

How Much Medical Practitioners Are Willing To Use Online Diabetes Management Service

A Feasibility Study For A Medical Service Design

by

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ABSTRACT

Diabetes is becoming a serious problem in China. At the same time, China's medical system has faced a difficult situation because of the lack of medical resources and the unequal medical resource distribution between the BHs and BLHs. BH doctors are tremendously busy with both serious and minor illnesses while BLH medical providers are worried about a sufficient source of patients. This study aims to find the potential feasibility of a new service model in managing diabetes which will solve these medical problems. The study was conducted using an extensive literature review in addition to employing an interview and survey method to explore the perception and current situation in workload and income of medical providers from one BH and one BLH in China. Furthermore, this study tried to understand the acceptance of online medical technology in these medical provider groups. The results showed that doctors in the BH do not have the time needed to engage in extra work. This population is not satisfied with their work responsibilities and income structure. They want to engage in diagnosing and prescribing tasks, with respect to diabetes management. They would like to distribute the management work to BLH. On the other hand, medical providers in BLH have extra time and enthusiasm in doing extra work to improve their income. They are not satisfied with their workload and income, and want to change it. BLHs are willing to do the management work assisting the BH doctors. Additionally, the study showed that online medical technology requires a broader user education for medical providers from both big and BLHs. The conclusion can be summarized as design research advice for future service design in healthcare management. The proposed online medical service should meet different level medical providers' position and requirements regarding time, payment, and value. BH doctors are more suitable for diagnosing and prescribing and BLH medical providers are more suitable for follow-up service. This service should reflect the value of the BH doctors' professional service and the value of BLH medical providers' health management service.

(discuss how design can improve this situation through app development)

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CHAPTER 1

INTRODUCTION

1.0.0 Introduction

Diabetes has become a big problem in China. Together with the increasing number of diabetes patients, more serious problems have emerged. For example, the awareness or diagnosis rate of people suffering from diabetes is very low in China as well as the treated rate. Traditional diabetes management approaches have only very slowly improved over the years. However, through the development of the Chinese online service market, there has been an increasing number of online diabetes services. Behind the prosperity of the online diabetes service market, the reality is not so satisfactory. These online diabetes services are not running well. One possible reason is that current online diabetes management services are mainly self-management assistants. They help patients monitor and record patient body data and provide information regarding health preservation through technology. These online self-management assistants cannot effectively improve patients' compliance of doctor's advice nor lead them to live a healthier lifestyle. As a result, there is a need of introducing traditional people-care methods in combination with online technology, specifically mobile application technology.

Another issue facing China's medical system is the shortage of medical resources. It is hard for patients to get medical services that they deem satisfactory.. Of the various causes there are two main ones. First, doctors from big hospitals (BH) are highly respected and trusted by patients. These doctors are the first-priority in a doctor's visit. Patients simply trust these specialists more and ignore the ability of other medical providers in certain kinds of diseases like diabetes. In actuality, the other medical providers such as doctors and medical assistants from basic level hospitals (BLH) are highly qualified for the work regarding diabetes management. There needs to be a more efficient model to reallocate medical resources to diabetes patients. This preliminary study aims to explore the potential feasibility of this reallocation model. This research mainly explores the distribution and utilization of medical providers' time and aspiration. Technologies

such as mobile applications and online services are also studied in this research due to their high potential for improving diabetes management in the future.

1.1.0 Justification

The WHO report (2015) shows that since 1980, the number of diabetics has surged to 422 million globally. Over the past decade, diabetes has risen rapidly in low and middle income countries. In 2012, diabetes caused 1.5 million deaths and hyperglycemic complications led to an additional 2.2 million deaths. Complications can lead to heart disease, stroke, blinding, and kidney disease. The situation in China is especially serious. According to IDF statistics, in 2015, China had 110 million people with diabetes and one million people died of diabetes complications.. Diabetes has also caused a large economic lost. China spends about \$ 5 billion a year on diabetes and related diseases annually, accounting for 13% of health insurance coverage, and 80% of those fees are used to treat complications. IDF predicts that by 2040, China will spend 7.2 billion U.S. dollars on diabetes and related diseases.

More alarming are the results from the report of China Association for Diabetes Prevention and Control in 2013. The association reported that the awareness rate of diabetes in China was only 38.6%, and the treatment rate was only 35.6% (Insert Citation). For individuals that received treatment, the effective disease control rate was 36.3%, which means that only 13% of diabetic patients have been effectively controlled. Therefore, it can be seen from the above figures that the current situation of diabetes treatment in China is grim and at the same time the market is huge.

To solve this problem macroscopically, it is necessary to start with the country and government, social and research institutions, families and individuals at the same time, said by Dr. Guo, the chairman of Beijing Diabetes Association. The government report "Healthy China 2030" (2016), highlights that the state has proposed to attach importance to and to promote the management of

universal chronic diseases. This shows that at the policy perspective, the state has started to take measures. The key point of the future is how can social capital respond to the appeal by the state to work together with the government to solve this great livelihood issue.

First, let us summarize the major problems currently faced by the prevention and treatment of diabetes. The first question, from the patients points of view, is, "Are patients aware of diabetes and understand the seriousness of the complications it can cause?". A survey by China Daily (2016) found that many people mistakenly believe that diabetes has no obvious symptoms, therefore, lacking sufficient attention on the disease. Chinese Medical Association Diabetes Branch Education and Management Group did a research in 2010 among a lot of cities across the country containing 5961 cases of type 2 diabetes self-management. The research showed that 83% of patients understand diabetes knowledge through the medical staff, patients' knowledge with the use of insulin, and healthy diet and foot care are poor. The cognitive accuracy of this knowledge is less than 20%. In addition, a large amount of patients have a great lack of cognition for the control of diabetes; also, diabetic patients do not have ideas of diet control or ideas of exercise control, 61.4% and 36.88%, respectively (Chinese Medical Association Diabetes Branch Education and Management Group, 2010, pg. x?-x?). Surveys show that generally poor knowledge of diabetes prevalence is one of the important factors leading to an only one quarter successful rate in blood glucose control compliance. However, from a medical point of view, diabetes can be effectively controlled. Authoritative experts mention that a healthy lifestyle can effectively prevent such a type 2 diabetes. Early treatment and early intervention, and standard treatment options can reduce and postpone the occurrence of complications. Therefore, it is worth exploring a method to effectively raise the people's awareness of the disease and its treatment plan, especially for people with diabetes mellitus.

For the treatment method itself, the current international community generally agreed to use diabetes management as a valued treatment. From the foregoing, we can see that diabetes

management itself is not complicated, but it is difficult to implement. A prevalent issue is understanding how to improve patient compliance, which draws into a second issue of prevention and treatment of diabetes. At present, because of various reasons, the treatment given by physicians is still in the stage of "informing patient with treatment plan", while the most effective stage "guaranteeing the implementation of treatment plan", is consciously abide by the patients themselves. However, precisely speaking, patients' compliance is somehow weak. For example, some of them are unable to maintain a healthy lifestyle or do not know which part of their life needs to be adjusted. Besides, some patients are not in accordance with the requirements of regular blood glucose monitoring; and do not regularly inject insulin. Two perspectives explain the reasons for these situations which can cause complications. From the patient's point of view, compliance is seen as nothing more than poor self-control, providing insufficient attention, limited ability to acquire knowledge, and a fast-paced lifestyle, which lead to a failure of strictly abidance or even a forgetfulness of monitoring their conditions. On the other hand, from the perspective of medical service providers who are supposed to assume more responsibility, there are several questions.. First, the physician did not have enough time and energy to do the two things that should have been done: careful patient education during the doctor visit process, and following-up of the patient's subsequent condition. The main cause for this phenomenon can be derived from patients' sense of medical treatment under China's current national medical structure. The over-concentration of medical resources has led to the patient's pursuit of transition to big public hospitals. Chen and Yue (2012) formulate a concept that they describe as "all medical treatment need to be done in BHs". However, different from specialist treatment, chronic diseases such as diabetes should be released to lower-level medical institutions and related doctors. Under the guidance of the entire society, these chronic diseases treatment are forced to be provided by physicians in BHs. Therefore, the phrase "doctors do not have enough time" should be accurately expressed as "large hospitals and related doctors who have multiple patients are too busy", while doctors in other general primary hospitals are still suffering from a lack of patients. Second, even if doctors have time and they adequately communicate with patients at the time of their first visit,

it still cannot solve the problem of lacking follow-up service (Xu & Zhang, 2008). Although follow-up visit has been shown to improve overall efficiency and coherence in the management of chronic diseases and to improve health care and patient satisfaction with health services, the current follow-up visit ratio is not ideal (Molina, 2012; Rosenblatt, 1998).

In summary, we can conclude there are urgent problems that need to be solved to be able to understand how to make a relatively simple medical treatment plan feasible and be effectively implemented. Not only should patients experience the effect of good treatment but it should also relieve the patient's pressure. In fact, the solution already exist and is internationally recognized. This solution is called tiered health care system (THCS) of chronic diseases diagnosis and treatment. THCS (Zhang, Cheng & Ma, 2015) hierarchies diagnosis and treatment activities according to the difficulty such as whether serious or not, whether urgent or not. In this system, different levels of medical institutions take care of different diseases. It is characterized by grass-roots first visit, two-way referral, rapid division, up and down linkage. Here we do not talk too much about general THCS but only grading on chronic diseases. The system itself is designed to solve the current imbalance situation in China between available providers and patients (with chronic diseases?). At present, 80% of China's medical and health resources are concentrated in the cities, of which 80% are concentrated in large and medium-sized hospitals, presenting an inverted triangle resource structure (Wen, 2010) . However, most of the demands for medical and health services are at the grassroots level and the demands are in a "positive triangle" demand structure (Wen, 2010). Inverted triangle shaped medical resources and the positive triangle shaped medical needs led to the difficulty of doctor visit. THCS can effectively solve this difficulty while simultaneously controlling the bad phenomenon of minor ailments over treated. THCS emphasizes that the diagnosis and treatment of minor diseases and chronic diseases should be provided at the grassroots level clinics first and then referred up if necessary. The blueprint sounds good. However, since 2014, the trial implementation of THCS has been piloted throughout the China, but the effect of solving doctor visiting problem is not obvious. Overall, the

local practices have achieved phased results, but it is still at an exploratory stage. Generally speaking, there are problems such as the insufficiency of service capacity in primary health care institutions, the unclear function division of different levels and types of medical institutions, the lack of effective cooperation mechanisms, and the lack of effective internal incentive and restraint mechanisms (Li, 2015; Xiong, 2015; Yang et al., 2016). The reasons can be attributed to three aspects. First, judging from the current medical system structure on which THCS is based, the main problem of the current medical and health system in China is that “the hospital is the center, the service is fragmented and just focuses on the quantity instead of quality” (Tan & Sun, 2017), “prefer hospitalization rather than the primary care Institutional Services” (Fu, 2014), “medical service providers Lack service Integration and coordination among various level medical services (Lu, 2011). The principles of coordination of medical institutions among all levels THCS required has not been established yet. Second, although THCS are initially designed to require patients to be treated at the grassroots level clinics, patients suspect primary medical practitioners’ technology so that the THCS fails to achieve the goal of division (Huxiu, 2017). Patients do not have self-motivation in using THCS. A survey (n=13288) by Dingxiangyuan.com (insert year) showed that 68.3% of the respondents did not trust the grassroots doctors. Additionally, 62.9% of the respondents indicated they would not choose primary hospitals under the current THCS. Of the 62.9% of respondents, Third, doctors are reluctant to work at primary health care institutions (Wang et al, 2011). The structural design of THCS is good, but it is limited by the current consumers’ awareness of medical treatment and the objective reality of the low capability of grassroots clinics which needs to be acknowledged. In addition, THCS does not have enough attraction for high skilled providers. As a result, in the short term, there will be lots of difficulty in releasing the pressure of medical resource imbalance by using THCS to improve the treatment experience for those with chronic diseases.

