primary care appointments is estimated at billions of dollars annually. The access of the patient to necessary services is restricted and the role and functions of a medical doctor as responsible key decision maker is significantly diminished. Key responsibilities are still on the shoulders of the medical doctor, but decision-making power is shifted to middleman administrative bodies. This split between the responsibilities and decision-making bodies is destructive for the service of medicine. The aim of this study is to create a new management model in the health care system.

**Methods:** To develop a new model of management in the health care system, we conducted a blind survey among 1,700 patients. To optimize the health care system, a decentralization health careservice method is proposed via uberization.

**Results:** The method may continue with providing the request to a responding healthcare provider and receiving a response from the responding healthcare provider. The method may continue with establishing a bidirectional communication between the patient and the responding healthcare provider in real-time and receiving a plan of actions to treat the patient from the responding healthcare provider. The method may continue with receiving, from the diagnostic and laboratory service, the real-time vital parameters of the patient and making the real-time vital parameters available to the patient and the responding healthcare provider in an electronic medical record database.

**Conclusion:** On the basis of our developed model of decentralization of the healthcare system via uberization, the implementation of the proposed model will increase the efficiency and availability of medical services.


# Introduction

A key component of achieving universal health coverage is ensuring that all population groups have access to quality health care. Three goals (equity, efficiency, and sustainability) must be pursued by a global health system. Access to timely and effective health care must not only be expanded, but expanded in ways that address the deep inequities in access to health care that currently exist. In order solve the problems of delaying treatment, increasing treatment coverage, and addressing inequities of access to timely health care, much work remains to be done.

The emergence of COVID-19 is a timely reminder of the significant impact of a hardened healthcare system engulfed with bureaucracy, which can reduce access to and quality of healthcare.

In present time there is a growing interest in the potential of new technologies and innovative organizational mechanisms that can significantly increase the health system's ability to provide access to safe, effective and affordable service [1,2].

In many low- and middle-income countries, the challenge of effectively delivering quality healthcare to all who need it, is becoming increasingly evident [3,4]. The trade-off between equity and efficiency is central to the spatial distribution of healthcare. The distribution of health services is always done with limited resources; therefore, the actual task of the healthcare system is how to reconstruct the structure of multilevel healthcare and optimize the spatial distribution of medical resources to achieve an equilibrium of supply and demand with lower costs and higher efficiency. A fundamental challenge for health systems is the need to adapt to changes in the structure of health service needs, technological advances, and the economic and institutional environment of healthcare providers]. Health systems are most efficient when they combine both centralization and decentralization functions [5,6,7]. The medicine is one of the most humanistic and auspicious field of human activity with rapidly expanding new diagnostic and therapeutic modalities and with highly trained specialists to deliver both the science and art of medicine. Parallel to these outstanding achievements, when almost instantly doctors can diagnose and treat life threatening conditions (which were deadly couple of decades ago), however, gradually a bureaucratic system has developed which makes healthcare extremely costly, slow to act and in many cases directly impeding evaluation and management of a sick person by creating barriers, obstacles, such as treatment authorization request processes, which by themselves are time consuming, confusing, not goal directed and most importantly are delaying the treatment of the patient even when the diagnosis is clear and correct treatment plan has been comprised. Millions of people are suffering unnecessarily and thousands are dying because of the bureaucratized procedures of providing healthcare services and heavily legislative system. Restrictions and regulations created in the national healthcare system significantly affects the delivery of available care to patients [8,9]. In addition, traditional healthcare services are slow and time-consuming as the current healthcare system requires a patient to make multiple doctor visits just to obtain a diagnosis. It often takes few weeks from the initial visit, for a patient to obtain a diagnosis and a treatment plan. In addition, traditional healthcare services, even in emergency rooms, are delaying immediate doctor-patient contacts, thus slowing the implementation of planned actions, and wasting precious time. The current system is not doctor and patient friendly, neither is designed to be driven by doctor. Even if the doctor makes a decision to act practically, there are designed obstacles and barriers.  Managed care systems and all other insurances have been put in the position of gatekeeper, whose responsibilities include cost containment as well as patient care. The access of the patient to necessary services is restricted, hence the role and responsibility of a medical doctor as key decision maker is significantly diminished. The provision of healthcare services is very costly (because of delayed service), fragmented with multiple obstacles and barriers. Key responsibilities are still on the shoulders of the medical doctor, but decision-making power is shifted to administrative middleman.

