Thoughts on Ethics in the Development of an Internet Medical Service System for Vulnerable Population

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Abstract. The development of Internet medicine as a new medical treatment is highly valued around the world. Internet healthcare is mainly used in the United States, followed by countries in Europe, Africa, Latin America, and the Asia-Pacific region. More than 60% of US residents communicate with their doctors via video, and some of them compare doctors via the internet. Most people in Europe and Japan use the internet to get medical information. Internet medical treatment, based on 5G technology, has significant advantages and economic benefits, but the medically vulnerable service also has some shortcomings. Based on this, this paper defines the concept of medically vulnerable population and discusses how the internet medical service system incorporates two medical ethics principles: the principle of nonmaleficence and the principle of justice. Furthermore, we examine the most recent data and future prospects of Internet medical and conclude that global Internet healthcare has significant development potential and market value, which can effectively relieve the pressure on vulnerable groups to seek medical care. So, the construction of the vulnerable population network service system has certain application value, and provides a new idea for the diagnosis, treatment, and rehabilitation of vulnerable patients.

Keywords: medically vulnerable population · Internet medical treatment · medical ethics

1 Introduction

Since 2011, various departments have issued a number of documents and policies in order to encourage the growth of the internet medical community. Following the outbreak of COVID-19, Internet medical demand reached an all-time high. The internet medical community assisted in greatly reducing the outbreak's impact, relieving pressure on the hospital, and improving information exchange between doctors and patients. The internet medical community works with cutting-edge medical technology that is constantly personalized and innovated. At the same time, new ethical issues have arisen.

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This paper defines the connotation of "medically vulnerable population," and the medically vulnerable population in this paper mainly refers to the elderly and the disabled. What's more, we predict the development of Internet medical treatment by studying the current situation in the world. In addition, we focus on the analysis of the ethical issues surrounding the principles of no harm and fairness in the construction of an internet medical care system for vulnerable groups in order to put forward an optimization scheme.

Han Qide, honorary president of the China Association for Science and Technology and academician of the Chinese Academy of Sciences, believes that the development of Internet medicine provides an effective way for the whole society to enjoy the overall allocation of medical resources. Li Lanjuan, an academician of the Chinese Academy of Engineering, once predicted that "Internet + Medicine" would be the trend of The Times based on medical conditions. This proves that the research field of this paper is of high social value.

2 Definition of Medically Vulnerable Population

The term "vulnerable population" refers to a broad category of people in society who are poor, unable to care for themselves, or are socially marginalized and excluded. It can be subdivided into a special group, namely, the medically vulnerable population. "When the elderly are unskilled in operating smart devices, these so-called conveniences become troubles for them" [1]. Because of the recent epidemic, more online operations are required prior to seeking medical treatment, making it difficult for the elderly to seek medical treatment. At the same time, people with disabilities are frequently unable to meet their medical needs due to physical or physiological deficiencies. The lack of physiological function of deaf and mute people in language information reception and expression, in particular, makes communication with people difficult, and they frequently face obstacles when seeking medical treatment [2]. Furthermore, people suffering from infectious diseases must not be overlooked. In general, the following characteristics of medically vulnerable populations can be summarized as follows:

First, elderly or disabled people with limited mobility. Second, people who have trouble communicating with others. Third, people with difficulty in operating smart medical equipment. Fourth, people with infectious diseases are vulnerable to discrimination and exclusion.

According to the above characteristics, this paper defines the medically vulnerable population as those who cannot rely on their own strength or are extremely difficult to complete the whole medical treatment process, and need the society to provide them with fair, convenient and guaranteed medical services.

Internet medical treatment is gaining popularity as a new medical model based on hospital treatment and utilizing network programming for technical support, combining the realities of a hospital and a virtual network to eliminate the need to go to the hospital registration queue, realize treatment and doctoring on the internet, provide targeted solutions and guidance solutions for a new type of medical treatment, and be more convenient for vulnerable populations. The evolution of Internet medical treatment can be divided into three categories based on the type of service: online physical condition

consultation, online consultation, and online consultation. An online health consultation service offers medical and health consultations as well as answers to medical questions. It is convenient for vulnerable populations to obtain accurate information on the internet. Remote consultation, remote diagnosis, case discussion, and other functions will be provided via online consultation to assist vulnerable populations with regular physical examinations and other services. Online consultation can simulate a hospital consultation experience for vulnerable populations.