Generally speaking, the THCS itself is well designed, but the entire transformation of the medical system and consumer concept still need a long term plan. For example, there are several needs

of building the construction of grassroots medical resources, training grassroots doctors, and exploring medical cooperation model between all levels medical institutions.. It is foreseeable that this process will last a long time because of the issues that have been raised. The question is, how do medical institutions guide consumer concept changes and gradually develop consumer habits of using THCS for treatment such as diabetes management in such a transitional period? In its current state, the main guidance has been provided by the Chinese government. The government mainly works from an administrative means to control the transitional process, for example, from the payment point of view, the government used Medicare reimbursement to lock the patients in primary medical institutions when they need an initial diagnosis (Qiu, 2007) The essence of this controlling mean is using the price factor to affect patient behavior. In other words, patients seek lower costs by going to BLHs first for treatment. But the possible risk is, this reimbursement system reduces the fairness and accessibility of the basic medical and health care among the people in China. And the effect is limited to the economically developed areas in China (Yang, Zhang & Tang, 2000;Wang et al, 2010). This is not conducive to meet the needs of patients because without the core medical resources in grassroots medical institutions keeping up with high level medical institutions, patients will not be satisfied with and trust grassroots medical resources' capacity. Besides, there is still a point worthy of scrutiny in the current national practice. Primary care should have been based on the provision of minor medical services such as chronic disease management, however, currently the primary care practitioners lie in the grassroots lack motivation of providing this kind of medical services. Both grassroots medical institutions and large general hospitals are focusing on specialist medical services (He & Yu, 2017). Solely,grassroots medical institutions can neither achieve the high value of basic healthcare due to the lack of feature functions, nor have differentiation and complementarity with specialist medical services (Huang & Dai, 2015). Instead, they are in a homogenous competition. This paper argues that the entry of the solution is chronic disease management. Chronic disease management appears to be a good embodiment of advantages of THCS. Following the trend of THCS development, if chronic disease management can work as an example to allow consumers

to experience the benefits of THCS, it will be conducive to training consumers' trust and acceptance of primary care and THCS.

In order to make more efficient use of medical resources new technologies are continuously being added to improve the condition of people with diabetes. One of them is mobile diabetes management applications. Currently there are many players on the market, and capital is very optimistic about it. There is vast market space in the near future for this innovation. The R2G (2017) report showed that 76% of diabetes application operators think this area is the most commercially viable in the future. Currently, only 1.2% of people with diabetes use apps on their smartphone or tablets to manage their diabetes (R2G, 2017). The R2G (2017) report also predicted that by 2018 7.8% of diabetes patients will use it and the number will reach 24 million. If in the future more outstanding developers enter the field of diabetic mobile applications, the above ratio can easily be increased. However, the truth is, this seemingly attractive market prospects have not spawned a leading diabetes management application. According to BCG (2015) statistics, at the conclusion of 2016 there were 140 million people with diabetes in China, but no related applications had a market share of more than 1% or more than 1 million users. This phenomenon is worthy of reflection. Did the existing diabetes management applications' design and business model have problems? At present, many experts and business people have pointed out that the domestic mobile health service (mHealth) business model is not mature enough. Lack of payers, fake demand, high cost user obtaining unsatisfied ROIs are among some of the common problems. . Are these questions equally for diabetic applications and are limiting their development? What are the more feasible improvements? These are all questions to be discussed in this research.

1.2.0 Scope & Limitations

The study will only study Chinese diabetes management. It will mainly learn big and BLH providers' situations including workload and income, and expectation about workload and income.

It will not focus on the medical treatment technologies of diabetes, because this is not a thesis for the master of medicine degree. This research studies a service design for diabetes management. Participants will be divided by their workplace, which as a result include doctors from BHs and medical providers from BLHs. The medical providers will include doctors and medical assistants. Participants will come from a medical treatment alliance. This medical treatment alliance contains a BH called the Province Third Hospital and several BLHs that will be a part of this study. The reason this medical treatment alliance was selected is that it is a well-known, and close-knit alliance. The referral activity works much better than other alliances in this area. And BLH selected in this alliance is in charge of an aged community, where there is a high rate of diabetes because of the older residents. This study is based on a typical medical treatment alliance as a pilot study. The results are not generalizable across the field, rather they highlight a case that can be further developed to make it more generalizable with future research. Several limitations exists in this study including the limited hospitals represented which is not reflective of all other medical treatment alliances. Additionally, participants are very busy in their working hours and the research activities are scheduled during their working hours because of the convenience of participants. They do not want to occupy their valuable rest period. This study has to take place during their break time during working hours. Participants moods may have an impact on the results. There is a risk of participants feeling anxious due to having to rush back to work. This may result in inadequacy of their entire ideas and expressions. For some participants, the concern of the privacy of their answers may play a role due to participants making calls for the study by their manager. Participants must be cautious because of this study taking place in China. This may cause a conceal of entire ideas although the recruitment field will emphasize the safety of their privacy.

1.3.0 Glossary or Definitions

BH: includes the top three hospitals and specialized hospitals with good reputation

BLH: includes the second-class hospitals and community medical units

Medical providers: includes doctors, nurses and other medical assistants

Online medical service: medical services using online technologies

Multi-sited license: a way that doctors can work as a doctor in different units

mHealth: The term 'mHealth' implies the use of mobile communications such as mobile phones for health information services (Foundation, 2009)

Tied Healthcare System (THCS): medical system contains varies level hospitals and medical centers for example BHs and BLHs. This system advocates patients to go to a BLH for the first diagnosis and then transfer patients between different level hospitals depending on the situations

co-management: big and BLH providers work as a team to manage diabetes

Self-management Interventions (SMIs): Technologies to help patient manage their diabetes by themselves, for example, monitoring their blood glucose by applications on their phones

1.4.0 Topics that need to be explored in this research

The study will use methods such as literature review, observation, interview and survey to learn the workload and income information of the BH doctors and BLH medical providers in the aspects of their current situations and their expectations. Second the study will explore the current and potential approaches of diabetes management. Third, the study will explore perceptions and acceptances of online medical services among the BH doctors and the basic level medical providers. The detailed study of this topic are as follows.

1.4.1 Current situations and expectations of the workload

The study will have insight of participants' current daily work time, satisfaction of work time and work content, expectation of work time and work content, possibility of doing part-time work, and perception of "multi-sited license".

1.4.2 Current situations and expectations of the income

The study will have insight of participants' current amount and structure of income, satisfaction of amount and structure of income, and expectation of income.

1.4.3 Current approaches of diabetes management

The study will have insight of participants' perception of two-way referral system, and ability of doing diabetes management.

1.4.4 Different kinds of providers' roles in diabetes management

The study will have insight of participants' self-positioning and expectation in diabetes management and the possibility of working as a team in diabetes management.

1.4.5 Perception and acceptance of online medical service

The study will have insight of participants' perception and acceptance of online medical services.

CHAPTER 2

REVIEW OF LITERATURE REFERENCES

2.0.0 Introduction

This chapter will provide an insight into the conclusions and research results of previous studies. Additionally, there will be some quotes of other experts' ideas. The chapter will be structured through a guide language paragraph and six topics. The guide language will state the reason why this study refers to BH doctors and BLH medical providers at the same time and try to figure out the potential combination approach to bring these two groups of medical providers in a team to provide diabetes management service.

2.0.1 A guide language

A rationally organized health care system ensures patients benefit from a timely specialty care.. At the same time it retains those patients who would not derive benefit from specialty services within primary care settings (Forrest, 2009). However, making decisions of when a referred patient should be followed up in primary or specialty settings are not easy because of the unclear standard, which contributes to the high burden of routine follow-up care in specialists' practices (Valderas et al, 2009). This elicits discussion of what roles specialists should have and what roles other medical practitioners should have when conducting healthcare service so that each of them can achieve their maximum efficiency. First, there is a need of defining specialists and their roles through the literature review. Specialists impart their expertise to patients with different illnesses. They attend to health problems referred to them. And, they use their knowledge to provide advice, perform a procedure, or share the care of patients with unstable health conditions ("A Typology of Specialists' Clinical Roles", 2009). They provide cognitive consultation to reduce clinical uncertainty and procedural consultation to perform a needed test or procedure. Additionally, their roles in the health care delivery system include co-management with shared care for patients with long-term health problems with primary care physicians and co-management with principal care for patients with conditions they manage in their entirety and

uncommonly provide a primary care medical home. For the consultant roles, the specialist's involvement in the care process is short, just containing a minimal number of contacts or in many cases just one visit required to gather information, perform a procedure, interpret test results or imaging studies, and ensure that an effective opinion is communicated. Routine monitoring is the responsibility of the referring primary care physician. The cognitive consultant reduces medical decision-making uncertainty, empowering the primary care physician and patient to care for the referred condition outside of the specialty setting. For patients with chronic disorders, the specialist acting as cognitive consultant may provide input episodically ("A Typology of Specialists' Clinical Roles", 2009). As a procedural consultant, the specialist ensures that the benefits of a procedure outweigh its risks, safely and effectively executes the procedure, and communicates results to the referring physician and patient. With the two co-manager roles, the specialist is involved in the ongoing care of the referred health problem, either sharing responsibility for its management (shared care) or assuming total responsibility (principal care) ("A Typology of Specialists' Clinical Roles", 2009). The first-contact responsibility of primary care is to triage patients' needs to the appropriate type and level of service (Judith, 2001). For co-managed patients, the primary care physician can serve as the first contact site for medication refills, new referrals, and shared responsibility for patient and family education (Miller, Forrest & Kan, 2000), which is suitable for the long time routine diabetes management. The problems is, about 1 in 10 visits made to specialists are made to primary care physicians (Valderas et al, 2009). Besides, the quality of primary care services appears to be lower when provided by specialists than by generalists (Rosenblatt et al, 1998). Only for patients with highly complex, dominant chronic medical conditions, an internal medicine subspecialist may appropriately act as the principal care and primary care physician (Bender & Holley, 1996).