Letting the doctor be a doctor and using a correct terminology can prevent any intentional and unintentional deformations in doctor-patient relationship. Any restriction of doctor patient relationship

with increased unnecessary responsibilities and leading to violation of the first principle of medicine, “Primum No Nocera”.

This tiny and difficult to notice changes in terminology are intentionally and unintentionally deforming the patient-doctor relationship with restriction of doctor’s role in a HCS along with increased responsibilities. This model is an absurd in an ICU setting. But every ICU patient is coming from primary care zone.

This split between the responsibilities and decision-making bodies is destructive to the medicine. This is one of the causes of delay of evaluation and management of problems of the patient along with the ‘burn out’ of the medical doctors. Quality is another issue of the current Health Maintenance Organization (HMO) system, which will not improve unless the middleman is eliminated. The organizing authority for Health Care System (HCS) must be doctor-patient relationship. Centralized HCS’s diminish the autonomy of doctor-patient relationship in a primary care setting. In a centralized HCS the doctor is labeled as “health care provider”. Another business-oriented term “member-customer” is become the title of the soulful human being (the patient). These tiny, sublime changes in descriptive vocabulary project the cause of lather, initially unexpected strange, contra intuitive deformities and unexpected outcome with fanatical catastrophes’ in HCS. There is no doubt, that the centralized system has important role in dealing with more or less stable domains of HCS, like organizing and following Annual Wellness Examinations (AWE), Age Appropriate Screening Tests (AAST), Vaccinations, keeping previous evaluation and test results in an archive, monitoring-helping-preventing redundancy examinations

The word “decentralization” is often used in healthcare systems literature as an arrangement in which power, resources, or responsibility are transferred from central to peripheral actors [10,11]. These definitions suggest that decentralization is a top-down process from the central government. The theoretical benefits of decentralization (i.e., governance in small units), is the inspiration for decentralization reforms in healthcare system. In many countries, the responsibility for the provision of health services is decentralized, but decisions on the regulatory framework of competition, economic policy and trade in services are made more at national, federal or even global levels.

The logic of decentralization is based on the powerful idea that properly structured small organizations, that are more flexible and manageable than larger organizations, is more attractive. German sociologist Max Weber, in early twentieth century, wrote: "The only alternative to bureaucracy is to return to small organization"[12].

Decentralization has long been considered an important measure for improving the efficiency and efficacy of healthcare systems. From a managerial point of view, decentralization can be defined as a shift in the scaling of administrative decision making. The equity aspects of decentralization imply the need to ensure the availability of resources, capacity and ability for regulation and cross-subsidization supported not only at the local, regional and national levels, but also that they are provided internationally, intercontinentally on a global level, where commercial and economic regulatory measures have increasing influence.

In the 1980s, decentralization reforms were implemented in line with WHO recommendations, and healthcare system reforms initiated by the Declaration of Alma-Ata aimed to remove the constraints of centrally managed healthcare systems in order to reach underserved rural communities in low and middle-income countries [13].

Decentralization is central to many health sectors reforms. They show to be an effective means of stimulating improvements in service delivery, ensure better allocation of resources according to needs, involve the community in decision-making on priorities and help reduce inequalities in health care [14].

According to statistical studies, about 3.6 million Americans miss medical appointments each year because of difficulties with transportation to a healthcare facility, and the impact of missed primary care appointments is estimated at billions of dollars annually. The access of the patient to necessary services is restricted and the role and functions of a medical doctor as responsible key decision maker is significantly diminished. The provision of healthcare services is very costly (because of delayed service), fragmented, with multiple obstacles and barriers. Key responsibilities are still on the shoulders of the medical doctor, but decision-making power is shifted to middleman administrative bodies. This split between the responsibilities and decision-making bodies is destructive for the service of medicine. This is one of the causes of delay in evaluation and management of problems of the patient along with the ‘burn out’ experienced by medical doctors. Quality of service is yet another issue of the current Health Maintenance Organization (HMO) system, which has little chance to improve unless the middleman is eliminated.

This article suggests alternative approaches to expand access to timely and effective healthcare. Taking into account the importance and relevance of optimization required in modeling the management of medical services, the aim of this work is to create a new model of management in the health care system.

