

Research Article

Health Care System Decentralization *via* Uberization, Concepts and Expected Efficiency Outcomes

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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, 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 the health care system, a decentralization health care service method is proposed via uberization. This concept is based on the patient's right to receive high quality 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: 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. We propose a model for medical services systems in which a patient, after registering on an online platform, will have access to Uberize virtual medical services.

Proposed uberization of Health care system matches all commonly acceptable principles of resilience with open feedback loops to correct and develop. Our model allow patients to assess their symptoms and offers patients the opportunity to consult a virtual phone consultation with a doctor. The doctor, upon request, could make a diagnosis and save the patient from traveling to the clinic.

Keywords: Health care; Uberization; Efficiency; Global health system; COVID-19

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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 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 [5-7]. 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 along with increased responsibilities.

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]. 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" [11]. 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 [12]. 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 [13].

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 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.

Materials and Methods

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 high quality 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

Based on our study, a model of decentralization of the healthcare system through uberization has been developed [14]. 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 for the 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 health care service center may further receive, from the diagnostic and laboratory service, the real-time vital parameters of the requesting patient and make the real-time vital parameters available to their questing patient and the responding healthcare provider in the electronic medical record database. The real-time vital parameters may be used by the responding healthcare provider for selecting a treatment plan for the requesting patient.

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.

Figures 1-4 show the sequence of steps of the developed model of decentralization of the health care system.

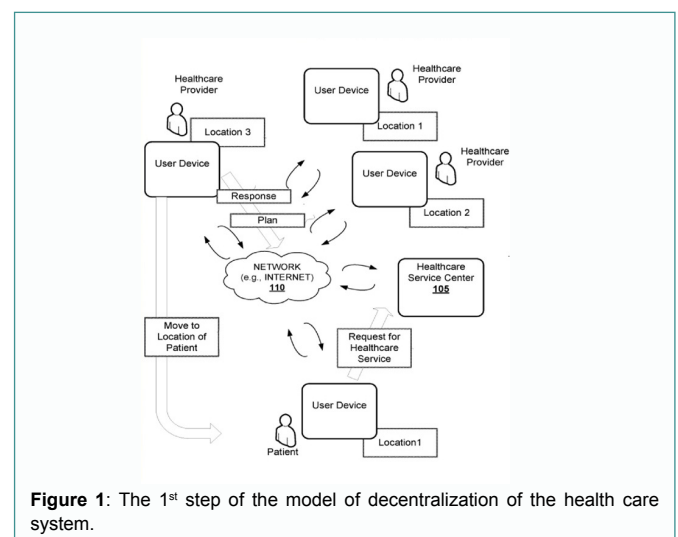


Figure 1: The 1st step of the model of decentralization of the health care system.

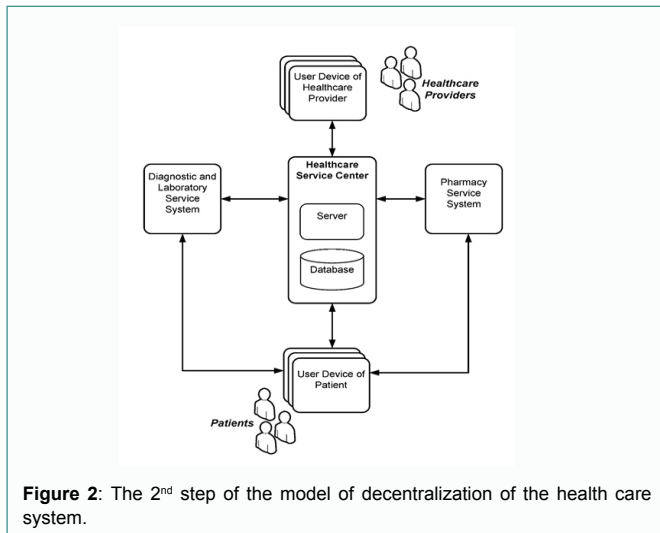


Figure 2: The 2nd step of the model of decentralization of the health care system.

