Analysis of community chronic disease health management mode under the background of big data

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Abstract. In recent years, the "Internet + medical" exploration and the country's vigorously promoted hierarchical diagnosis and treatment system have provided an opportunity to improve the status quo of diabetes. Some scholars have proposed "one-to-one binding community nurses" (Wang Li et al., 2016) and personalized treatment based on big data (He Ting et al., 2016). New chronic disease management concepts such as an integrated chronic disease management model for the elderly based on mobile medical technology (Che Fengyuan et al., 2016). Although different names are used, the core point of view is that patients and community doctors complete the contract, the community doctors will take care of the patients, and the hospital doctors will take care of the patients. The patient's blood glucose data can be shared with relatives and friends, community doctors, and hospital doctors in real time with the help of platform tools such as blood glucose meters, mobile apps, and cloud medical platforms. And community and hospital doctors' feedback on patients can also be sent to patients and relatives and friends in real time, thereby realizing hierarchical diagnosis and treatment of diabetic patients when medical resources are scarce and unevenly distributed. This article refers to this model as the "family-style chronic disease management model". The interaction between patients, relatives and friends, community doctors, and hospital doctors is shown in Figure 1.

Figure 1. Family-style chronic disease management model (theory)

However, the existing research on the family-based chronic disease management model mostly stays at the level of theoretical explanation, and lacks the practical process and effect research on the family-based chronic disease management model. In order to promote the implementation and optimization of the family-style chronic disease management model, this article attempts to describe the current status and problems of the existing model through the use of tools such as VOSviewer and MATLABR2018b, and provides directions and suggestions for the optimization of the family-style chronic disease management model in my country.

1 Introduction

Existing research has provided a rich preliminary research foundation for the Internet-based emerging chronic disease management model, but there are still gaps in the following two aspects. **First, there is a lack of research**

on the Chinese context. Due to the huge differences between China's medical system and North America and Europe, the results of empirical research based on North American and European samples may not be fully replicated in the Chinese context. Therefore, the emerging chronic disease management model based on the Internet in the Chinese context involves issues such as which

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participants, how to divide and interact with each other, and how to evaluate the effectiveness of chronic disease management. Research on chronic disease management based on the Chinese context can help provide operational advice to the Chinese government, chronic disease management companies, doctors, and patients. **Second, there is a lack of fine-grained research on the process and mechanism of chronic disease management.** Most domestic and foreign studies either outline the main roles and activities of the participants in a rough theoretically,

or give a statistically significant evaluation of the chronic disease management effects of patients through self-reporting or objective data. There is still a lack of fine-grained descriptions of the participation motivation, interaction process and interactive behavior of the participants in the entire chronic disease management model. The implementation process, implementation status, implementation subjective experience and implementation problems of chronic disease management are still black boxes.

Figure 2. Structural distribution of male diabetic patients

Figure 3. Structural distribution of female diabetic patients

2 Results

1. Preliminary preparation: prepare an outline for the interview, determine the selection objects and reference standards of the case. Look up the literature description of the problem at home and abroad.

(1) Keyword search for "chronic disease management", download data from CNKI and web of science, and export endnote format

(2) In Vscod, maintain and check keywords

(3) Load the export results of HowNet and web of Science in endnotes, and export the RIS output file

(4) Modify the file suffix, change ".txt" to ".ris"

(5) Perform bibliometric operations in the Vosview GUI interface, as shown in the figure below.

Figure 4. Create a new analysis file

Figure 5. Select input file type

Figure 6. Web of science's map of "chronic disease management" keywords

Selection of survey objects: In order to collect true, credible and representative practice data, this article intends to select some third-class hospitals and communities in Hangzhou. The pilot was initiated by the Hangzhou Municipal Government in September 2017 and has achieved good results. In this pilot project, the tool platform provider cooperates with the local government to encourage patients to sign contracts with communities and specialist doctors free of charge, claim smart blood glucose meters and install the WeChat applet "Tangyoukang". After the patient completes the blood glucose measurement, the contracted doctor and the patient's relatives can see the blood glucose data in the small program. If the blood glucose data is abnormal, the contracted doctor will contact the patient one-on-one to understand the cause of the abnormal blood glucose and give a treatment plan. After the free trial of the service for one month, the outpatient clinics of specialist hospitals began to charge 2.5 yuan/day to patients who tried the chronic disease management service. Most of these fees were returned to the specialist in the form of salary. Secondly, the relevant participants in charge of the pilot, including relevant persons in charge of the medical platform, patients, community doctors and specialists, have a strong willingness to participate in the survey, which provides good conditions for the data collection of this study.