# Methods And Perspectives

To develop a new model of management in the health care system, we conducted a blind survey among 1,700 patients, studied the literature on health care organization in various countries and made a critical analysis of the literature, identified shortcomings in the health care system in the current period. To optimize medical services, we have proposed a method for the decentralization of medical services. We propose a new conceptual healthcare system based on decentralization via uberization. This concept is based on the patient's right to receive highquality and affordable medical care. High quality medical care includes systematic patient assessments, accurate diagnoses, appropriate treatment, and proper patient counseling. Asystematic patient assessment involves gathering clinically relevant information by asking appropriate medical history questions and doing recommended examinations and tests.

# Results

On the basis of our developed model of Decentralization of the healthcare system via uberization, a patent was obtained,Patent number US 11,101,044 B2, Date of patent 24/08/B2 [15].

Objects, advantages, novel features, and technical effects of the proposed system in part will become apparent to those skilled in the art upon examination of the following description and the accompanying drawings.

An example system comprises a healthcare service center including one or more computer servers and at least one database. The healthcare service center can be in communication with user devices of patients and user devices of healthcare providers. For these ends, the system also includes a user interface configured to provide information to the patients and obtain inputs from the patients using a graphical user interface displayable on the user devices of the patients. The system also includes a user interface configured to provide information to the healthcare providers and obtain inputs from the healthcare providers using a graphical user interface displayable on the user devices of the healthcare providers. The healthcare service center may be configured to receive a request for a healthcare service from a requesting patient. The request for the healthcare service may include at least a selection of a responding healthcare provider. The healthcare service center may provide the request for the healthcare service to the responding healthcare provider.

The healthcare service center may further receive, from the participating healthcare provider, a response to patient's request for the healthcare service. The response may include an acceptance of the request for the healthcare service. Upon the receipt of the response from the participating healthcare provider, the healthcare service center may establish a bidirectional communication between the requesting patient and the responding healthcare provider in real-time. After establishing the bidirectional communication, the healthcare service center may receive, from the responding healthcare provider, a plan of actions to prescribe further diagnostic exams and/or treatment plan for the requesting patient. The plan of actions may be available to the requesting patient in an electronic medical record database. The healthcare service center may further receive, from the requesting patient, based on the plan of actions, a selection of a diagnostic and laboratory service. If further diagnostic and laboratory service shall be deemed necessary and prescribed forthe requesting patient, by the doctor for additional data collection, the healthcare service center may instruct the diagnostic and laboratory service to physically contact the requesting patient at the location of the requesting patient and collect the real-time vital parameters. The healthcareservice center may further receive, from the diagnostic and laboratory service, the real-time vitalparameters of the requesting patient and make the real-time vital parameters available to therequesting patient and the responding healthcare provider in the electronic medical recorddatabase. The real-time vital parameters may be used by the responding healthcare provider for selecting a treatment plan for the requesting patient.

Figurs 1, 2, 3,4 show the sequence of steps of the developed model of decentralization of the health care system. It should be well understood that the technology described above enables the patient to solve one or more of these technological problems known in the industry, including, for example, the problem of

slow, ineffective, and expensive medical data processing and medical data exchange between patients, healthcare service providers, laboratories, pharmacies, and the like.

# Discussion

The practice of medicine is one of the most humanistic and auspicious fields of human activity with rapidly expanding new diagnostic and therapeutic modalities and with highly trained specialists to deliver both the science and art of medicine. Parallel to these outstanding achievements, when almost instantly doctors can diagnose and treat life threatening conditions (which were deadly couple of decades ago), however, gradually a bureaucratic system has developed which makes healthcare extremely costly, slow to act and in many cases directly impeding evaluation and management of a sick person by creating barriers, obstacles, such as treatment authorization request processes, which by themselves are time consuming, confusing, not goal directed and most importantly are delaying the treatment of the patient even when the diagnosis is clear and correct treatment plan has been comprised.

Managed care has emerged as the dominant method of health care provision in the United States. Managed care systems assume responsibility for both the financing and provision of health care. Managed care presents new problems for health care practitioners. Managed care systems and all other insurances have been put in the position of gatekeeper, whose responsibilities include cost containment as well as patient care [16]. Some health care commentators have suggested that the new organization of medicine threatens the role of physicians as professionals. Others have called for new models of the physician-patient relationship to accommodate the changes in health care financing. Most doctors indicate that under managed care physicians are less able to avoid conflicts of interest and are less able to place the best interests of patients first. The majority of doctors note that quality of healthcare is compromised by limitations in location of diagnostic tests and length of waiting time for choice of specialists. Most doctors noted a decrease in the physician’s ability to carry out ethical obligations, to respect patient autonomy, and to respect confidentiality in physician-patient communication. Many physicians surveyed believe managed care has significant negative effects on the physician-patient relationship, the ability to carry out ethical obligations, and on quality of patient care. These results have implications for health care system and requires a reform effort to solve these issues.