Medically vulnerable population are defined in this paper as people who cannot rely on their own strength or find it extremely difficult to complete the entire medical treatment process, and society must provide them with fair, convenient, and guaranteed medical services.

3 Internet Medical Treatment Development Status and Prospects

3.1 Status of Development

The development of the global Internet medical market has been generally optimistic. With the gradual aging of the population, the medical video APP, various monitors, and various medical and health-related Internet apps have a long-term growth trend.

The advancement of Internet medical treatment has not only improved the lives of ordinary people but also brought convenience to the medically vulnerable population with a single medical treatment model. The People's Republic of China's Drug Administration Law went into effect in December 2019, effectively legalizing the online sale of prescription drugs. In March 2020, China expanded the scope of medical insurance payment to include qualified "Internet + medical" services, encouraging designated medical institutions to provide "no-meeting" drug purchase services [3]. The development of Internet medical treatment has alleviated the problem of making it difficult for the elderly and disabled people with mobility issues to travel and seek medical treatment, as well as greatly increasing the convenience of medical treatment in terms of time and space (Fig. 1).

The United States mainly uses the internet for medical treatment, followed by European, African, and Latin American countries, and finally the Asia-Pacific region. More than 60% of American residents communicate with doctors via video, and some of them compare doctors through the internet. The proportion of people who can access information via the internet in Europe and Japan is 71% and 23.8% respectively. The global market for remote home and hospital/clinic care is expected to grow from $23.8 billion in 2017 to $55.1 billion in 2023 [4]. We can see from the foreign economic growth trend that the foreign Internet medical industry is also rapidly developing.

According to the latest research data from GVR, the internet medical market will achieve explosive growth in just five years. "Rising per capita spending on health care has made health care unaffordable for a large proportion of the population," the report said. As a result, the demand for Internet medical services is expected to increase significantly in the next six years [5].

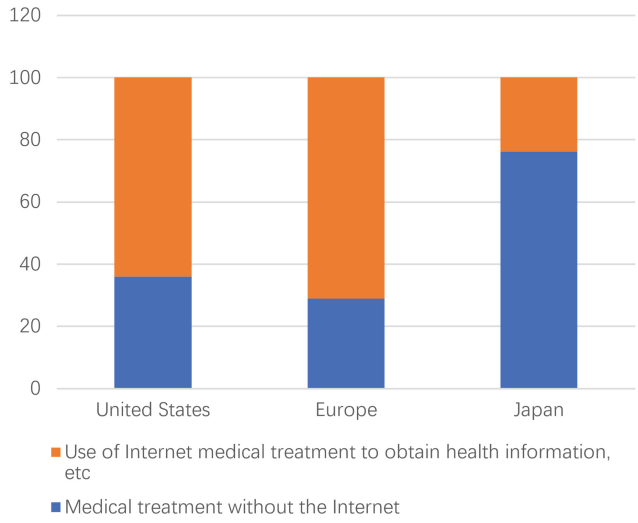

Fig. 1. The prevalence of Internet medical use in the USA, Europe, and Japan **[Self-painted]**

3.2 Prospects for Growth

There is no doubt that Internet medical care will attract more social investment as 5G, artificial intelligence, and other technologies mature and accelerate their integration with medical scenarios. However, there is still a development gap between Internet medical treatment and a mature model and large-scale market application [6]. With the advancement of Internet technology and the preferential support of national policies, Internet medical treatment will be more than just a money-making tool for Internet companies, and it will be a good technological innovation that will benefit thousands of businesses. It greatly simplifies people's medical treatment processes, eliminates the time-consuming process of "running to the hospital," reduces the time of offline examination, greatly benefits medically vulnerable population, and reduces the possibility of medically vulnerable population being discriminated against.

The National Health Commission issued the "Notice on Deepening the internet, Medical, and Health" and "Five One "Service Action" in March 2021 [7]. In this context, China's Internet medical treatment industry is rapidly expanding. The scale of China's Internet medical market has increased from 56.6 billion yuan in 2017 to 214.5 billion yuan in 2021, with a compound annual growth rate of 39.5% [8], according to data from Zhou Qian, Wang Qiuye, and other scholars in the Analysis of the internet Medical Development Model in China. It is expected to steadily rise over the next four years (Fig. 2).