Sometimes specialists have better performance in disease diagnose. A significant concern of mixing primary care with specialist as a team is that they require different decision-making styles. Compared with primary care physicians, specialists appropriately use a more resource intensive

diagnostic style, which drives to a diagnosis and disease management as rapidly as possible. This suggests that careful attention should be given to discerning the right types of patients for whom specialists may serve as a primary care physician. Although sometimes specialists have more advantages in skills, some referrals could be avoided if specialists' knowledge bases were available to primary care physicians for routine queries (Donohoe et al, 1999). One study found that a formal system of e-mail consultation resulted in just 1 in 10 patients needing a face-to-face specialty visit (Bergus et al, 2006). There have been some provider organizations developed Web-based e-referral systems to build a bridge of knowledge between primary care physicians and specialists (Metzger & Zywiak, 2008). These systems provide rapid turn-around responses to questions, give management advice, transfer patient information, and facilitate access for patients requiring face-to-face encounters with specialists (Metzger & Zywiak, 2008).

As medical assistants, physician assistants (PA) and advanced practice nurses (APN) are involved in the primary care patient-provider relationship with physicians (Sargen et al, 2011, Zieve & Eltz 2012). There needs to be medical assistants similar to PA and APN in Chinese diabetes management. PA and APN both have different roles in the primary care patient-provider relationship. The primary role of the PA is to care for acutely ill patients who are likely to need a longer visit, or who have more urgent needs (Dunlop, 2011). The International Council of Nurses (ICN, 2010) has defined the NP/APN as follows: "A Nurse Practitioner/Advanced Practice Nurse is a registered nurse who has acquired the expert knowledge base, complex decision-making skills and clinical competencies for expanded practice, the characteristics of which are shaped by the context and/or country in which s/he is credentialed to practice." However, APN is more advanced than traditional nurses (Sheer and Wong, 2008). The APN concept contains a lot of advanced practice roles and one of them is nurse practitioner (NP) (Cronenwett et al., 2011). One of the primary roles of the NP is to care for patients who require minor treatment and in this article APN will be used as a general term for NP at a higher level consistent (Koskinen et al., 2012). It is widely agreed that APN is a unique blending of nursing (caring) and medicine (curing)

(e.g. AANP, 1993a; Donato, 2009). The services that are commonly provided in nurse clinics are health assessments to monitor a patient's health condition and symptoms, health education to facilitate compliance and a healthy lifestyle, and coordination of care (Clendon & White 2001, Loftus & Weston 2001). These services APNs can provide are also in diabetes management. In primary care in the U.S., APNs fill a variety of roles, including serving as the primary care provider for patients and providing chronic disease management (Everett et al, 2013). In some countries such as the U.S., the APN has the following characteristics: a) they need to hold a license, b) must be an independent practitioner who practices autonomously. Additionally, they need to collaborate with an interdisciplinary team to assess, diagnose, treat, and manage the patient's health problems and needs (AANP, 1993a). The roles of APNs can be provider, mentor, educator, researcher and administrator (Byrant et al., 2004). Another reason that APNs are great in chronic disease management is that its roles can vary within and between settings because roles depend on specific collaborating physicians (Everett et al, 2014, Hooker & Everett, 2012, Hooker & McCaig, 2001). The clinical role of primary care APNs can be defined by the division of responsibilities between the APN and physician and historically has been classified into two categories reflecting the level of APN involvement: usual provider and supplemental provider of care (Sibbald & Laurant, 2006, Starfield, 1998). In supplemental roles the APN focuses on a subset of primary care services, such as chronic disease management (Hooker & Everett, 2012, Everett et al, 2013). When it comes to diabetes management, the APN makes a great contribution. Studies (Jackson et al, 2011, Litaker, 2003) showed that when an APN is involved in the care team, the results of diabetes management are better. Delamare & Lafortune, (2010) remind us that evidence shows that using APNs can improve clients' access to services, reduce waiting time, save health costs and general practitioners' workload without reducing quality of care or patient satisfaction (Wilson et al, 2002). However, although evidence generally supports the involvement of APNs in diabetes care, it still provides a limited understanding of the appropriate team-based role of APNs (Everett, 2013). There needs to be more research on what roles APNs should play in diabetes management.

Another concerns come to play. Can APNs be trusted in diabetes management? APNs have been shown to deliver the same quality of care as doctors for various health problems and routine patient follow-ups, provided they have received education and training (Mundinger et al., 2000). Patients with supplemental APNs who did not treat highly complex patients consistently experienced similar or better outcomes, compared to patients receiving physician-only care (Everett, 2013). APNs were more likely than MDs to document provision of general diabetes education and education about nutrition, weight, exercise and medications. No differences were found in patient outcomes (Lenz, Mundinger, Hopkins, Lin & Smolowitz, 2002). Also, in the subjective view of physicians and patients, outcomes are not different if some kinds of medical cares are provided by APNs. A study by Sciamanna, Alvarez, Miller, Gary & Bowen (2006) examined the attitudes of physicians and APNs toward a collaboratively managed model of care. In this model for patients with chronic illnesses, a physician sees the patient for acute issues and an APN provides ongoing chronic illness care. Overall, though this model of care is rarely used, physicians and APNs support it very much, though APNs were significantly more likely to support the model. In their (Sciamanna et al, 2006) study, nearly 80% of physicians agreed that this collaboratively managed model of care would improve chronic illness care; and other primary care physicians have interest in it. Respondents were confident in APNs' ability to effectively manage multiple chronic medical conditions. This high level of confidence in APNs abilities is consistent with previous findings (Johnson & Freeborn, 1986). In another study, more than 90% of physicians felt that APNs deliver the same or better quality of care than physicians do (Johnson & Freeborn, 1986).

Agosta (2009) reported high patient satisfaction with APNs delivering health care services. A study by Mundinger and colleagues (enter year) in which patients were randomized to receive their primary care from a physician or APN, however, showed no overall difference in patient satisfaction between patients seen by physicians and those seen by APNs (Roblin et al, 2004, Mundinger et al, 2000). Patient satisfaction mainly derives from the fact that APNs spend more

time with the patients and provide information and counselling more holistically (Delamaire & Lafortune, 2010).

Conceptual Framework Diagram 1

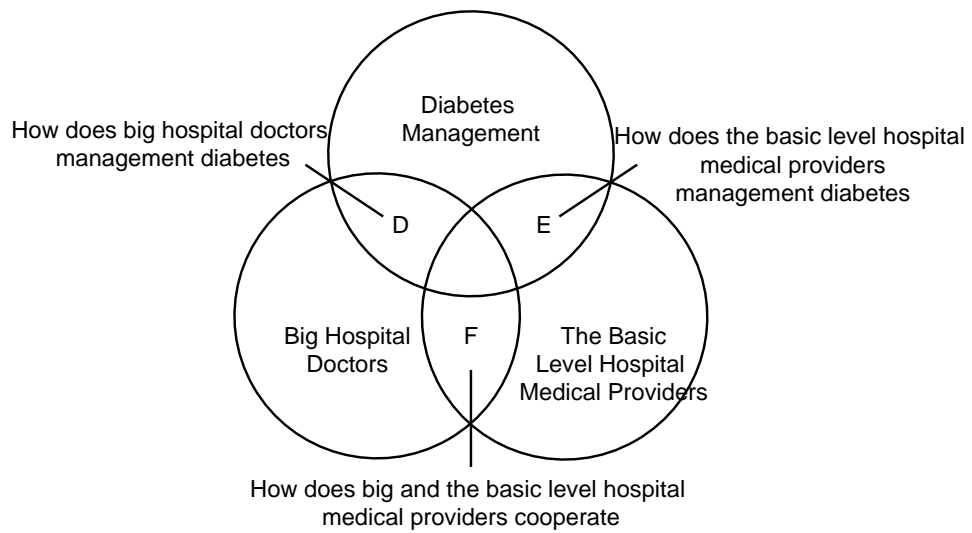


Figure 1. Conceptual Framework

2.1.0 Diabetes management

2.1.1 How to of management diabetes (Rosenqvist, 1995)

Studies showed that superior diabetes management need both self-management and teamwork. Rosenqvist (1995) stated that “to provide quality diabetes care to all patients, four prerequisites would have to be fulfilled: (1) Patients must have better **knowledge** about the disease to be motivated for an active role in its treatment. (2) Medical care should be available **close** to where patients live. (3) A more knowledgeable staff should spend **more time** with the patients. (4) Training of the staff and **reallocation** of some of the work performed by physicians to specially trained nurses should be accomplished”. Although patient educating is very important from the context provide above, the latest study found that Self-management Interventions (SMIs) that embed general self-management skills training within interactive disease-specific modules are more effective than didactic disease education alone in enhancing the self-efficacy component of the patient activation construct (Francis, Fever & Smith, 2007). Furthermore, web-based interventions to support self-management of chronic diseases have the potential to reach a broader population of patients and extended periods than do traditional SMIs, to increase patient activation and have the potential to enhance the self-management capabilities of the chronically ill people. Activated patients produced by web-based interventions are more likely to adhere to recommended health care practices, which in turn leads to improved health outcomes. Designing Web-based interventions to target a specific stage of patient activation may optimize their effectiveness. (Solomon, Wagner & Goes, 2012)

Although the diabetes control is complex, patients with good diabetes self-care behaviors can attain excellent glycemic control. Diabetes management providers know that if only their patients adhered to their treatment recommendations, they could do well and avoid diabetes-related complications (Delamater, 2006). Delamater’s point substantiates how diabetes patients in China have a chance to improve their health outcomes regarding adherence to treatment recommendations. Delamater pointed out four factors related to adherence including demographic factors, psychological factors, social factors and health care provider and medical system factors. Social support provided by nurse case managers has been shown to promote

adherence of diabetic patients to diet, medications, SMBG, and weight loss (Sherbourne et al., 1992) and regimen adherence and achieved improvements in glycemic control, as well as in lipid and blood pressure. In the Diabetes Control and Complications Trial , “a prospective randomized multicenter clinical trial to compare the effects of intensive insulin therapy aimed at near normalization of blood glucose levels with the effects of conventional therapy on the early microvascular complications of insulin-dependent diabetes mellitus” (D Group, 1990), one of the key elements to success in achieving good glycemic control was the availability of support provided to patients by the health care team (Listed, 1995). In addition the ability to obtain support from health care team members, the quality of the patient-provider relationship is a very important determinant of regimen adherence. Research has demonstrated that patients who are satisfied with their relationship with their health care providers have better adherence to diabetes regimens (Korff et al., 1997). Which means the diabetes management service needs to make patients being satisfied with providers.

2.1.2 The current situation of the online diabetes service (Liao, 2015, Yang, 2013)

This topic will summarize some advantages and disadvantages of the current diabetes management apps.. From Liao’s (2015)study, patients with diabetes have low awareness of mobile medical service in China, 20.6% respectively.. Only 16% of the patients know that diabetes management can be done through mobile medical service, and only 4.5% of the patients have used the service. These percentages show that the new management tool of mobile medical services for chronic diseases is not widely known by the population of individuals who have diabetes.. From the patients’ ideas, doctors recommendations is one of the main way for diabetic patients to learn online diabetes service. The influence of different demographic characteristics and disease conditions on the use intention was different. Young and middle-aged people, well-educated population, high income population, and short term patients with diabetes have a higher willingness to use the system. However, presently the truth is the disease

characteristics of diabetes in China are mainly middle and old age group. They also have a low education level and live in rural areas (Liao, 2015; Yang, 2013).