One of the main goals of any health system is to improve health through the provision of clinical and public health services.

In the 21st century, the quality of medical care in the organization of health care is of great importance. All people should be able to count on receiving high-quality care that will improve their health and earn their trust [17].

The first work on assessing the quality of medical care began with the work of Avedis Donabedyan, whose article in 1966 proposed a framework for assessing the quality of care, which is the described quality along the dimensions of structure, process, and outcomes of care [18].

The Committee on Quality of Health Care in America of the Institute of Medicine (IOM) saw six dimensions defining quality of care [19,20]

- safety,
- effectiveness,
- patient-centredness,
- timeliness,
- efficiency,
- equity.

WHO has defined people-centered integrated health systems as systems in which “all people have equal access to quality health services that are produced collaboratively according to their life cycle needs [21].

High quality healthcare systems for people are based on the following values: justice, steadiness, efficiency. People orientation begins with the obvious observation that health systems must reach people - access is a prerequisite for using health services. Health care systems cannot be static and must adapt to changing societal needs, and one of the ways to improve the quality of health services and the availability of health care consumers; reforming the health care system through decentralization.

Decentralization as a reform measure aims to improve resources, management processes and health outcomes and has political, administrative and financial implications. The significance of decentralized governance of health systems as to improve decision making in different tiers of health service delivery is constantly growing. The importance of decentralized management of health systems for improving health service delivery is growing. Decentralization affects health system reform in three important areas: health financing, individual health services and public health. Decentralization of health systems is a key element of health sector reform initiatives and is often seen as a means to improve the efficiency and quality of services.

Thus, the question of whether decentralization improves equity, efficiency, accountability and quality of services continues to generate debate among scientists and politicians. The impact of decentralization and outcomes has been studied by several scholars.

Infrastructure literature is focused on the concepts of centralized, decentralized, and distributed systems and how these configurations support or hinder adaptive and transformative capacities towards resilience of the functioning system.The studies used different approaches to study one or more aspects decentralization and its impact on the functioning of the health system; however, the lack of consensus on an acceptable framework is a critical gap in defining its quantity and quality. The main question in the discourse about decentralization in health care depends on whether decentralized governance achieves the stated goals of efficiency, equity and quality of health services. Various studies have assessed the extent to which decentralization can serve as a policy tool for improving the national health system.

Mills et al. noted the many benefits of a decentralized health care system, noted the resistance of government officials to changing the power structure, and argued that decentralization was never an easy implementation and rarely brought immediate benefits [22].

Collins and Greene have proposed a number of warning questions and concerns that need to be taken into account to ensure that decentralization does indeed contribute to the orientation of primary health care health policies [23]. Atkinson and Haran found a link between decentralization and productivity improvements. The study found that good governance practices led to the decentralization of local health systems, not the other way around. He went on to conclude that “any obvious link between decentralization and efficiency may be an artifact of informal governance” and that “the broader political structure strongly influences the effectiveness of local health systems” [24].

Faguet J-P investigated the effect of decentralization on allocation efficiency in terms of investment patterns and satisfaction of objective indicators of needs in Bolivian municipalities and Spanish provinces and concluded that decentralization led to better alignment between investment patterns and needs [25].

D Jimenez discovered the positive effects of decentralization on health services by analyzing data on health spending [26].

The main findings of the review show that decentralization in the public health sector has many conceptual dimensions that require consideration of the complexities of measurement.

The novel coronavirus disease 2019-nCoV (COVID-19 virus) pandemic outbreak presents national and local authorities with unparalleled public health challenges, with reforms ongoing and incomplete.

A blind survey conducted by us among 1,700 patients from our side revealed that it is increasingly difficult for a patient to see a doctor now, and sometimes patients have to wait a long time for their health problems in order to receive timely medical advice and services. At the present time, at the peak of the COVID pandemic, many medical organizations and doctors are very busy, getting to them is all difficult, and besides, many patients, due to the risk of infection, avoid visiting a medical facility for a regular medical examination and with non-urgent health problems. In connection with this, there is growing interest from patients who prefer to connect to a doctor using telemedicine (for example, telephone or video).