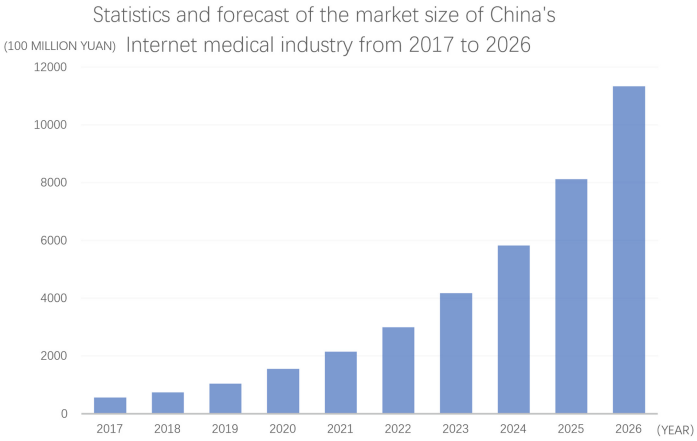

Fig. 2. From 2017 to 2026, statistics and forecasts for the Chinese Internet medical industry **[Self-painted]**

4 Assessment of the Ethical Framework of Internet-Based Medical Services

Medical ethics principles that began simply around the doctor-patient relationship have evolved to include the national government, society, medical institutions, individuals with many multidimensional requirements, and the internet's medical requirements as science and technology progressed and people's attention to physical and mental health grew. This paper focuses primarily on the non-harm or favorable principle and the justice principle.

4.1 The Principle of Nonmaleficence

The principle of nonmaleficence means that patients should not be harmed during the diagnosis and treatment process, which is the bottom line principle that medical staff should keep in mind in a series of ethical principles of clinical practice and practice [9].

While improving service quality, Internet medical treatment should prioritize the protection of patients' physical and mental health. The principle of nonmaleficence should be to prevent intentional and responsible injuries, prevent unintentional but knowable injuries, and minimize controllable injuries; to make no abuse of auxiliary inspection and drugs [10], and to ensure that patients are beneficial, help patients achieve well-being and health, improve the quality of services, especially to protect patient privacy, and generally, patient death information must be confidential, but hospitals do not currently follow this principle [11].

Furthermore, we use dialectical reasoning to meet the needs of the "no-harm principle" and the "favorable principle" in medical ethics. The favorable principle is the ethical principle that guides medical staff's diagnosis and treatment decisions in order to protect patients' interests, promote their health, and increase their happiness. However, because people's cognition and medical culture change and evolve, "favorable" principle

measures may appear at different times in the opposite situation, so we must "keep up with the times." Furthermore, modern medical treatment includes many invasive examinations and operations, and the drugs and treatment methods have side effects, so there is no absolute "no harm." Patients and their families, as well as medical staff, should be rational about this.

4.2 Justice Principles

The principle of justice requires medical staff to treat different patients fairly, respect their autonomy, and realize medical resource sharing and fair distribution [12].

Medical resource allocation is divided into macro resource allocation and micro resource allocation. Macroallocation of medical and health resources refers to how much of the total resources available to the country is allocated to the medical and health sector [13].

The term "micro-distribution of resources" refers to the ethical principles that medical personnel and medical administrative units follow when allocating health resources to patients, as well as how to do so in a just and reasonable manner. This section focuses on the micro-distribution of Internet medical resources. When the number of Internet medical visits is excessive, which types of people should be prioritized, or how should they be weighed in the same emergency situation, when the internet medical need line is below patients and hospital patients face a time conflict?

First, appropriate guidelines must be established. Following that, a reasonable schedule of network patient visit times must be established. In the limited allocation of health resources, screening at an urgent level, improving consultation efficiency while ensuring an accurate diagnosis rate, providing maximum benefit to medically vulnerable population, or adapting to increase the number of visiting doctors are all options. In general, the majority of diseases discussed in Internet medical consultations are chronic or common diseases. Interns can be consulted under the supervision of professional doctors, which not only improves consultation efficiency and reduces the burden on hospitals, but also increases interns' clinical experience.

Finally, it is difficult to ensure that any health resource allocation criteria will not be subject to social disputes, which is a challenge that we, as medical workers, must face. Therefore, if we want to build a medical service system that is truly beneficial to the medically vulnerable population, we must firmly remove the existing obstacles, maximize the ethical issues, and jointly stick to the bottom line of Internet medical care.

5 Ethical Considerations in Research

5.1 Service Excellence

The main topics discussed during the development of Internet medical service system are disease early warning, diagnosis, and disease information protection.

(1) Early detection and diagnosis

Prior to early disease warning, disease detection is required.