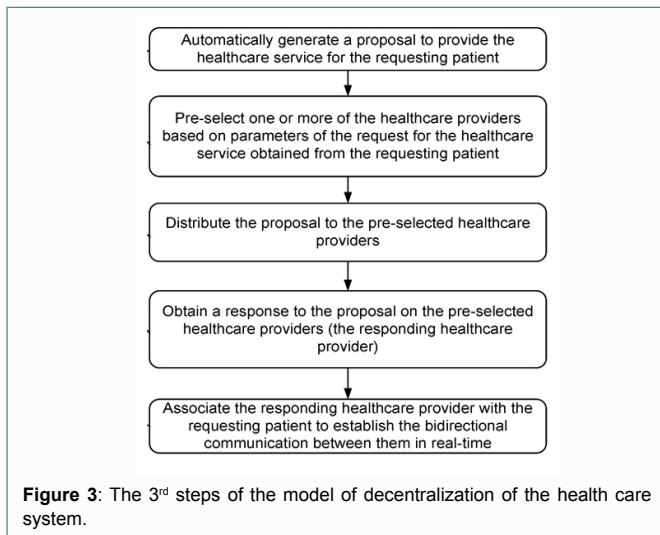


Figure 3: The 3rd steps of the model of decentralization of the health care system.

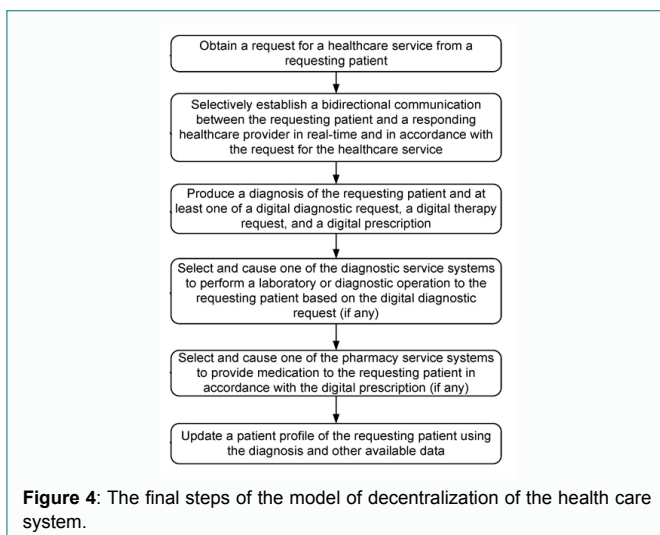


Figure 4: The final steps of the model of decentralization of the health care system.

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.

In health care in the United States, managed care takes responsibility for both funding and delivering health care. The responsibilities of a managed care system and type of insurance include cost control and patient care [15]. Most doctors note Managed care less able to put patients first, the quality of care is degraded by the limitations of diagnostic testing and long waiting times for specialist selection, the clinician's ability to meet ethical obligations, respect patient autonomy, and maintain confidentiality in doctor-patient communications is reduced. Solutions to these problems require reforms of the health care system, since one of the main goals of any health care system is to improve health through the provision of clinical and community health services.

In the 21st century, the quality of medical care in a healthcare organization is of great importance and must be accessible to patients and earn their trust [16]. Avedis Donabedian [17] is one of the first researchers who, in his article published in 1966, proposed a scheme for assessing the quality of medical care, which consists of 3 parameters: the structure, process and results of medical care.

The Committee on Quality of Health Care in America of the Institute of Medicine saw six dimensions defining quality of care [18,19]:

- 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 [20]. Quality health systems are based on the following values: equity, sustainability, efficiency. Health systems must be dynamic and must adapt to the changing needs of society. The accessibility of the healthcare system is one of the ways to improve the quality of medical services. Decentralization of health systems is one of the key elements in health sector reform and is often seen as a means to improve the efficiency and quality of health services.