The COVID-19 pandemic has fostered the use of telehealth as a means of delivering emergency, primary and specialized health care. Several telehealth modalities allow HCP and patients to connect using technology to deliver health care, allows direct transmission of a patient’s clinical measurements from a distance to their healthcare provider. At the current rate of the pandemic, the use of telemedicine for primary health care will grow [27,28,29,30].

In a computerized era, the virtual form is becoming equally acceptable. The doctor starts the Evaluation and Management process along with ordering appropriate tests on line regimen (x-rays, ultrasounds,

laboratory work-ups, electrocardiography's…) with the reports returning to the doctor in the shortest possible time period. Most of these services can be done by mobile units. By following an established algorithmic guideline, the doctor is making a decision of treatments, further tests, emergency room referral or specialists consult with his notes. Decision making power and responsibility are in the doctor's hands, which will shorten the treatment initiation process, saving time and money with much higher probability of getting better patient satisfaction. This is the result of no middle man, no barriers, no obstacles or artificially created third party powers with authority and responsibility in one place. Decentralized system is becoming a more distributed system. Nowadays, many tech companies are trying to make health care Uberize: using a patient's smartphone to get medical advice on demand, patients can download the company's app and fill out a health-related questionnaire in minutes. After the patient submits the responses, they are reviewed by the doctor, who can then write a prescription.

Uberizing Health Care requires doctors and patients to use the "app economy" to deliver and receive health care services. Are the conditions medically and economically viable to make this model sustainable for doctors and insurance companies? The uberization of the HCS will increase the resilience of HCS. Resilience is the category, describing the capacity of the functioning key unit of the system to any type of variability, rapid change, or just after getting new information which requires the change of the direction of action with the readiness for further change.

We propose a model in which a patient, after registering on an online platform, will have access to Uberize virtual medical services. At the request of the patient, a mobile medical vehicle equipped with diagnostic equipment arrives at the patient's place of residence, the visiting specialist fills in the patient's answers to questions in the questionnaire, takes materials for laboratory research, performs the necessary diagnostic studies, electrocardiography, sonography, X-rays, etc. and sends the data to the online medical service center, where the researcher, based on the analysis of the patient's questionnaire data, sends the laboratory diagnostic data to the appropriate specialist who, after studying the patient's data, decides on the choice of treatment tactics, and already communicates with the patient by video phone after hearing the patient's complaints and having at hand the data of laboratory and diagnostic research, he can solve treatment tactics or write a prescription online, or if it is required medical manipulation in a medical institution, the patient already recommends in which specialized medical institution he applies for treatment.

Our model and product's artificial intelligence allow patients to assess their symptoms and offers patients the opportunity to consult a virtual phone or video consultation with a doctor of different specialties. The doctor, upon request, could make a diagnosis and save the patient from traveling to the clinic and write a prescription. For doctors, on-demand work at a technology company minimizes downtime, virtually costs less to see a doctor, and is one of the most effective ways to provide medical care.

Proposed uberization of health care system matches all commonly acceptable principles of resilience with open feedback loops to correct and develop the model.

# Conclusion

Developed model of decentralization of the healthcare system via uberization, a patent was obtained, the implementation of the proposed model will increase the efficiency and availability of medical services.

# Declarations

### Ethical Approval and Consent to participate

All procedures performed involving human participants were in accordance with the ethical standards of the local ethics committees and with the 1964 Helsinki declaration and its later

amendments or comparable ethical standards.

Informed consent was obtained from all individual participants included in the study.

### Consent for publication

The corresponding author confirms that the manuscript has been read and approved for submission by all the named authors.

### Availability of supporting data

“Not applicable”

### Competing interests

The authors declare that they have no competing interest


### Funding

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### Contributions

All authors contributed to the design of the study. GH drafted the manuscript which all authors commented on. All authors read and approved the final manuscript.