2.1.3 Web-based intervention to manage diabetes

This topic will highlight some of the benefits health care applications have and try to explain why there is a potential need of introducing online healthcare technology in managing diabetes. As said above, self-management is useful, however, there is an urgent need of patient education. For example, patients are told that self-monitoring of blood glucose (SMBG) is a self-management tool without being told the additional context and education. And, frequent feedback is required to interpret trends and adjust behaviors accordingly (Polonsky & Fisher, 2013; Schnell et al., 2015). However, Polonsky outlines four main considerations for SMBG amongst this specific population and one of them is that patients need to be provided with SMBG-related training (Polonsky & Fisher, 2013). Klein & Lippa (2008) brought up their concern that although self-management is a major component of chronic disease management, most of the patients are not provided or do not have access to the tools. Besides, personalized education is needed to engage in daily self-care practices said by Klein and Lippa. Self-management applications are designed to aid in this development by educating patients about their diseases, teaching skills to promote self-care behaviors, and fostering self-confidence in patients' abilities to manage their disease (Lorig & Holman, 2003, Hill-Briggs, 2003, Newman, Steed & Mulligan, 2004). As patients' capabilities in these three areas improve, their level of patient activation, a measure of self-management capabilities, increases (Hibbard, 2004). With the explosive growth of mobile communications over the past decade, more interests are given to mHealth which is supposed to promote health care in resource-poor settings. For instance, study has approved that interventions based on sending messages automatically to mobile devices to promote lifestyle behavior can improve glycemic control in patients with type 2 diabetes, both in developed and developing countries (Arambepola et al., 2016). mHealth is defined as a new paradigm of emerging information technology (IT), which can transform healthcare delivery around the world

by making it more accessible, affordable, and available (Akter, D'Ambra & Ray, 2010; Foundation, 2009). mHealth have more flexibility and mobility by ensuring information services at the right time to the right person at the right place (Ahluwalia & Varshney, 2009; Chatterjee et al., 2009; Junglas, Abraham & Watson, 2008; Sneha & Varshney, 2009). In the future, it is best to assign a community health care worker who can interact with patients at home as well as in the clinic (Katz, Mesfin & Barr, 2012). The term 'mHealth' implies the use of mobile communications such as mobile phones for health information services (Foundation, 2009). This service system is seen as an enable of change in the healthcare field, shifting the care service to the promotion of wellness, prevention, and self-management (Akter, D'Ambra & Ray, 2010, Foundation, 2009). mHealth can also be used in diabetes management. Although glucose self-monitoring is important, using mobile health to enhance keeping standard-of-care measures up to date can better influence the effect on long-term diabetes care (Katz, Mesfin & Barr, 2012). There was a pilot program concluding the recognition of the complexity of a cell phone–assisted diabetes self-management system that showed success depends on the multiple links in the chain of the health care system. The outcome showed challenges specific to a mobile health chronic care application include multiple components including user (patients, case managers and primary care providers) habit forming, patient training, user activation remaining, payment willingness guidance, patient incentives guidance and information record remaining (Katz, Mesfin & Barr, 2012). Introducing cell phones with disease management applications has great potential to improve chronic care of diabetes, but the cell phone alone is not sufficient to make a difference. A successful mHealth home management health system requires attention to all of the links in the chain of chronic care and it is supposed to be with characteristics including accessibility, which means anytime and anywhere (Bauer et al., 2005; Varshney, 2009; Kahn, 2010), personalized, which means addressing a specific person's specific needs based on his/her own condition (Barnes, 2003; Barnes & Scornavacca; 2004), immediacy, which means focusing on relevant, targeted and timely information at right time (Barnes & Scornavacca, 2004; Barwise & Strong, 2002; Pousttchi & Widemann, 2009), location-based (Barnes, 2003; Varshney, 2005; Kahn, 2010), interactivity,

which means cooperation through long-term and two-way interaction (Akter, D'Ambra & Ray, 2010; Barnes, 2003; Kahn, 2010), and mobility (Kakihara & Sorensen, 2009; Chatterjee et al., 2009).

2.1.4 Medical providers' influence on patients' attitudes toward online diabetes service

Study showed that the easier to use the user perceived, the more willing the user will be to use online medical service (Ren & Deng, 2014). Besides, the willingness of diabetic patients to use mobile medical service was highly influenced by the person they trust (Li et al, 2013; Mo & Deng, 2015). Social impact refers to people with diabetes using or not using mobile medical service, such as the attitude by the most important people (family, friends and medical staff). Patients are more likely to receive recommendations from family members or friends. And, the influence of doctors' attitudes is greater (Wang, 2017). Perceived risk refers to judgment and prediction of the risks of using online medical service and the perceived risk of using mobile diabetes services is not too high (Wang et al., 2017).

2.2.0 BH doctors

BH doctors come from BHs, mostly in 3A hospitals in China. They have better medical skills and reputations than BLH providers.

2.2.1 BH doctors' workloads (Damodar, 1995)

Workload is the base of evaluation of the medical value and paying for the doctor (Damodar, 1995). There are two main indexes in evaluating the workload of doctors, the patients they treat and the working hours (Zeng & Wen, 2008). In a sample study, the standard working hours of doctors from the first level hospital and BLH is 21-25 hours per day. However, the truth is 14-20 hours per day, which indicated the unsaturation of these doctors' workload. Besides, the outpatient visits are not equally distributed during the working hours. Additionally, the level of

patients per hour fluctuates throughout the day. And, the leisure time is not released random (Kong, 2011). There is another study about doctors' workloads in different level's hospitals. Participants came from 46 hospitals among 10 provinces. The result showed that working hours of doctors from BLHs (46.64 ± 9.14) are much less than those in the BHs (52.17 ± 11.51). The result also reflected the differences between individuals, which is about 20 hours (Wen, Hao & Hu, 2015). Other study (Zhang, 2014) showed that doctors with higher titles work more hours than those with lower titles. And gender is also a factor of workload. 47.2% of the female doctors compared with 32.9% of the male doctors work less than 8 hours per day and at the same time are the busiest doctors who work more than 10 hours per day, the percentage of males is 16% higher than females.

2.2.2 BH doctors' income

The satisfaction of income are described in two aspects, the amount and the mode of distribution. Generally, doctors are not satisfied with their income (Hu, 2011). 62% of the respondents think their income is lower than other businesses. 76.5% of the respondents think they don't get what they deserve according to their professional skill and value. Compared with other local medical units, only 8.0% of the respondents feel satisfied. Most of the respondents don't agree with the current check-up system. Only 23% of the respondents think the check-up system of their units are rational. When it comes to the payroll calculation of "multi-sited license", most of the clinical doctors (54.9) agree with "distribution according to work", 24.9% of the clinical doctors agree with the method of negotiating with the second work place.

2.3.0 BLH medical providers

2.3.1 BLH medical providers' workloads (Jian et al, 2009)

Currently, research on doctors' workload is not sufficient, most of the studies focus on the measuring method (Jian et al, 2009). In the limited amounts of research, one showed that doctors in BLHs spend 8.9 hours per day, which in the author's mind is a heavy workload (Zhao, 2014).

2.3.2 BLH medical providers' income (Zhao, 2014, Yu et al, 2004)

The amount of income BLH medical providers are being paid are much lower than BH doctors'. Data from Beijing Sanitary Bureau indicated that in 2012, the amount of BH doctors' income is twice than of BLH medical providers. A research done by Capital Medicine Magazine showed that 40% of BLH medical providers think they should get the same pay back as BH doctors when doing the same medical case. The research also conducted that the low income is due to the less number of patients who choose to go to BLHs instead of BHs (Zhao, 2014). Other research showed that compared with BH doctors, BLH medical providers are more unsatisfied with their income (Yu et al., 2004).

2.4.0 Diabetes management by BH doctors

BH doctors have good public praise in their medical skills. For these doctors, the following literature review will focus on their attitude toward managing diabetes to see if they think managing diabetes wastes their talent on a petty job.

2.4.1 Attitude toward managing diabetes

Yuan et al., (2009) report in their study about medical providers' perception of diabetes in BHs in China that, 92.3% of the medical providers are willing to participate in diabetes education groups and 97.9% of the medical providers are willing to provide help to diabetes education activities and 99.1% of the medical providers are willing to provide medical assistant training. The enthusiasm providers have in managing diabetes indicate a potential feasibility of letting providers provide diabetes management service.

2.5.0 Diabetes management by BLH medical providers

BLH medical providers are usually not fully trusted by the public so in this study, the literature review will focus on their ability to manage diabetes.

2.5.1 Ability of diabetes management

A study by Zhou et al., (2009) showed that in BLH, the ability of diabetes treatment is not good and needs improvement quickly. However, many studies (Liet al., 2009; Peng et al., 2012; Hua, Zheng & Dai, 2012) showed that managing diabetes in BLHs and communities can receive a better effect than normal treatment. Another research showed that the chronic disease education provided by the basic level medical providers is not satisfied because of the overwhelming workload and the lack of chronic disease education materials (Zeng, 2015).

2.6.0 Cooperation and common points between BH doctors and BLH medical providers

Cooperation in this section means working as a team to take everyone's advantages. The BH doctors can instruct BLH providers and in turn BLH providers can collect data back to BH doctors to help them make decisions. Big and BLH providers have common points in income, workload and percentage in diabetes management. In this section, if not specific stated, situations represents both big and BLH providers.

2.6.1 How do doctors think of referral

Wang, Feng, & Li (2012) state that doctors are not the main hinderance in transferring patients to primary hospital. Instead, they have high enthusiasm in transferring patients to primary hospitals. 96.5% of the informants think two-way referral system is feasible and 95.2% said it has great practical significance (Wang, Feng & Li, 2012). 72% of doctors who are from 3A hospitals and 70.5% of the doctors who are from BLHs said they accept medical skills of primary hospital doctors (Wang, Feng & Li, 2012). Additionally, Wang, Feng, & Li (2012) state that 88.2% of the

participants are willing to transfer patients with common diseases and are in convalescence to community clinics. 94.1% of the participants said this activity will not reduce their income. The hinderance of transferring patients to primary hospital are patients and their families (Wang, Feng & Li, 2012).

2.6.2 Doctors' income

Doctors are not satisfied with their income. Doctors think they don't get what they deserve. They work hard but cannot earn what they want. They need a legal way to increase their income. They also want to improve their clinical skills and get more experience. They want to follow and supervise their patients' conditions sufficiently (Shao, 2015).

