Cost-Effectiveness Analysis of Using Digital Platforms to Alleviate the Gap in Access to Healthcare Services for the Elderly in China

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Abstract: The issue of healthcare access has transcended individual concerns to become a major societal challenge, especially in the context of an aging population. The problem of access to health care has led to a growing healthcare divide. The approach presented in this paper aims to delve into the intricate interplay of social, economic, political, and cultural determinants, the reasons why these factors contribute to the widening disparities in healthcare access experienced by older adults, and the proposed feasible solutions. The implementation of this solution requires a multi-faceted strategy, including an important part - hypothesis-driven experimental research driven by university student volunteers. By proposing hypothetical principles and analyzing data to make a comprehensive economic assessment, this paper aims to propose a pragmatic solution to this pressing problem. Ultimately, we aim to significantly mitigate disparities in healthcare access for older adults, aiming to minimize the impact of the problems of older adults themselves due to the uneven distribution of physician resources, and insufficiently comprehensive government policies.

Keywords: Health care gap, digital platform service, elderly

1. Introduction

Health care is a service provided by a formally trained and qualified health care worker (doctor, nurse, physiotherapist, etc.) whose purpose is to improve a person's health condition by providing certain medical services (drugs, advice, advice, etc.) or to minimize or minimize further decline in health condition.

A healthcare gap is an impact on the health of a particular group of people compared to other groups due to economic, social status, and national policies, which leads to a gradual gap between this group of people and other groups in terms of access to health care services, and thus affects their right to access health care services.

In China, age-related health problems keep cropping up. For them, especially the elderly living in rural areas, seeing a doctor is a huge problem, and chronic diseases, as the "common diseases" of the elderly, develop very rapidly among them. According to 2021 statistics, about 75% of the elderly aged 60 and above in China suffer from non-communicable diseases such as cardiovascular disease, type 2 diabetes, hypertension, and hyperlipidemia [1].

The reason for this is that the state is unable to provide adequate medical services, and the distribution of resources is very unequal for various reasons [2]. We all know that marginal social benefit(MSB) equals marginal private benefit(MPB) plus marginal external benefit(MEB), However, when we plot the curve of marginal cost intersecting them on the secondary axis with the horizontal axis being quantity and the vertical axis being money, we will find that the quantity of medical services provided by the government cannot reach the optimal level required by the society (R represents the service provided now, R* represents the optimal level in the ideal). And because the elderly also have great problems in obtaining accurate information and understanding the relatively complex doctor's orders, prescriptions, or information for them, this also indirectly leads to the fact that the gap in access to medical care is widening.

If we now look at the political, social, and cultural factors, China has implemented a different system in the city and the countryside - the urban-rural dual system. This system is composed of different medical security systems and different medical service systems, which determines that it is a very difficult reality for patients to obtain the same degree of medical care services in different places to a certain extent. The meaning of the term "left-behind elderly" is that as these elderly people, their children go out to work, leaving the elderly to live alone in the countryside. Their financial resources are extremely unstable, so they cannot support the family or even their own life, which brings a heavy burden to the family. And when they want to access medical services, you can imagine the difficulty. Similarly, such left-behind elderly, lonely elderly, will have very difficult accessing medical information. For historical reasons, they don't have a lot of knowledge, which means that some of them may have deep doubts about modern medicine [2]. This is reflected in their inability to adapt to the modern medical system and thus have a deep impact on traditional Chinese medicine (TCM) [3].

As early as many years ago, the Chinese government began to introduce various policies and programs to ease the pressure of service, improve the level of service, and enhance the quality of service. The long-term care insurance guarantee plan is a nationwide long-term medical insurance system established during the "14th Five-Year Plan" period to provide basic medical insurance and health services for China's aging society. However, when selecting pilot areas, it is only implemented in several cities with relatively good development and certain medical security service foundations [4]. Second, China established the National Center for Gerontology (NCG: National Center for Gerontology: to develop a national health development strategy, similar in function to NICE in the UK, but an organization led by the state to conduct critical research to promote better access to health services for older people in rural and remote areas. They also provide further training for professionals working in the field of health, and these trained personnel carry out international exchanges of new models and techniques [1]. The third is the revised measures and guidance to cope with the aging population: the Chinese government has decided to establish a basic pension list system to expand the coverage area of the elderly pension insurance and strengthen the construction of elderly health centers and rehabilitation hospitals [5].