### Acknowledgements

“Not applicable”


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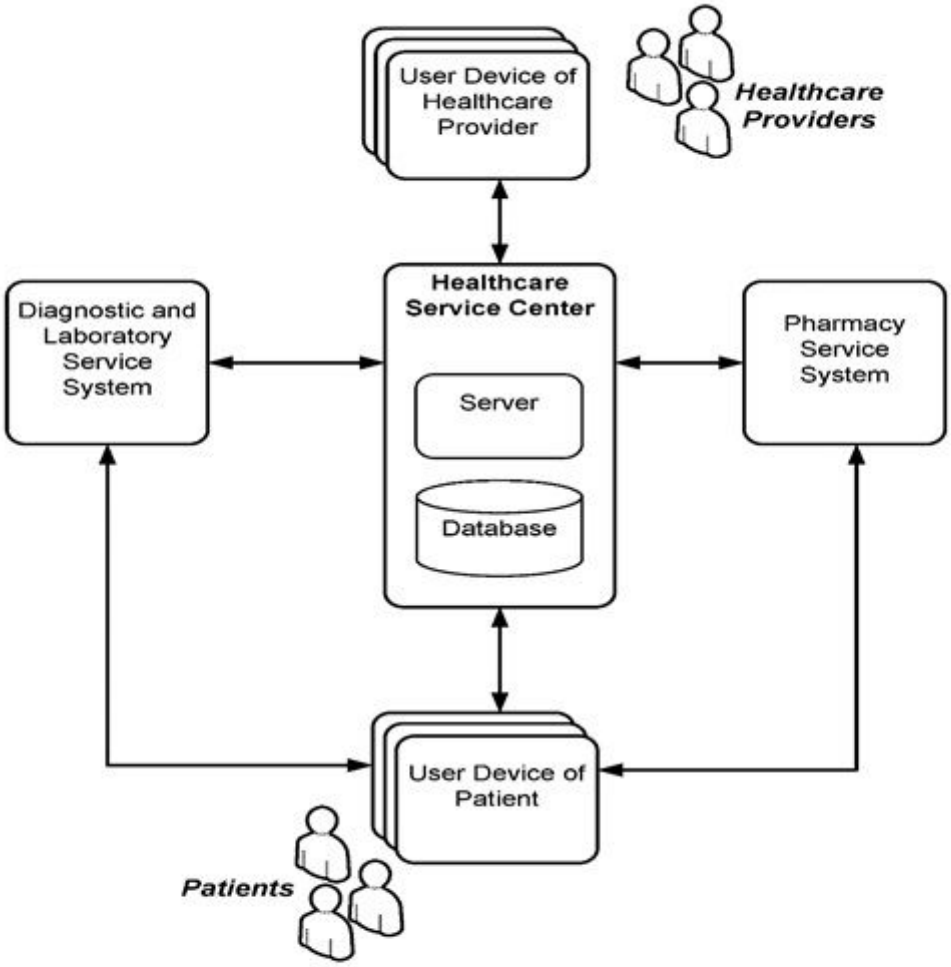
# Figures