Income is the main reason there is huge pressure on doctors and the level of differences among the different level hospital doctors is significant. In BHs, 49.2% of the respondents hold that idea, which the percentage is up to 70% in BLHs (Zhang, 2014). The doctors' income structures are the same between BHs and BLHs. The variety of doctors' income are as follows: basic fixed income, the nation's basic wage, post wage, salary and allowance, the wage depends on the doctor's length of service, technical titles, administrative levels, as well as regional allowances, and other factors (Bian et al, 2004). This kind of wage income generally are not easy to be changed. This part of the income is not directly related to the quantity and quality of the doctor's work, and the range of fluctuation is small. The variable income generally depends on the hospital's operating conditions, the hospital and the doctor's professional quality and the ability of social activities. Its purpose and function is used to motivate the doctor's work enthusiasm, to encourage hospital to provide high quality medical and health services (Bian et al, 2004). Good economic benefits have been obtained at the same time with good social benefits. Doctors' non-fixed income generally includes benefit salary, year-end bonus, contract risk income, individual award and dividend. Another income that cannot be measured and estimated is hidden income, such as the patient's individual payment for a doctor's note (Bian et al, 2004).

2.6.3 The situation of online healthcare service usage by doctors

Dai et al. (2015) report that 55.4% (492/888) of the informants said they have online interaction with patients. And these doctors who have online interaction experience varies by aspects such as department, sex, education and title. Doctors from Internal medicine department, male doctors, doctors with a doctoral degree and above and chief physician are the most active population of interacting with patients online. From the doctor, compared with face-to-face doctor visit, online medical interaction has the following benefits. First, 57.3% (282/492) of the informants think the communication with patients can be easier (Dai et al, 2015). Besides, 49.3% (243/492) communicating with patients online is more convenient and economical (Dai et al, 2015). Moreover, 33.3% (164/492) of the informants think doing a follow-up visit online has better persistence (Dai et al, 2015).

2.6.4 "Multi-sited license"

Online medical can successfully get people " multi-sited license" means permitted medical workers work at two or more locations. Doctors in most countries in the world are free to practice and are not fixed with a medical institution. In the United States, doctors can practice at different institutions in registered states, while Japan allows doctors to practice one day a week (Li & Zuo, 2005). Studies mostly explore doctors' insights about "multi-sited license" in income and feasibility aspects. When it comes to the payroll calculation of "multi-sited license", most of the clinical doctors (54.9%) agree with "distribution according to work", 24.9% of the clinical doctors agree with the method of negotiating with the second work place (Hu, 2011). However, when it comes to the feasibility, there is a little divergence. According to previous study, doctors have a positive attitude toward "multi-sited license". Hu (2011) reports in his/her study that 46.5% of the respondents prefer "multi-sited license", while only 31.5% did not prefer this method. 78.4% of the respondents think "multi-sited license" is a future tendency. However, the divergence is mainly caused by titles and departments. Different labeled doctors have different degrees of positive

attitude. The higher professional title the doctor has, the more he/she will prefer “multi-sited license”. Doctors from traditional Chinese medicine department, genitourinary department and department of gynaecology and obstetrics prefer “multi-sited license” (Hu, 2011). Although doctors have the same idea of income and vocational values, doctors from different practice departments have different requirements to achieve the goal of “multi-sited license”. Physician interns have less requirement in team work and equipment than surgeon physicians when doing “multi-sited license”. When it comes to the risk and quality control, the surgeon physicians also pay more attention than the physician internists (Jin, 2017). In a word, the physician internists have more advantage in “multi-sited license” than the surgeon physicians.

CHAPTER 3

METHODOLOGY THEORETICAL FRAMEWORK AND METHODOLOGICAL APPROACH DESIGN

3.0.0 Introduction

First, this study aims to explore the potential need and the enthusiasm of taking part in a new part-time work among the medical provider groups in China. Just as mentioned before, medical providers in this article mainly involve BH doctors and BLH doctors, in addition to some of the other medical assistants, such as advanced nurses. BH doctors mean prestigious doctors to common patients. Doctors in BH get the most trust and popularity by patients. They are usually very busy because of this. BLH doctors are not fully trusted by common patients. They usually have time and ability of managing diseases such as diabetes but they are not the first choice of patients. Discussion about these groups of people is very pivotal because medical providers are one of the main components of a medical service, together with patients and payers.

Furthermore, because of the supply-demand relationship in China's medical market, in which supply falls short of demand, the medical providers are the conditional precedent for starting a new medical service. The main topics discussed in this study are divided into two sub-topics. The two sub-topics are derived from the two groups of medical providers, which are BH doctors and BLH doctors with the medical assistants. This goal of this study isto have a primary understanding of the medical providers' situation in work and income, and their aspirations in both of the two aspects.

Second, as the study is based on diabetes management, there will be an understanding of diabetes management, including two sub-topics which are the current experience of managing diabetes and the outlook of potential approaches.

3.1.0 Research Topics & Questions

The questions come from several key words of mind map and some of them are supposed to have causal relationship, which are shown in the framework (Figure 1). Then it comes to several questions and three of them are chosen to be the main research questions: What situation do BH doctors face? What situation do BLH doctors have? How to manage diabetes? Answering these questions could provide an insight about what challenges and possibilities medical providers have and how they can distribute a team to work together and balance the work in managing diabetes. Results could be insightful for Chinese healthcare organizations in developing strategies that could attract medical providers using their service. It will indicate the market of developing online diabetes management service through providers' view. It can also be as a government policy support.

3.1.1 Current situation, potential need and enthusiasm of taking part in a new part-time job among BH doctors

■ How do BH doctors perceive their workload?

There have already been articles showing the heavy workload of the BH doctors. During the process of answering this question, the study will find out how busy BH doctors are and how they like the situation. The result will give an idea of if these doctors need a new allocation of their working time.

■ Are BH doctors satisfy with their income?

Answering this question will locate whether BH doctors are satisfied with their income in total amount, cost performance and distribution mechanism. Return is very important in motivating people to do something. The potential discontent of income may create a big motivation of change.

3.1.2 Current situation, potential need and enthusiasm of taking part in a new part-time job among BLH doctors and other medical assistants

- How do BLH doctors and other medical assistants perceive their workload?

There have already been articles showing the insufficient workload of BLH doctors. However, there still needs to be a more precise description of these medical providers' workload.

During the process of answering this question, the study will find out how much work BLH doctors have and how do they like the situation. The result will give an idea of if these doctors need a new allocation of their working time.

- Are BLH doctors and other medical providers satisfied with their income?

Answering this question will highlight whether BLH doctors and other medical providers are satisfied with their income in total amount, cost performance and distribution mechanism.

And, compared with BH doctors, what are the differences in the requirement of job return?

3.1.3 Ways of managing diabetes

Answering this question will give this article an insight of the nature of diabetes management and the key points of successfully managing diabetes in doctors' point of view.

- How do doctors in BHs or BLHs currently manage diabetes?

Answering this question will explore the current approaches done to manage diabetes and the differences between different level hospitals' methods. Knowing this will help find the inadequacies and advantages need to be held to inspire future improvement.

- How do doctors in BHs or BLHs think their roles in managing diabetes?

Answering this question will explore if different level doctors have different self-positioning in managing diabetes and what roles do they think they can do.

- In which way do doctors in BHs or BLHs want to cooperate in managing diabetes together with each other?

Answering this question will draw doctors' ideas of what roles they want to play in the cooperation and how to distribute work.

- How do doctors in BHs or BLHs perceive “two-way transfer”?

Answering this question will draw doctors' attitude toward “two-way transfer” and what they want in this system. This system is initiated by the government for several years however the result was not satisfactory. There have been studies about doctors' perspective of “two-way transfer” system and there still need more research toward this topic to learn the current situation.

3.1.4 Online medical services

- How do doctors in BHs or BLHs perceive online medical service?

Online technology has been more frequently used in providing medical services. Answering this question can give insight into the awareness level of the medical providers.

3.2.0 Approach

Unlike quantitative data analysis (O'Leary, 2010) which focuses on statistical significance on focused topics, qualitative data analysis is a holistic approach to learn peoples' subjective awareness and understanding of the world (Edwards et al. 2014, Webb, 2004). Subjectivist researchers around the world explore the tapestries of everyday life, the understandings, experiences and imaginations of the people, the ways that social processes, institutions, discourses, or relationships work, and the significance of the meanings that they generate (Mason 2013; Schwandt 2005). Qualitative research produce data through identification, coding, sorting, and sifting of themes and texts (Boeije 2010).

Designing and assessing a service requires sensitive “qualitative” approaches for medical providers who are one of the most important factors in managing diabetes. The study under consideration is a combination of research methods: interview and surveys.

This study will employ qualitative research approaches to first have an insight in what situation the medical providers have and what the reasons are. The situation includes workload and income. Medical providers include BH physicians, BLH physicians and the other medical assistants. Using field work approaches to determine customer needs from a medical providers’ perspective, learning what they want in their working hours, including how they want to make their workload more considerable and at the same time making more money. The methods used in this step are twelve 20 minutes face-to-face interviews which is semi-structured and sixty 10 minute online surveys. By using these methods we can observe and ask what medical providers’ confusions are and collecting the unsatisfied details.

3.2.1 Face to face interview

The interview (O’Leary, 2010) is semi-structured. Semi-structured interviews are widely used in qualitative research (Edwards & Holland, 2013). It can result in the production of rich data, including observational data (Bjørnholt & Farstad, 2012). Semi-structured interviews are often the sole data source for a qualitative research project (Adams, McIlvain & Lacy, 2002). In this study, the interview was organized around a set of predetermined open-ended questions, with other questions emerging from the dialogue between the medical providers and the interviewer (DiCicco-Bloom & Crabtree, 2006). Participants range from BH doctors, BLH doctors, and the other medical practitioners. Questions will be a little bit different between different kinds of participants. They will be either audio recorded or video record, or a written document, depending on participants’ permission. Approaches like focus groups (Miner, 1956) will not be used in this study although Morgan (1997) mentioned that the focus group approach is very popular in the social sciences and health, although not without its critiques. Because it is usually used for testing people’s attitude toward an existing product with objective attitude. However, in this research the

focus is participants' individual points of view of their own work situation and need. Participants contain more subjective thoughts about themselves instead of a product. The individual in-depth interview allows the interviewer to explore deeply into social and personal matters, whereas the group interview allows interviewers to get a wider range of experience but prevents exploring as deeply into the individual (Chirban, 1996, Johnson, 2002, Rubin & Rubin, 2005). Group interviews such as focus groups have varies participants sharing their knowledge or experience about a specific subject (Barbour & Kitzinger, 1999, Morgan, 1997, Owen, 2001). Each focus group represents a group of similar people, without distinct individuals and is not a short cut for collecting data from several individuals at the same time (Duggleby, 2005).

Interview Questions (semi-structured)

1. *Please let us know you. What's your working title? How long have you been a medical practitioner?*
2. *Let's talk about your income. How much do you earn per year? And what kind of working income do you have? Are you satisfied with your working income?*
3. *Let's talk about your workload and appeals. How much hours do you work per day? Do you think the workload now you have is satisfied or not? What do you suppose your work look like?*
4. *What is your idea of "multi-sited license"? What role do you think you are now in "multi-sited license" system? How do you suppose your role in "multi-sited license"?*
5. *(For BH physicians) If possible, would you like to endorse small hospital physicians? For example, transfer your diabetes patients to doctors or assistants in primary care hospitals?*
6. *If there is a team for a diabetes patient's management, What role do you prefer to play?*
7. *Let's talk about online medical service. Have you ever heard about online diabetes services? Could you please describe your perception of online diabetes services? Which do you think is the main function of online diabetes service for you as a doctor?*

3.2.2 Online survey

Online surveys (O’Leary, 2010) will be used to gather information from a medium base of participants, which are supposed to be 30 participants for each of the two different groups of participants. The questionnaire will likely consist of both open ended and close ended questions as well as a Likert scale to collect attitude, brief, and preference data. Because this study is a primary insight o participants’ situations and needs, and doctors are very busy, so the questionnaire is designed to be short. Further study will have a deeper insight in this field.

