The Innovation Research of the Medical Service Quality Based on Big Data

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ABSTRACT

Compared with traditional medical services, the use of big data can not only bring new technologies for medical services, but also lead to update model of innovation. In this paper, it is on the basis of the analysis of the status quo at home and abroad, using literature analysis method and interdisciplinary crossing method to define the connotation of medical service quality in the new period, to build the medical service quality gap model, to set up the evaluation system of the medical service quality based on big data, to create the model for the innovation of the medical service quality, and also to put forward the application solutions of the medical service innovation based on big data.

KEYWORDS

Medical Services, Medical Service Quality, Big Data, the Evaluation System of Medical Service Quality, Service Innovation

INTRODUCTION

Along with the social progress and technological development, patients’ understanding of the connotation of medical service quality has changed greatly. Patients care about comprehensive service quality including non-technical service quality rather than technical service quality alone. Especially in recent years, big data has been applied to field of medical services. As the information platform, it can not only provide comprehensive process framework and application program to patients, but also effectively promote medical service quality. It can let medical services faster and capable of responding and integrating patients’ demands timely.

Therefore, how to use big data to effectively obtain the data of medical service quality and establish scientific and objective quality evaluation system has great meaning for improving medical service.

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COMMENT OF RESEARCH STATUS AT HOME AND ABROAD

Application of Big Data in Medical Service Quality

Application of Big Data in Foreign Medical Industry

Application of big data in foreign medical industry is mainly for servicing residents, servicing awareness, servicing scientific research, servicing management organization and public health services. According to the newest report in 2015 of Global Management Consulting Company McKinsey, if the health care field can fully and effectively use big data, medical institutions and patients can save up to USD 450,000,000,000. At present, the United States is at the forefront of medical big data research. At the beginning of 2012, the United States started “big data research and development program” and planned to invest USD 200,000,000 to enhance the refining capacity of big data in order to serve medical and other fields preferably [1]

In addition, “Nature” and “Science” magazines in academia published “Big Data: Science in the Petabyte Era” and “Dealing with Data” respectively. They discussed the application of big data in fields including biological medicine, internet technology, environmental sciences, supercomputing, internet economics and internet technology.

Application of Big Data in Domestic Medical Industry

Compared with foreign countries, the use of big data in the medical service industry started relatively late and develops at a relatively slow pace. But in recent years, the momentum of rapid development is showed suddenly. Since original Ministry of Health in China issued Outline for Planning Development of Health Information in China in 2003, “medical big data” has become the important field and key development orientation of medical information in China. Central South University has cooperated with mobile company to develop “mobile health care” and use modern communication, internet of things and other technologies to develop health management, doctor-patient interaction, pre-hospital care, telemedicine and other services and change the traditional way of hospital treatment. [2] It is noteworthy that Taiwan has used big data technology to establish health care database in Taiwan and realize medical information sharing in Taiwan. It marks that Taiwan has entered the stage of practical application of big data and set a good example for our research.

In a word, application of big data technology in medical and health industry has obtained certain achievement in foreign countries, especially United States. But it is at the initial theory research stage in domestic medical and health industry. There is very little research on the application of big data technology in medical service quality and evaluative aspect and it is still in the blank stage.

RESEARCH ON MEDICAL SERVICE QUALITY BASED ON BIG DATA

Definition of Connotation of Medical Service Quality in New Period

Medical service quality is constituted by technical service quality and non-technical service quality. Technical service refers to the service level which medical
technology is used to complete patient treatment process. Non-technical service quality refers to the service level which patient medical experience is emphasized and behavior guide and method of psychological intervention are used to complete medical process [3].

Along with the social progress and technological development, patients’ demands of medical service have great changes. The requirements of medical service quality also turn to the integration of technical and non-technical service quality. Therefore, medical personnel must know the patients’ demands; take patients as orientation; target service location; provide services with high quality to patients and alleviate the contradiction between doctors and patients.

**Construction for Model of Medical Service Quality Gap**

PZB (1988) pattern of service quality gap used methods including questionnaire, interview and site observation to compare the expectation of patients and relatives of patients before using medical services with perception after use and construct the model of medical service quality gap (as Figure 1).

Form the model, we can find that patients have five gaps to perception of medical service quality. The first is the gap between expectation of patients to medical services and hospital to patients’ expected perception; the second is the gap between hospital to patients’ expected perception and service quality standard; the third is the gap between service quality and service delivery; the fourth is the gap between service delivery and external communication and the fifth is the gap between expectation of patients to medical service and actual perception of patients.
Main reasons of the five gaps: hospital managers do not understand the patients’ demands and they cannot provide accurate service location. Service quality standard of hospital has great “gap” with the standard known by patients. Therefore, it is imperative to establish a scientific and objective medical service evaluation system and shorten the gap on cognitive service quality standard of doctors and patients.