## Figure 1

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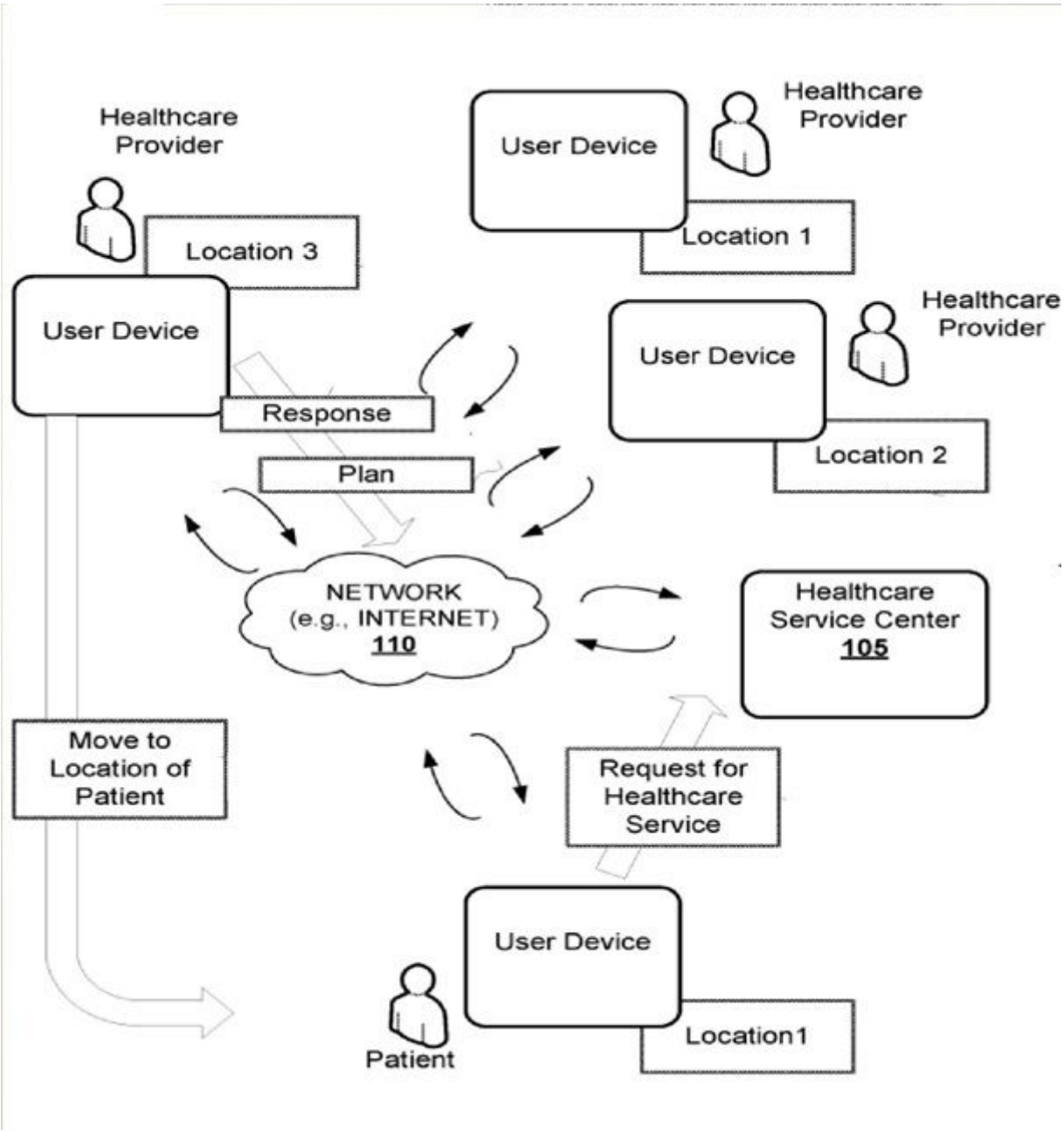
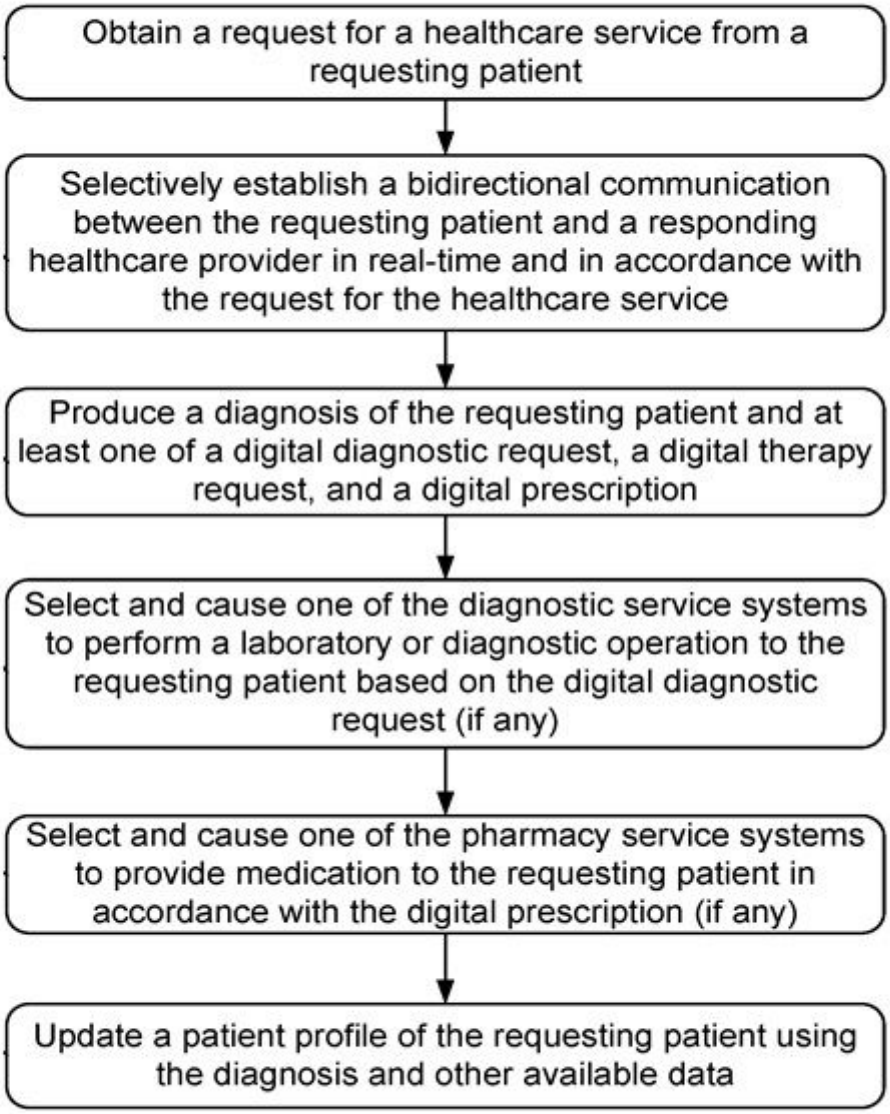