2. Research method: This report is designed based on the characteristics of the research question and a single case study. The Internet-based chronic disease management model that this report focuses on is a new phenomenon that emerged under the background of the development of a new generation of health support

technology. It still lacks mature theoretical guidance and complete theoretical explanations. A single case study helps this article to go deep into the management practice of representative cases, and combine the rich case background and environmental information to conduct an in-depth analysis and interpretation of the behavior of stakeholders in the chronic disease management model (Eisenhardt & Graebner, 2007; Walsham, 1995).

Steps: To comprehensively and objectively describe the effects and potential problems of the implementation of the family-style chronic disease management model, collect a wealth of primary and secondary data.

Primary data is mainly obtained through interviews, instant messaging tools, telephone calls, emails, etc. The research team conducted one-to-one interviews with platform tool providers, specialists, community doctors and patients involved in the chronic disease management model in the pilot area.

Second-hand data mainly includes official websites of hardware service providers, news reports on "chronic disease pilot projects" and "chronic disease management" on portal websites such as Tencent, Sohu, and Baidu, relevant industry information reports, and academic peer-reviewed journals in both Chinese and English.

3 Analysis strategy

The collected data is based on MATLABR2018b, and the number of keywords is output in descending order through the algorithm to output.xls in excel, and then filtered, as shown in Figure 7.

```

WordCount.m x iword.m x +
128 - if docell
129 -     width = max(cellfun('length',yn));
130 -     width = max(5, min(50, width));
131 - else
132 -     width = 5;
133 - end
134 -
135 -
136 - fat1 = sprintf('  %ds   %5d   %6.2f%%\n',width);
137 - fat2 = sprintf('  %ds   %5s   %6s\n',width);
138 - fprintf(1,fat2,'Value','Count','Percent');
139 - if docell
140 -     for j=1:maxlevels
141 -         fprintf(1,fat1,yn{j},counts(j),percents(j));
142 -     end
143 - else
144 -     fprintf(1,' %5d   %5d   %6.2f%%\n',[values' counts' percents]');
145 - end
146 - else
147 -     if ~docell
148 -         table = [values' counts' percents'];
149 -     elseif isnum
150 -         table = [y1(:) counts' percents'];
151 -     else
152 -         table = [yn num2cell([counts' percents'])];
153 -     end
    
```

Figure 7. Keywords extraction

Based on the number of occurrences, which is proportional to the size, draw a keyword analysis chart, as shown in Figure 8.

Figure 8. Keyword analysis diagram

4 Problems in the practice of family blood glucose management

The practice model of family-style chronic disease management as shown in Figure 9 is drawn. Different from the theoretical model shown in Figure 1, we found that (1) the frequency of interaction between patients and

hospital doctors is relatively high; (2) The frequency of interaction between patients and community doctors is relatively low; (3) The frequency of interaction between community doctors and hospital doctors is relatively low. These differences reflect the problems in family-style chronic disease management practices.

Figure 9. Family-style chronic disease management model (practice)

1. Weak collaboration between specialists and general practitioners

In order to alleviate the problem of uneven distribution of medical resources, the national policy advocates hierarchical diagnosis and treatment, and encourages the rational division of labor and complementary capabilities between general practitioners and community doctors to jointly achieve daily and abnormal care for patients. Among them, general practitioners are responsible for monitoring and managing the information of chronic disease patients, providing daily health guidance (medication, exercise, diet, etc.) and health knowledge; The specialist doctor is responsible for the management of the patient when the patient's condition changes and the treatment plan or hospitalization needs to be adjusted (Che Fengyuan et al., 2016). At the same time, specialist doctors provide general practitioners with some training and guidance to improve the professional capabilities of general practitioners and enable patients to achieve two-way referral between general practitioners and specialists.

This article summarizes the reasons for the weak collaboration between specialists and general practitioners into the following four aspects.

First, the overall level of general practitioners is poor and they lack understanding of cutting-edge medical knowledge.

Second, patients have not formed the consciousness of "see a general practitioner first if there is a problem" and lack trust in the general practitioner.

Third, the conflict of interest between community hospitals and specialist hospitals hinders the two-way referral of patients. In my country, community hospitals and specialist hospitals maintain independent operations, and there is no standard mechanism that encourages community doctors to recommend critically ill patients to specialists or specialists to take care of stable patients with community doctors. Some doctors rely on personal relationships or sympathy for patients to collaborate, but this collaborative relationship is very fragile and vulnerable to personal work plans.