Decentralization as a reform measure aimed at improving resources, management processes and health outcomes has political, administrative and financial implications. Decentralization affects three important areas of health care: financing, individual health care, and public health. The importance of decentralized management of health systems as a tool for improving the delivery of health services

is constantly growing. Whether decentralization improves the equity, efficiency, accountability, and quality of health care services continues to be controversial among scientists and policy makers. The impact of decentralization on improving the quality and efficiency of health care services has been studied by several scientists. The studies used various aspects of decentralization and its impact on the functioning of the health system; however, there is no consensus on its acceptable basis.

Various studies have assessed the extent to which decentralization can serve as a policy tool to improve the national health system and whether the decentralized health administration achieves its stated goals:

- more efficiency,
- justice,
- quality of medical services

Mills et al. [21] noted the benefits of a decentralized healthcare system, but argued that no immediate benefits can be expected from these reforms. Collins and Greene [22] in their papers have focused on a number of important issues and concerns that need to be taken into account when assessing the role of decentralization in health care reform. A study by Atkinson and Haran [23] showed a link between decentralization and improved health systems performance and concluded that "any apparent link between decentralization and efficiency could be an artifact of informal governance" and that "broader political structure strongly influences the efficiency of local health systems". Faguet [24], examined the impact of decentralization on allocation efficiency in terms of investment patterns and satisfaction of objective needs indicators and concluded that decentralization led to a better match between investment patterns and needs. Jimenez and Smith [25], after analyzing data on health care expenditures, came to the conclusion that decentralization has a positive impact on health services.

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 pandemic outbreak (COVID-19 virus) is presenting federal governments with unprecedented public health challenges as reforms continue and are not completed. 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. The COVID-19 pandemic has fostered the use of telehealth as a means of delivering emergency, primary and specialized health care. At the current rate of the pandemic, the use of telemedicine for primary health care will grow [26-29]. Telemedicine techniques allow physicians and patients to use this technology to provide medical care, allowing them to directly transmit a patient's clinical measurements at a distance to their healthcare provider. 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.

Nowadays, it is becoming increasingly difficult for patients to see a doctor, and sometimes patients have to wait a long time for health

problems in order to receive timely medical advice and services. In a computerized era, the virtual form is becoming equally acceptable. In connection with this, there is growing interest from patients who prefer to connect to a doctor using telemedicine (for example, telephone or video).

Most of these services can be done by mobile units. By following an established algorithmic guideline, the doctor 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, the doctor is making a decision of treatments, further tests, emergency room referral or specialists consult. 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.

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, the implementation of the proposed model will increase the efficiency and availability of medical services.