There has been widespread discussion about the gap in access to health care for the elderly, which has made identifying the problem and developing solutions an important topic. Data show that by 2040, China's population over the age of 60 will reach 402 million, this huge number only accounts for 28% of the total population, which means that the aging problem will not disappear in the short term [6].

What is even more tragic is that this gap has been exacerbated by the perverse reforms and unimplemented implementation of the past few years [7]. There are also growing disparities in the availability, accessibility, affordability, and quality of healthcare services. This makes it challenging for public health workers in the context of rapid urbanization and an aging population.

2.   Literature Review

In this part, the author will introduce the data support of the whole project design and relevant laws and regulations, and talk about the expected economic changes, as well as the expected changes related to the economy and health services through the implementation of the method and measure of college students' volunteering. Then it will also make corresponding measures to implement the project, and finally find out the problems and shortcomings through comparison.

2.1. Model

2.1.1. Design

The rapid growth of China's aging population, especially in rural areas with relatively poor medical care, has exacerbated the wide gap in access to healthcare services for the elderly. To address this pressing challenge, we have designed a program to address or mitigate gaps in access to healthcare services for older adults in different regions. The program introduces a telemedicine service platform aimed at seamlessly connecting medical resources with certain quality and quality. We hope that the elderly population can easily visit the attending doctor in the hospital and have more detailed video consultations through this platform. Similarly, we have also designed the function of being able to schedule online appointments and get e-prescriptions quickly and comfortably at home via a smartphone app on this platform. The design of the entire platform must be simple and easy to understand, carefully checking whether user access to each function only requires a simple touch of single digits. The platform will use a large font to make it easier for the elderly to read. In addition, to bridge the digital divide, the system will cleverly use university volunteers to provide one-to-one or one-to-many specific help to the elderly. This innovative system is a nationwide telemedicine service platform specifically designed to meet the healthcare needs of the elderly.

2.1.2. Operators

The government is positioned to play a pivotal role in not only facilitating but also regulating the establishment of this platform. Simultaneously, the private sector is integral in providing technical solutions and delivering essential healthcare services. With a focus on the elderly population, the utilization of telemedicine services stands as a crucial component in meeting their diverse healthcare needs. The National Center for Gerontology (NCG) is set to take charge, integrating scientific research, clinical care, and comprehensive health management. Additionally, internet platforms are geared towards providing seamless access to online healthcare services and a wealth of medical information. Moreover, college students are actively engaged in educating and guiding the elderly population on accessing and effectively utilizing this innovative platform.

2.2. Related Policy and Data Support

In 2022, the number of students in China surged to about 46.55 million, reflecting the large presence of a young population [8]. There has also been a significant increase in the number of these students participating in voluntary work, with an impressive participation rate of 84.5% [9]. As part of a forward-looking initiative, plans are underway to mobilize more than 10 million university students as volunteers, especially targeting rural areas [10]. This widespread participation is largely due to the state's strong encouragement and support for college students to do community service, which is an important component of the service learning curriculum, including credit hours [11]. This concerted effort demonstrates a collective and proactive approach that can harness the potential of the student population to make a significant contribution to the welfare and development of rural areas. In

addition, during the COVID-19 pandemic, 940,182 doctors provided online medical services, 13.7 million remote consultations, and 84,916 online care specialists provided online help to patients infected with COVID-19 [12]. All these explain the feasibility of online medicine and the benefits that can be obtained after the implementation of online medicine. What is more, there is a study shows that the training of elderly people in using modern medical equipment and technologies was not included in 76% of health-related fields.

2.3. Economic Forecast

After the implementation of the digital platform and its related services, the overall productivity of the healthcare industry is expected to increase significantly. However, the surge is expected to show a clear bias, not necessarily to the detriment. On the contrary, it is beneficial, in particular, to promote the actual access of older persons to health services." The concept of "physical service accessibility" describes a situation in which the number of medical devices does not necessarily increase directly; However, due to the application of the platform, the availability and utilization of such devices will increase. Increased efficiency in the use of these devices is directly linked to improved access to health services, highlighting the significantly increased access of older persons to vital medical assistance.

If we look at volunteerism provided by students as a complementary aspect to the provision of medical services, it will increase the overall number of medical services available. This point of view suggests that it is possible to achieve a higher level of health care while optimizing cost-effectiveness as much as possible. When these student-provided volunteer services are viewed as services within the healthcare sector, it effectively increases the amount of care available because we only need college students to educate and guide or even replace the elderly population to use their digital platforms without a corresponding surge in spending, thus optimizing the cost-to-service ratio. This innovative approach not only expands the scope of existing health care for older people in urban and rural areas but also increases its accessibility, offering a promising path to improving health care accessibility and affordability.