Medical institutions diagnose conditions and issue warnings, but the diagnosis is not always correct. Microscopic diagnosis has a 93.33% nature of lesion compliance

rate, a type of lesion full compliance rate of 43.33%, and digital diagnosis has a 96.67% nature of lesion compliance rate, a type of lesion full compliance rate of 46.67% [14]. As a result, doctors must take every patient seriously and carefully, particularly those in medically vulnerable population.

There are some problems with the internet medical service's diagnosis of illnesses. For example, patients may have had unclear expressions during the online diagnosis, so the information obtained by the doctor was not enough for the doctor to reach a conclusion. Therefore, doctors and patients can further agree on the time and place online for face-to-face diagnosis, and effectively integrate online and offline medical resources. Furthermore, in the age of big data, the information obtained by doctors and patients is not equal, and it is difficult to distinguish between true and false identities of "online experts" and "enthusiastic medical aid," and many criminals will exploit this point for fraud. Patients, particularly those in medically vulnerable populations, are more likely to be misled by their own factors, resulting in physical (wrong self-diagnosis, use of harmful drugs), mental (reduced trust in online doctors, increased fear of disease, anxiety of economic loss), and economic harm. As a result, we should allow the doctor in the network consultation to use his or her real name to ensure that the response is mine. Legislation can also be enacted to limit their actions. Furthermore, there are numerous paid medical apps available online. However, developers only seek profit maximization and do not prioritize the interests of patients, which contradicts the favorable principle. As a result, when medical services and market interests collide, we must define our own positioning to ensure that the objects we serve reap the greatest benefits.

(2) Disease information security

For patients to establish personal records, Internet medical treatment will integrate basic information, medical history, medical records, and electronic prescriptions. Convenient medical treatment also helps to expand the medical database. The disease information archive contains more clinical research samples, particularly for complex conditions. The rapid influx of information databases will be a driving force in the advancement of medical care. However, because the internet medical platform system's hardware and software security facility guarantee system is relatively backward, the extensive collection of information will be accompanied by potential dangers. As an example, consider the case of a county in Zhejiang Province that was ruled by a people's court for violating personal information. In the case, over 700 million pieces of citizen data were leaked, and over 80 million pieces of citizen data were sold, including a large number of pregnancy examination data exported as a result of an intrusion into the unit medical service information system. Many Internet medical patients have difficulty protecting their rights for two reasons: first, they are unaware of the disease information leakage, and second, they are unaware of how to protect their rights following the information leakage.

As a result, we must first accelerate the implementation of special patient medical history information protection policies in order to ensure the security of network data. In addition, the medical and health administration departments should ensure the perfection of a series of rights protection channels for patients after their information is leaked, forming an information island and reducing unnecessary trouble for rights defenders. Furthermore, the background staff's access authority to medical information must be

strengthened. When illegal access behavior is detected, it should be traced as soon as possible, and the illegal access behavior should be severely punished [15].

5.2 Appropriate Resource Allocation

For a long time, the world has made great achievements in expanding the total amount of public medical resources, but the problem of unbalanced distribution of those resources has not been effectively solved, especially the gap between urban and rural areas [16]. In the same area, both large and community hospitals have "grab food." Because of large hospitals' "refusal to release," the majority of medically vulnerable populations are forced to live in rural townships. The disease cure rate decreases as resources become scarcer. Many serious diseases necessitate transregional treatment. Medical care for vulnerable populations is prohibitively expensive. As a result, Internet medical treatment should be medically classified based on the rational allocation of medical resources in all levels of medical institutions. Breaking through the medical resource monopoly, the type of disease is not treated differently based on the patient's gender, region, or economic strength. Patients should receive the best possible health care at the lowest possible consultation cost, as well as adequate humanistic care. Eliminate the bad mood caused by patients' repeated medical treatment under the influence of unbalanced distribution to alleviate the social contradictions caused by uneven distribution of resources.

6 Conclusion

During the process of developing a health-care system, we discovered that service quality and resource allocation did not adhere to medical ethics principles such as misdiagnosis, information fraud, information exposure, and serious discrimination against infectious disease patients. Medical care should clarify its positioning and adhere to the ethical principle in order to establish a solid guarantee for vulnerable population in the age of economic impact on the internet.

Acknowledgement. (1) The key topic of the "14th five year plan" of Heilongjiang educational science in 2021 "Research on the way of integrating revolutionary cultural resources into ideological and political courses in colleges and universities" (GJB1421480);

(2) Heilongjiang college students' innovation and entrepreneurship project in 2022 "'AnXinYang' a comprehensive medical service platform for disabled and elderly populations" (S202211230064x);

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