Questionnaire

For the BH doctors

1. *What title do you have?*
2. *How many hours do you work per day?*
3. *How much do you satisfy with your work content? (0 Not at all—5 very satisfy)*
4. *How many work do you think should be done by you and how many work do you think should be done by the low level hospital medical providers?*
5. *How much do you satisfy with the amount of your income? (0 Not at all—5 very satisfy)*
6. *How much do you satisfy with the structure of your income? (0 Not at all—5 very satisfy)*
7. *Do you support the “multi-sited license”?*
8. *In what circumstance do you want to transfer your patient to other doctors?*
9. *If there is a team for a diabetes patient’s management, What role do you prefer to play?*

For BLH medical providers

1. *What title do you have?*
2. *How many hours do you work per day?*
3. *How much do you satisfy with your work content? (0 Not at all—5 very satisfy)*
4. *How many work do you think should be done by you and how many work do you think should be done by BLH medical providers?*

5. *How much do you satisfy with the amount of your income? (0 Not at all—5 very satisfy)*
6. *How much do you satisfy with the structure of your income? (0 Not at all—5 very satisfy)*
7. *Do you want to increase your income by doing extra work?*
8. *Do you support the “multi-sited license”?*
9. *If there is a team for a diabetes patient’s management, do you accept to do follow-up?*

3.3.0 Sampling Strategy

As the research is mainly focusing on a specific and professional field, snow ball sampling (Goodman, 1961) is preferred. First, I visited one of the managers in a BH who later connected physicians and will help me schedule all the doctors’ time. Then they might be the key respondents and introduce their workmates to me.

There is a total of 72 Chinese medical providers aging from 25-55 years old from one BH and one BLH in Shandong province (the two hospitals are typical). Six physicians from BH and six physicians from BLH will be asked to participant the interview. And there will be 30 physicians from both BH and BLH being asked to do a paper survey.

The participants are all from a medical treatment alliance in Shandong province. It is a typical alliance which means it has advanced practice in referral and co-work between different level hospitals, which are regarded as two foundations of the new service model this research explored. Another advantage this medical treatment alliance have is that the managers have strong interest in online medical service and has make the alliance become a leading medical unit in eHealth field. Providers in this alliance have better awareness in contacting new service model and have more enthusiasm. These characters are very suitable for research like this one which aims to explore new service model. Participants from BHs are mainly from internal department and related departments which response for diabetes and complications. They are specialists in diabetes treatment. Participants from BLHs are from all the departments even the assistants

because the aim of studying them is to find who have the feasibility to participant in the potential new service.

3.4.0 Analysis methods (Auerbach, Carl & Louise, 2003)

The grounded theory (Strauss & Corbin, 1990) method uses a data analysis procedure called theoretical coding (Auerbach, Carl & Louise, 2003). In the data analysis part (chapter 4), the illustrative data will be from surveys and the sorted codes from the interviews will be gathered in tables.

CHAPTER FOUR

FINDINGS BODY OF THE DOCUMENT PROGRAM AND PROJECT ANALYSIS DESIGN PROCESS

4.0.0 Introduction

The research contains one observation, two interviews, and two surveys. The research proceeded well and as a result there is a one-day work record in BH, a one-day work record in BLH, 6 face-to-face interviews in BH (n=6), 6 face-to-face interviews in BLH(n=6), 35 surveys from BH (n=35) and 33 surveys form BLH (n=33). Information about participants are as follow.

4.0.1 BH participants' characteristics

Questionnaire

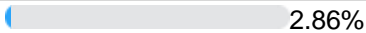
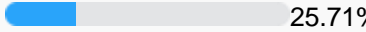
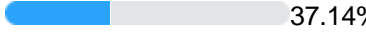
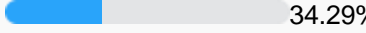
Title	Amount	Percentage
Chief Physician	1	 2.86%
Associate Chief Physician	9	 25.71%
Visiting Staff	13	 37.14%
Resident Doctor	12	 34.29%
Total	35	

Table 1. BH participants' characteristics in questionnaire

Interview

Title	Amount	Department
Chief Physician	3	Endocrinology, Gastroenterology, Endocrinology
Visiting Staff	1	Neurology
Resident Doctor	2	Internal, Endocrinology
Total	6	

Table 2. BH participants' characteristics in interview

4.0.2 BLH participants' characteristics

Questionnaire

Title	Amount	Percentage
Chief Physician	0	0%
Associate Chief Physician	6	18.18%
Visiting Staff	16	48.48%
Resident Doctor	11	33.33%
Total	33	

Table 3. BLH participants' characteristics in questionnaire

Interview

Title	Amount	Department
Associate Chief Physician	1	Gynecologist
Advanced Nurse	1	Community
Resident Doctor	3	Ophthalmology, Imaging, Internal
Assistant	1	Mediastinus
Total	6	

Table 4. BLH participants' characteristics in interview

4.1.0 Data analyze of the two surveys

4.1.1 Doctor's attitude toward work in the BH

The attitude toward work can be described through three aspects.

The first one is working hours. This index can show a direct-viewing of doctors' workload. It can be compared with legal standard working hours to reflect how busy the doctors are.

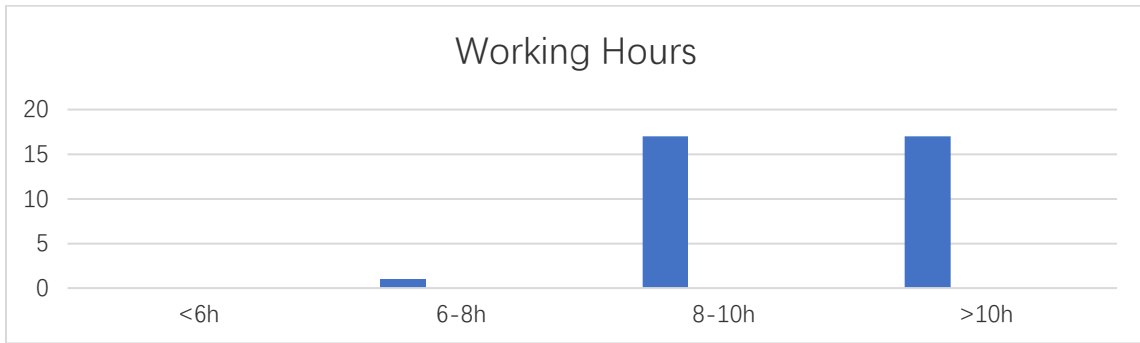


Figure 2. BH doctors' working hours

The results showed that in the BH in this research, most doctors work more than 8 hours, and even half of these overtime workers work more than 10 hours per day, far more than the legal standard working hours which is 8 hours per day. Doctors who has spare time during the daily work just reminds tiny, about 3%. And the spare time is less than 2 hours.

The second one is the satisfaction of work content. This index can show a direct-viewing of doctors' attitude toward the work they done.

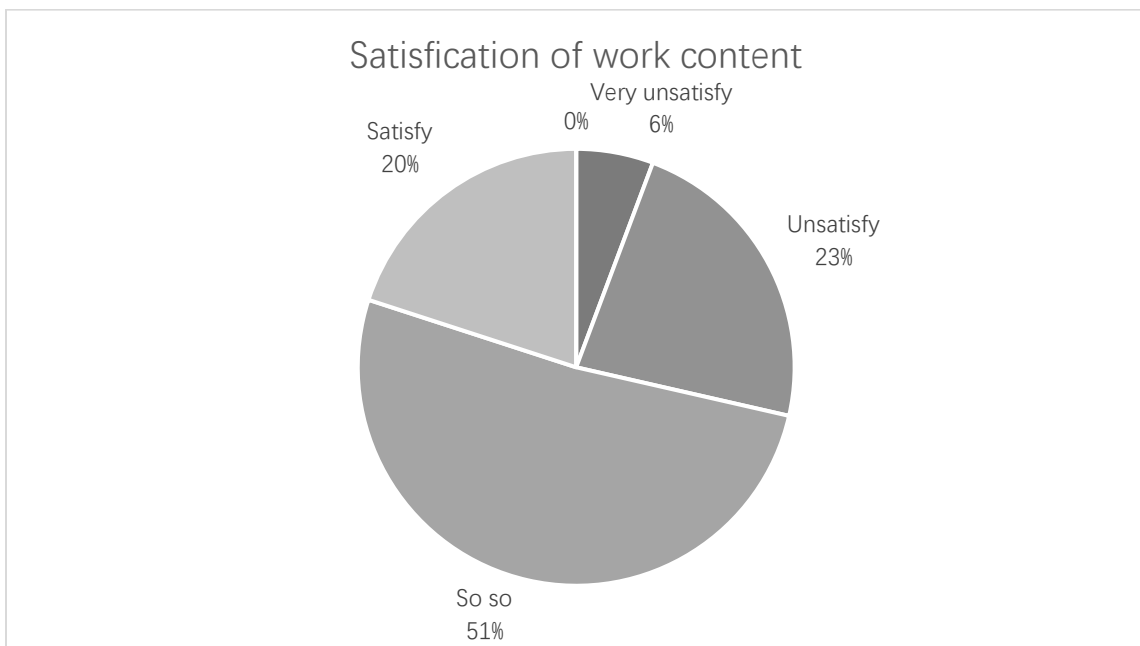


Figure 3. BH doctors' satisfaction of work content

The result can be seen through the pie chart. More than half (51%) of the participants said the work satisfaction as to them is just not bad however not good too. The unsatisfaction rate is 23%, which is about the same level as the satisfaction rate. Besides, there are 6% of the participants said they are quite unsatisfied with their work content.

The third aspect is doctors' evaluation of work content. This index somehow showed how much job do they think showing their value.