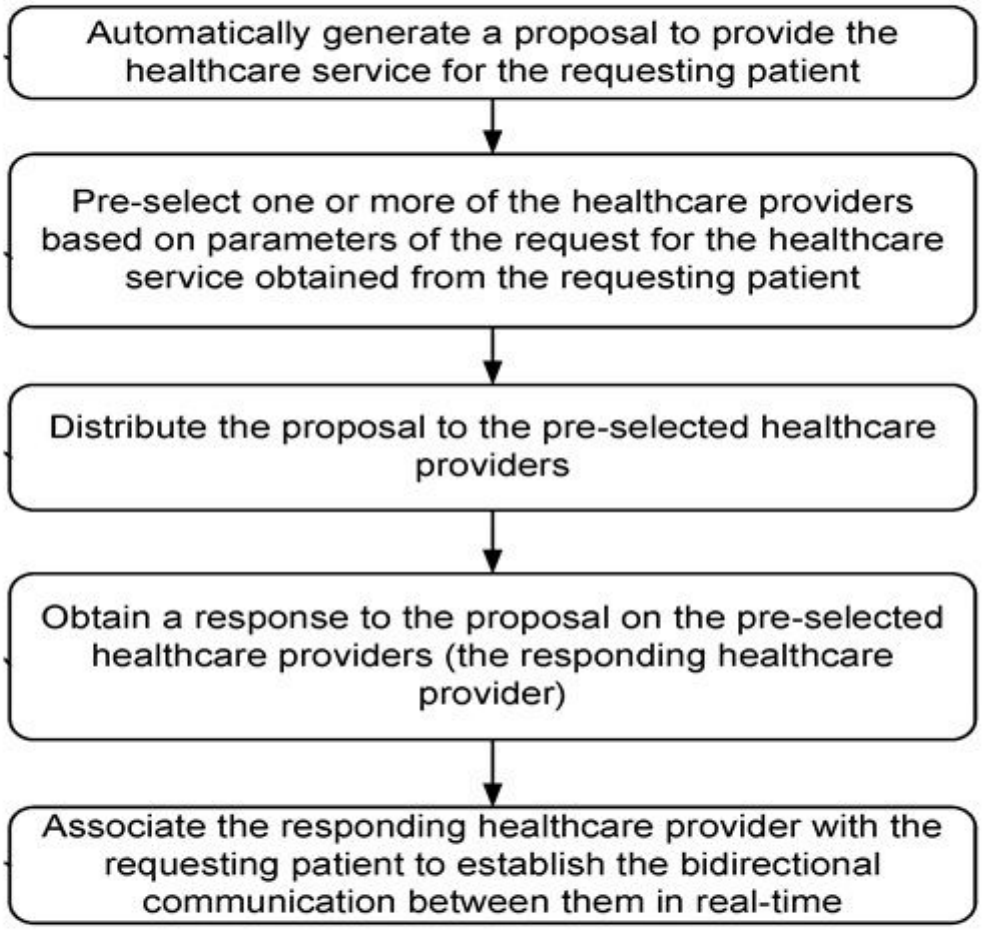

## Figure 2

Caption not included with this version.




## Figure 3

Caption not included with this version.




## Figure 4

Caption not included with this version.