References

1. WHO Regional Office for Europe. Lessons from transforming health services delivery: compendium of initiatives in the WHO European Region. Copenhagen: WHO; 2016.
2. Moullin JC, Sabater-Hernández D, Fernandez-Llimos F, Benrimoj SI. A systematic review of implementation frameworks of innovations in healthcare and resulting generic implementation framework. *Health Res Policy Syst.* 2015;13:16.
3. Bossert TJ, Beauvais JC. Decentralization of Health Systems in Ghana, Zambia, Uganda and the Philippines: A Comparative Analysis of Decision Space. *Health Policy Plan.* 2002;17(1):14-31.
4. Kaur M, Prinja S, Singh PK, Kumar R. Decentralization of Health Services in India: Barriers and Facilitating Factors. *WHO South East Asia J Public Health.* 2012;1(1):94-104.
5. Dwicaksono A, Fox AM. Does decentralization improve health system performance and outcomes in low- and middle-income countries? A systematic review of evidence from quantitative studies. *Milbank Q.* 2018;96(2):323-68.
6. Okeyo Obosi J. Decentralized Governance in the Management of Urban Health Care Systems in Developing Countries. *Open J Political Sci.* 2019;9(1):189-202.
7. Sumah AM, Baatiema L, Abimbola S. The impacts of decentralization on health-related equity: a systematic review of the evidence. *Health Policy.* 2016;120(10):1183-92.
8. Kruk ME, Gage AD, Arsenaault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. *Lancet Glob Health.* 2018;6(11):e1196-252.
9. Panda B, Thakur HP. Decentralization and health system performance - a focused review of dimensions, difficulties, and derivatives in India. *BMC Health Serv Res.* 2016;16(Suppl 6):561.
10. Abimbola S, Baatiema L, Bigdeli M. The impacts of decentralization on health system equity, efficiency and resilience: a realist synthesis of the evidence. *Health Policy Plan.* 2019;34(8):605-17.
11. Salthman RB, Bankaustkaite V, Vragdback K. World Health Organization; 2007.
12. Gørgen H, Schmidt-Ehry B. The concept of the district health system. In: Gørgen H, Kirsch-Woik T, Schmidt-Ehry B, editors. *The District Health System: Experiences and Prospects in Africa.* 2nd ed. Wiesbaden: Universum Verlag; 2004.p.27-50.
13. Heywood P, Choi Y. Health system performance at the district level in Indonesia after decentralization. *BMC Int Health Hum Rights.* 2010;10(3):3.
14. Aganyan Inc. Patents: Uberization and decentralization of healthcare services. JUSTIA Patents; 2019.
15. Smith JC, Medalia C. US Census Bureau. Current Population Reports. Health Insurance Coverage in the United States: 2014, US Government Printing Office, Washington, DC: 2015.
16. Birkhäuser J, Gaab J, Kossowsky J, Hasler S, Krummenacher P, Werner C, et al. Trust in the health care professional and health outcome: A meta-analysis. *PLoS One.* 2017;12(2):e0170988.
17. Donabedian A. Evaluating the quality of medical care. *Milbank Mem Fund Q.* 1966;44(3):166-206.
18. Institute of Medicine Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington, DC: National Academies Press; 2001.
19. Institute of Medicine Committee on Quality of Health Care in America. To err is human: building a safer health system. Washington, DC: National Academies Press; 2000.
20. WHO. WHO global strategy on people-centred and integrated health services. 2015.
21. Mills A, Vaughan JP, Smith DL, Tabibzadeh I. Health System Decentralization: Concepts, Issues and Country Experience. Geneva: World Health Organization; 1990.
22. Collins C, Green A. Decentralization and Primary Health Care: Some Negative Implications in Developing Countries. *Int J Heal Serv.* 1994;24(3):459-75.
23. Atkinson S, Haran D. Back to basics: Does decentralization improve health system performance? Evidence from Ceara in north-east Brazil. *Bull World Health Organ.* 2004;82(11):822-7.
24. Faguet JP. Does decentralization increase government responsiveness to local needs? Evidence from Bolivia. *J Public Econ.* 2004;88(3-4):867-93.
25. Jimenez D, Smith PC. Decentralisation of Health Care and Its Impact on Health Outcomes. *Discuss Papers Economic.* 2005.
26. Harvey JB, Valenta S, Simpson K, Lyles M, McElligott J. Utilization of outpatient telehealth services in parity and nonparity states 2010-2015. *Telemed J E Health.* 2019;25(2):132-6.
27. Martinez KA, Rood M, Jhangiani N, Kou L, Rose S, Boissy A, et al. Patterns of use and correlates of patient satisfaction with a large nationwide direct to consumer telemedicine service. *J Gen Intern Med.* 2018;33(10):1768-73.
28. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. *PLoS One.* 2019;14(8):e0221848.
29. Bashshur R, Doarn CR, Frenk JM, Kvedar JC, Woolliscroft JO. Telemedicine and the COVID-19 Pandemic, Lessons for the Future. *Telemed J E Health.* 2020;26(5):571-3.