Fourth, the channels for sharing patient information between specialist doctors and community doctors have not yet been opened up, and it is difficult to conduct in-depth collaboration around patients.

2. Patients with poor awareness of paying for chronic disease management

Diabetes is difficult to cure and requires long-term and careful care to slow down the progression of the disease. Most doctors believe that long-term continuous monitoring and management of patients' blood glucose will help keep blood glucose stable, reduce the possibility of serious diseases caused by uncontrolled blood glucose, and in the long run, it can also reduce the cost of medical care for patients.

However, in the current environment, many patients still cannot fully understand the value of chronic disease management services, and their awareness of paying for consultation services provided by doctors is relatively weak. As a result, patients believe that purchasing chronic disease management services has increased the financial burden and tend to stop purchasing services in advance. Due to patients' low awareness of paying for chronic

disease management services, it is difficult to maintain long-term payment. On the one hand, it may cause harm to patients' health and bring greater economic burden. On the other hand, doctors feel that their income will decrease and their willingness to participate will also weaken, which will hinder the long-term implementation of family blood glucose management.

5 Discussion

Studies have found that the family-based chronic disease management model can indeed effectively control the blood sugar of patients and achieve positive psychological intervention. For doctors, this model can improve the doctor's work efficiency, increase the doctor-patient trust, and increase the doctor's legal income. However, this model also has problems such as weak collaboration between community doctors and hospital doctors and poor patient awareness of seeking medical treatment.

Based on the causes of these problems, this article believes that improving the medical service level and willingness of community doctors is the key to further optimization of the family-style chronic disease management model. Because the improvement of the medical service level of community doctors helps to enhance patients' trust in community doctors, it also helps to improve the collaborative relationship between community doctors and hospital doctors; The gradual change of patients' awareness of seeking medical treatment and payment mainly depends on the popularization and promotion of medical knowledge by community doctors. Therefore, the implementation of the hierarchical diagnosis and treatment policy should pay more attention to the work status and willingness of community doctors. For example, it also provides salary incentives for community doctors to sign contracts and manage patients, strengthen training for community doctors' medical service levels, and provide conditions for community doctors' further training and promotion.

Policy recommendations for general practitioners:

One is to reduce unnecessary social things. Relevant departments must clarify what community doctors should do and which are not undertaken by community doctors. Even if community doctors are required to undertake social work, corresponding remuneration must be paid in time, and they cannot be tied up with the so-called performance pay gimmick. Much of the social work undertaken by community doctors can be separated. Give them to social organizations to complete, so that community doctors can focus on community medical services.

Second, the improvement of community doctors' medical service capabilities should also be emphasized.

The improvement of service capacity is a comprehensive project, and the number of health technicians must first be expanded. The original establishment was confirmed in accordance with the planned economic system, and it is no longer suitable for the current primary medical services. The shortage of manpower has now become the norm in various communities, followed by the improvement of comprehensive capabilities, especially the improvement

of medical services. The current medical consortium construction is a good way.

Although big data analysis can provide services for patients with chronic diseases from various aspects, there are still some problems and shortcomings worthy of attention for our country. On the one hand, since 2009, the US government has established a data open portal site Data.gov, which aims to fully open all data owned by the US federal government and realize data sharing. At the same time, the Australian and American governments are implementing the PCEHR [25] electronic medical file management system, this is a kind of "health management system from birth to grave", which realizes the unification of national electronic medical records, laying a solid foundation for data sharing. However, our country's informatization construction started relatively late, and the understanding of the application of big data in medical treatment is generally insufficient. "Information islands" are widespread, and the corresponding chronic disease data sharing platform is lacking, resulting in a serious shortage of chronic disease data for analysis. On the other hand, with the surging of big data, it also means that data security and privacy security are becoming more and more important. Big data urgently needs to formulate a framework that conforms to its own development and protects users' rights. The Health Insurance Portability and Accountability Act (HIPAA) has passed some privacy security and regulations to ensure that personal information is protected [26]. However, my country has not yet formed a specific legal framework to ensure patient privacy. In addition, our country's technology is relatively backward, and how to effectively use the "big data" method to extract knowledge from massive medical-related data and establish an effective, standardized and reasonable new model of chronic disease management still needs in-depth discussion.

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