2.4. Implement

How can we take our ideas and apply them to reality? I think the first and most important thing is the applicability of the law. When we try to change something on a large scale, we have to legalize it and even we need a series of government policies to support it, and even direct or indirect cooperation. Therefore, if there are private enterprises or the sector to invest and help us, we should try our best to seek cooperation with the government and reach a consensus. Second, we will select specific areas as test grounds to implement our initial, and perhaps immature, plans to deal with the problems and challenges that will follow. We then continuously update and evolve our digital platform system based on the data we receive or user feedback. At the same time, uniform training for college volunteers is also essential. Through the training of college volunteers, the time of serving a single user can be greatly reduced, to improve efficiency and achieve the purpose of serving more elderly people. This saves both time and cost.

3. Study Design

3.1. Method

Hypothetical design for a cost-effectiveness analysis (CEA) study (Please note that the following data are hypothetical examples)

3.1.1. Research Questions

Is the use of digital health platforms cost-effective in improving access to healthcare for older Chinese compared to standard care?

3.1.2. Assumptions

1. Null hypothesis (H0): The use of digital healthcare platforms is not cost-effective compared to standard care for elderly people in China.

2. Alternative Assumption (Ha): The use of digital healthcare platforms is cost-effective compared to the standard of elderly care in China.

3.2. Data

3.2.1. Define the Population

100 eligible elderly participants aged 60 and above in China in a specific area (rural and urban) were randomly selected by a computer to be evenly grouped (50 people per group) and followed for one year to collect data.

3.2.2. Interventions and Cooperators

Intervention group: Older people who use digital healthcare platforms to access healthcare services. Comparison group: Older adults who receive standard healthcare services without digital platforms.

3.2.3. Expected Results

Reduced hospitalizations for preventable diseases, health-related quality of life improvements (measured using the standard quality of Life scale), decreased healthcare delivery costs, and improved patient satisfaction.

3.2.4. Data Collection

Collection of data on health care utilization, including the number of hospitalizations for preventable diseases in the intervention group and the comparison group (10 per occasion in the intervention group and 20 per occasion in the comparison group).

Surveys and medical records were used to collect information on quality-adjusted life years (intervention group 5QALY, comparison group 3QALY) and healthcare costs (intervention group 50 ￥/ person, comparison group 70￥/ person).

3.2.5. Cost-effectiveness threshold

The cost-effectiveness threshold is defined as 750￥.

3.3. Data Analysis

3.3.1. ICER Calculation

ICER = (Cost in Comparison Group*Total Participants in Comparison Group - Cost in Intervention Group*Total Participants in Intervention Group) / (QALYs in Comparison Group - QALYs in Intervention Group)

ICER = (¥70*50 - ¥50*50) / (3 QALYs - 5 QALYs)

ICER = (¥3500-￥2500) / (-2 QALYs)

ICER = -¥500 per QALY

-￥500<￥750

So, ICER< cost-effectiveness threshold.

3.3.2. Discussion

In this analysis, ICER is -500 yuan per QALY, which is negative. This states that using digital healthcare platforms is both less costly and more effective when it comes to improving quality of life (QALYs) and preventing hospitalizations compared to standard care for the elderly in China.

Since ICER is negative and below 750 yuan which is the cost-effectiveness threshold, it means the digital platform intervention is cost-effective. So these results lead to the rejection of the null hypothesis (H0). This means there is evidence to support the alternative hypothesis (Ha) that the digital platform is cost-effective for the given population and outcomes studied.

4. Conclusion

Through our collaboration within the group, we have launched a national telemedicine service platform, a digital platform that is expected to address the challenges of complex healthcare visits for older people brought about by China's rapidly growing elderly population. The initiative makes strategic use of modern technology, engages in government consultations, works with university students, and involves strategic investments, all aimed at improving access, quality, and cost-effectiveness of healthcare services. In its ideal form, the platform is conceived as a dynamic system, constantly adapted and refined through rational feedback and correction, precisely tailored to meet the evolving and specific medical needs of the elderly. Through a combination of technology, consulting, collaboration, and strategic investment, the platform hopes to provide responsive and sustainable solutions to the healthcare needs and gaps of China's rural and urban elderly.

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