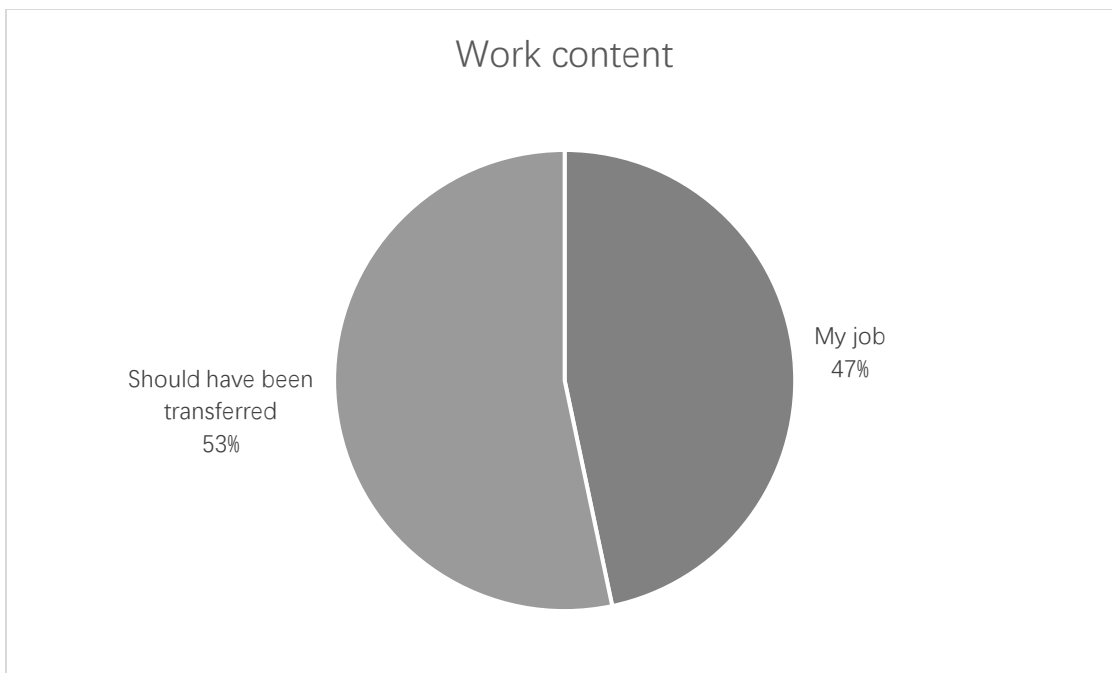


Figure 4. BH doctors' evaluation of work content

The result can be seen through the pie chart. More than half of the work the doctors think should not be done by themselves. Those work should be transferred to BLHs.

4.1.2 Doctors' attitude toward income in the BH

The attitude toward income in the BH are described in two aspects in this research.

The first one is satisfaction of income. This can show a direct-viewing of participants' attitude toward the amount of income.

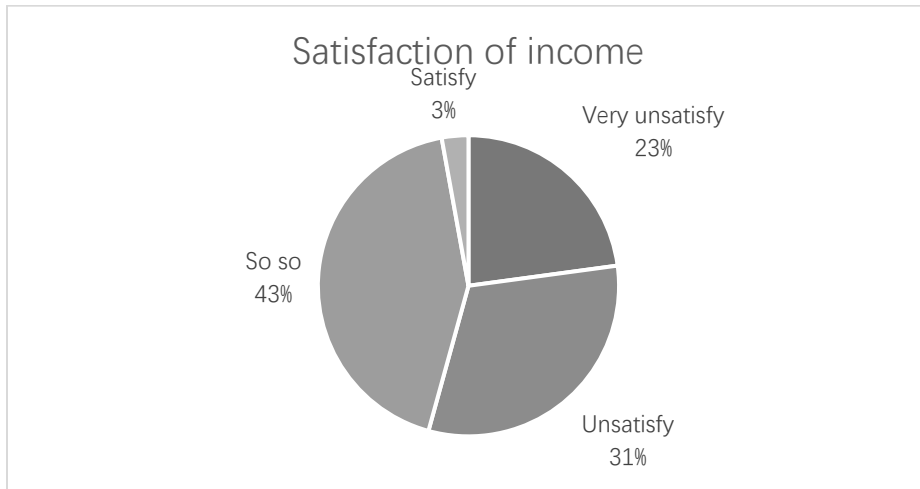


Figure 5. BH doctors' satisfaction of income

The results are showed through the pie chart. It showed that most (43%) participants think common of the amount of their income. And 31% of the participants are not satisfied with it. Even the rate of a quite dissatisfaction of the amount of their income is 23%. Only 3% of the participants are satisfied with the amount of their income.

The second index is satisfaction of income structure. This index described the satisfaction of the income in another point of view.

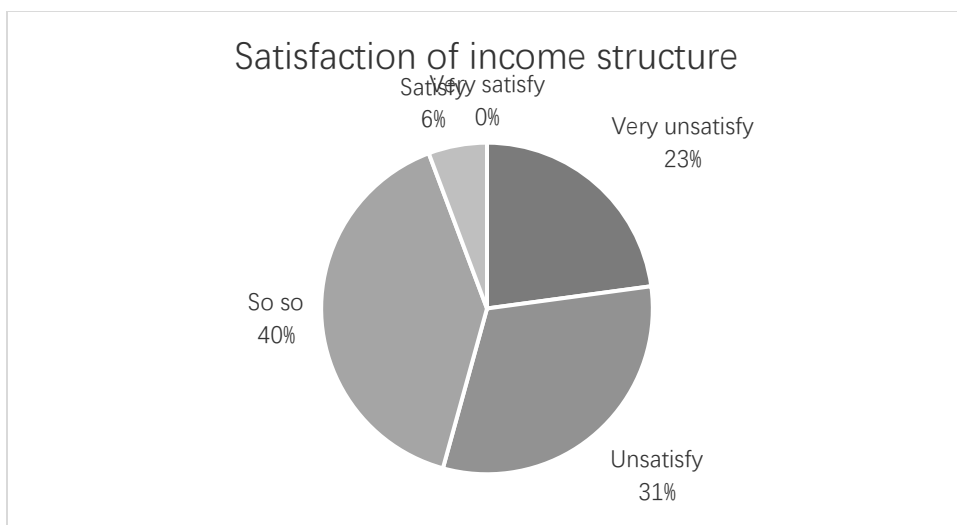


Figure 6. BH doctors' satisfaction of income structure

The result showed that 40% of the participants think common in their income structure however there are 31% of the participants are not satisfied with their income structure and even 23% of the participants quite unsatisfied with it. Only 6% of the participants think the income structure is satisfy.

4.1.3 Attitude for “multi-sited license”

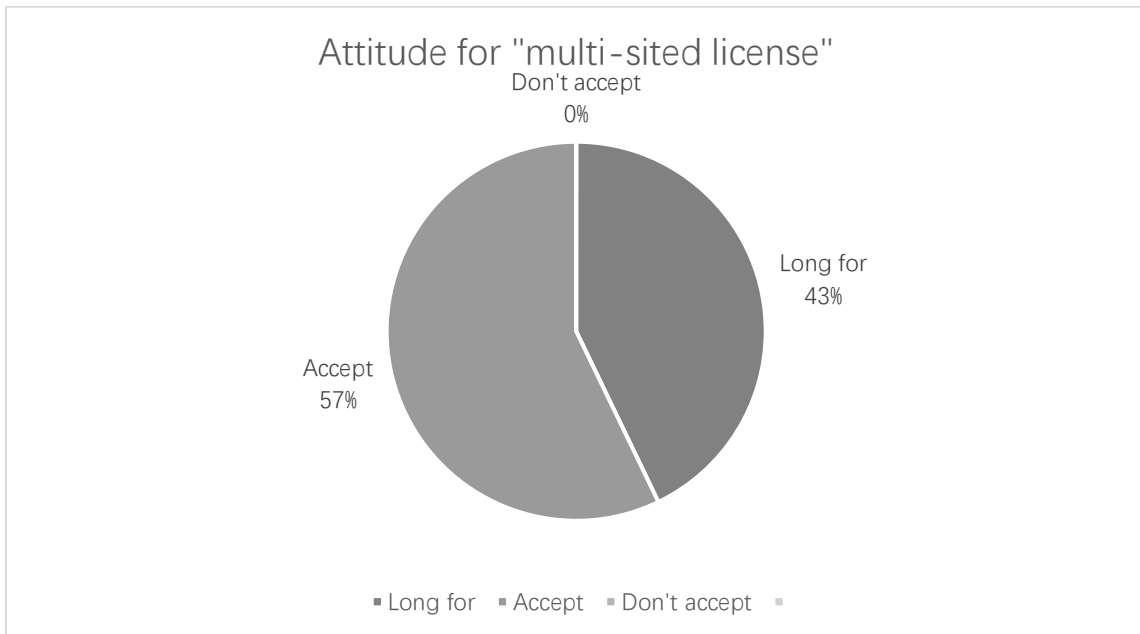


Figure 7. BH doctors' attitude for “multi-sited license”

The results showed that more than half (57%) of the participants accept “multi-sited license” and even 43% of the participants long for it. There is no participant disagree with it.

4.1.4 Attitude of transferring patients to BLH

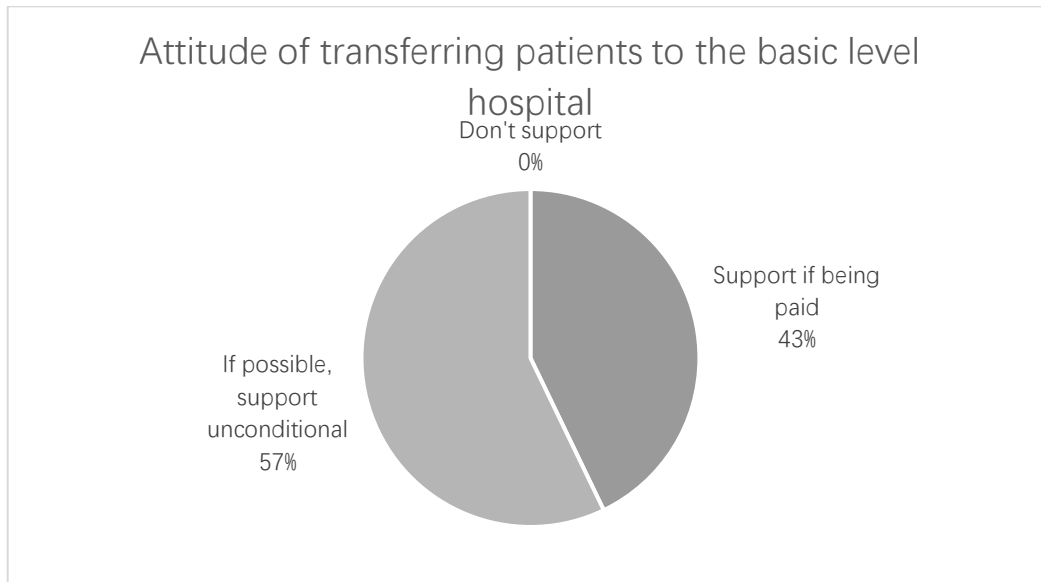


Figure 8. BH doctors' attitude of transferring patients to BLH

The results showed that 57% of the participants support this activity without any condition if needed and 43% of the participants will support it when get paid. All the participants support it.