**Establishment of Medical Service Quality Evaluation System Based on Big Data**

For a long time, evaluation method of medical service quality is only limited to patients’ complaint after the event and patients’ feedback after leaving the hospital. The hysteretic quality evaluation method seriously affects the improvement of hospital management quality and deepens the conflicts between doctors and patients. Compared with the previous information model, big data adopts a kind of new and special computer system processing model. The core content is forming a computing resource pool, that is, “cloud” resource after centralized and uniform management and adjustment by means of network connection through abstract packaging a large number of resources which are idle within the hospital internal system. Through
“cloud” computing, quality management decision of hospital does not depend on experience or feeling, but based on the realistic data analysis and it greatly promotes the management benefit of hospital [4].

PZB proposed five scales of service quality in 1988, which are reliability, responsiveness, security, caring and tangibility, and 22 questions, which finally formed SERVQUA scale to measure service quality. The scale is considered to be of good reliability and validity and it is widely used. However, after big data is used to medical service quality management, a kind of service innovation which is effective and can greatly improve the development ability is formed. Original SERVQUA evaluation scale is given the new idea and new mode of big data and three new scales with characteristics of big data are added, which are economy, effectiveness and customizability. The specific definition is as below:

(1) **Tangibility.** Hospital shall combine demand type and demand level and other big data resources of users to integrate; analyze and establish information demand database of patients and realize patients’ demand to tangibility of medical services [5].

(2) **Reliability.** Big data can automatically extend, clip and improve the reliability of medical services through scalability and flexibility and in accordance with the requirements of business scale [6].

(3) **Responsiveness.** Big data can count patients’ footprints of using medical services; forecast information demand of patients; obtain a large number of non-structural and semi-structured data of patients’ medical data; provide reference information of big data for doctors’ medical decisions; timely confirm patients’ treatment plan and realize the responsiveness of medical services [7].

(4) **Assurance.** Internal medical information of hospital is transferred to big data center through big data and it shall be maintained by its professional personnel, which guarantees the assurance of medical services [8].

(5) **Caring.** Only by calculating, analyzing treats, filtering and optimizing the complex data resource via big data technology can hospitals provide accurate and effective demand data for users and realize the caring of medical services [9].

(6) **Economy.** Application process of big data can further reduce the investment of fixed assets facilities of hospital and its relevant capital expenditures, which forms cost economy of medical services.

(7) **Effectiveness.** Big data technology uses cloud technology to realize the sharing of medical information resources; obtain the newest medical technology and realize the effectiveness of medical services.

(8) **Customizability.** Using mining technology of big data and searching relevant database to form an integral perception of patients. At the same time, using mobile data platform to push personalized medical service products for patients and finally realize the personalization of medical services.

**Construction of Innovation Model of Medical Service Quality Based on Big Data**

Medical service quality evaluation system is the important part of hospital quality management. In order to improve the overall service quality of hospital and guarantee the implementation of service quality evaluation system, hospital managers must establish a safeguard mechanism; formulate combination strategy of service quality; supervise the operation of service quality evaluation system and realize innovation of
medical service quality. Therefore, innovation model of medical service quality based on big data is constructed (as shown in Figure 2).

Achieving medical service innovation must have certain preconditions and conditions. Medical service innovation can be achieved only after changing service concept, means of service, service strategy and formulating combination strategy of service quality. Therefore, hospital must formulate the strategy from the perspective of macro-strategy and guide hospital service management. Secondly, hospital shall have certain investment of information technology and provide material insurance for the construction of big data platform. Thirdly, medical personnel and managers shall be trained. They shall pay attention to patients’ medical feeling and provide all-around and superior medical services to patients. Fourthly, they shall grasp the marketing rules of medical market; know patients’ demands; locate accurately and provide superior services to patients. Finally, the idea of total medical service shall be established and all medical personnel in the hospital shall be mobilized to study and use modern information technology.

![Figure 2. Innovation Model of Medical Service Quality Based on Big Data.](image)

**APPLICATION SCHEME OF INNOVATION MODEL OF MEDICAL SERVICE QUALITY BASED ON BIG DATA**

In order to achieve the innovation model of medical service based on big data, according to the characteristic of information construction in medical and health industry, construction of medical cloud platform system faces the overall business construction and the optimal selection for design scheme of big data platform for medical service is formed. The implementation of specific application scheme is as below:
Firstly, **system analysis of big data platform for medical service quality.** From the perspective of constructing big data platform, business process of medical services shall be collected and demand analysis is conducted aiming to the existing problems in the system. System demand of big data platform which takes patients satisfaction as the core and realizes the elements of service quality is formed, i.e. reaching the purpose of quality management.

Secondly, **system design of big data platform for medical service quality.** If cloud platform of big data wants to realize quality innovation purpose of medical services, it shall formulate relevant principles; design the overall architecture of system and describe detailed functional design.

Thirdly, **system implementation of big data platform for medical service quality.** Aiming at overall architecture and function of the system, physical architecture of medical service platform is designed and completed; software environment of corresponding functional configuration is realized; virtualization integration of server and storage is conducted, so is the transfer of business system, which lets big data platform of medical services enter the operational phase.

Finally, **system test.** System of all departments transferred to big data platform and the performance of their physical server shall be evaluated to achieve the effect of evaluation scheme.

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REFERENCES