4.1.5 Role in diabetes management

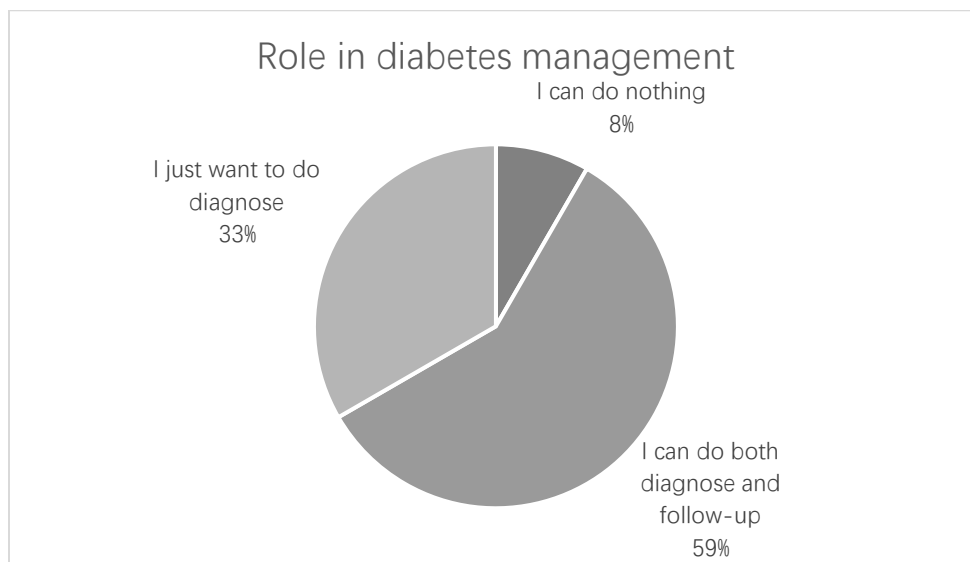


Figure 9. BH doctors' role in diabetes management

The results showed that 8% of the participants don't think they can do diabetes management. 33% of the participants just want to diagnose while another 59% of the participants want to do both diagnose and follow-up.

4.1.6 Doctor's attitude toward work in BLH

The attitude toward work can be described through three aspects.

The first one is working hours. This index can show a direct-viewing of participants' workload. It can be compared with legal standard working hours to reflect how busy the participants are.

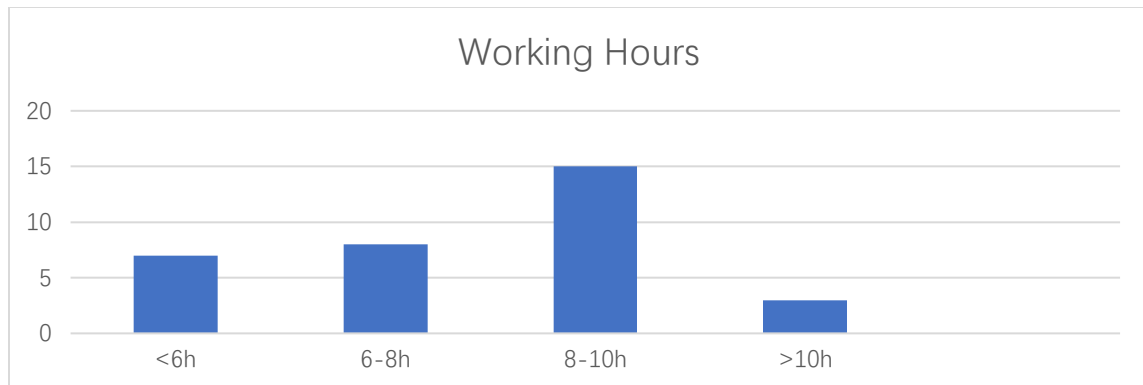


Figure 10. BLH medical providers' working hours

The results showed that in BLH in this research, most participants work less than 10 hours, and about 45% of the participants work less than 8 hours per day, less than the legal standard working hours which is 8 hours per day. About 45% of the participants have a little bit overwork about 2 hours. Doctors who has a heavy work just reminds tiny, about 9%. And the spare time is less than 2 hours.

The second one is the extra hours they want to work. This index can show a direct-viewing of participants' attitude toward their part-time aviliabilities.

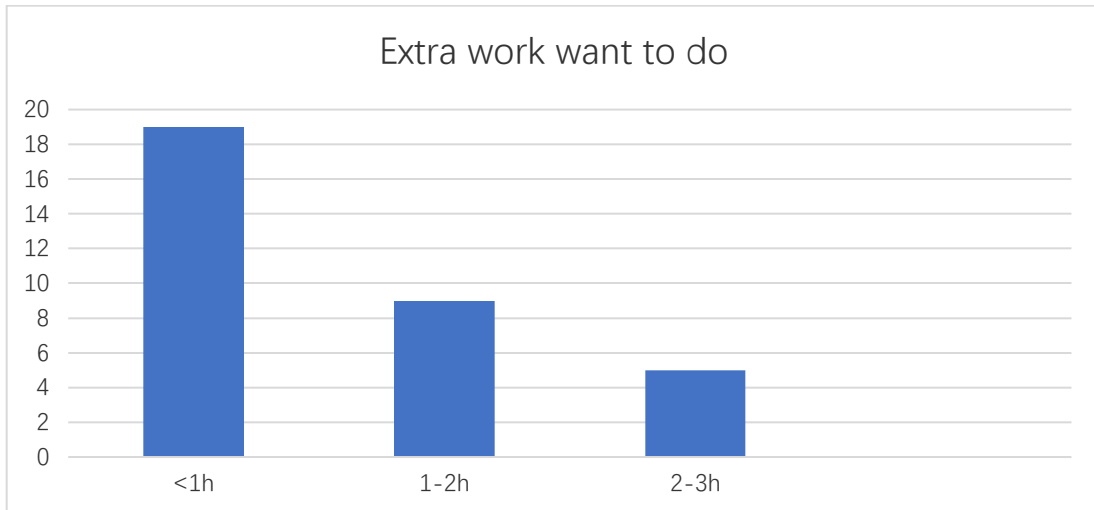


Figure 11. Extra work BLH medical providers want to do

The result can be seen through the bar graph. More than half (57%) of the participants said the part-time they want to take is less than 1 hours. 275 of the participants said they want to spend another 1-2 hours working and only 15% of the participants want to have more (2-3) hours' extra work.

The third one is the satisfaction of work content. This index can show a direct-viewing of participants' attitude toward the work they done.

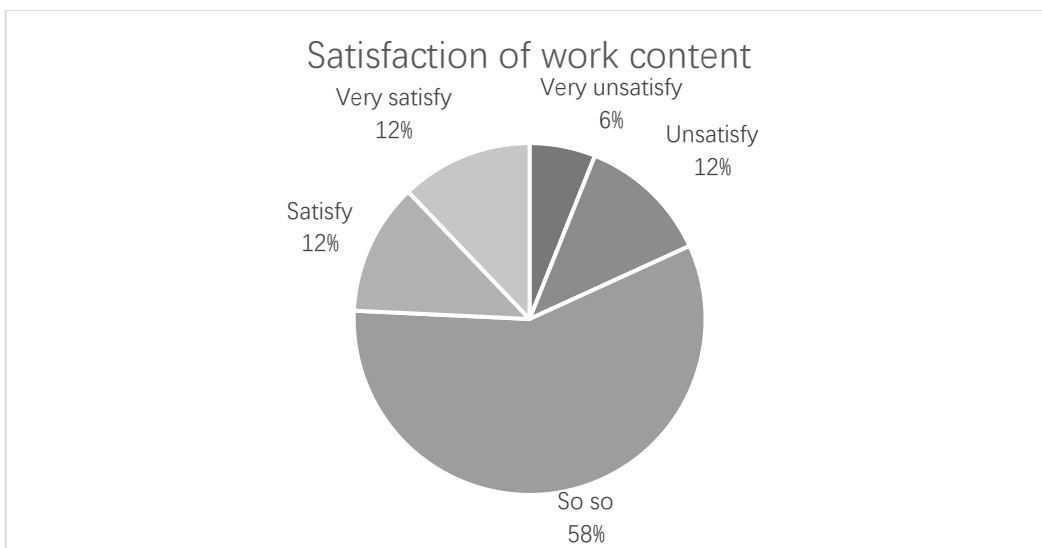


Figure 12. BLH medical providers' satisfaction of work content

The result can be seen through the pie chart. More than half (58%) of the participants said the work satisfaction as to them is just not bad however not good too. The unsatisfy rate is 12%, which is about the same level as the satisfy rate and the very satisfy rate. Besides, there are 6% of the participants said they are quite unsatisfied with their work content.

4.1.7 Doctors' attitude toward income in the BH

The attitude toward income in BLH are described in three aspects in this research.

The first one is satisfaction of income. This can show a direct-viewing of participants' attitude toward the amount of income.

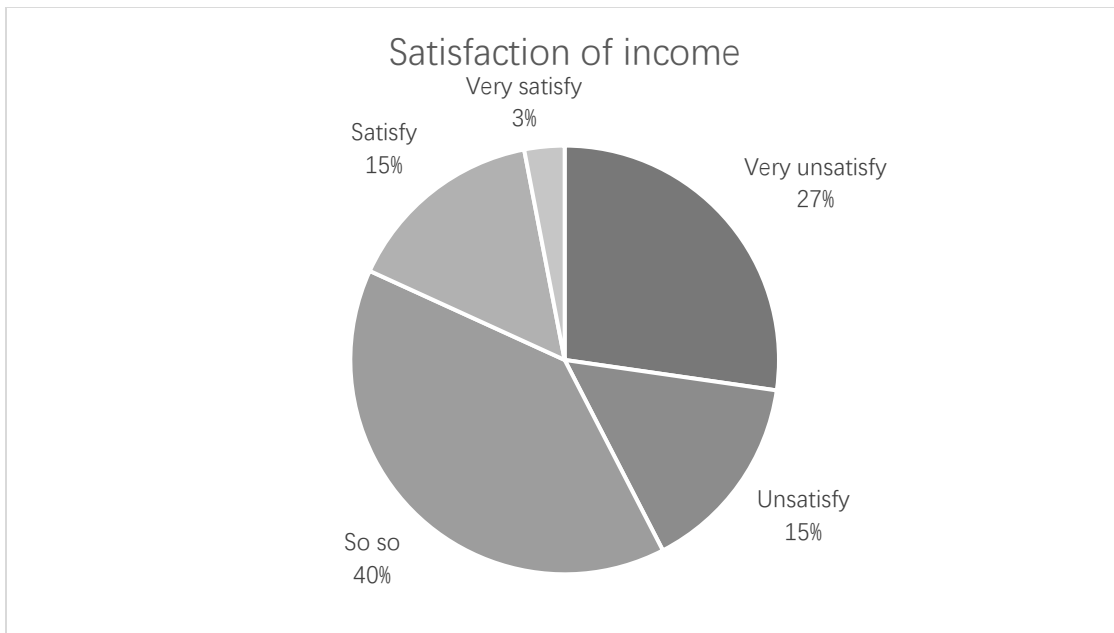


Figure 13. BLH medical providers' satisfaction of income

The results are showed through the pie chart. It showed that most (40%) participants think common of the amount of their income. And 15% of the participants are not satisfied with it. Even the rate of a quite dissatisfaction of the amount of their income is 27%. Only 3% of the

participants are very satisfied with the amount of their income and 15% of the participants are satisfied with it.

The second index is satisfaction of income structure. This index described the satisfaction of the income in another point of view.

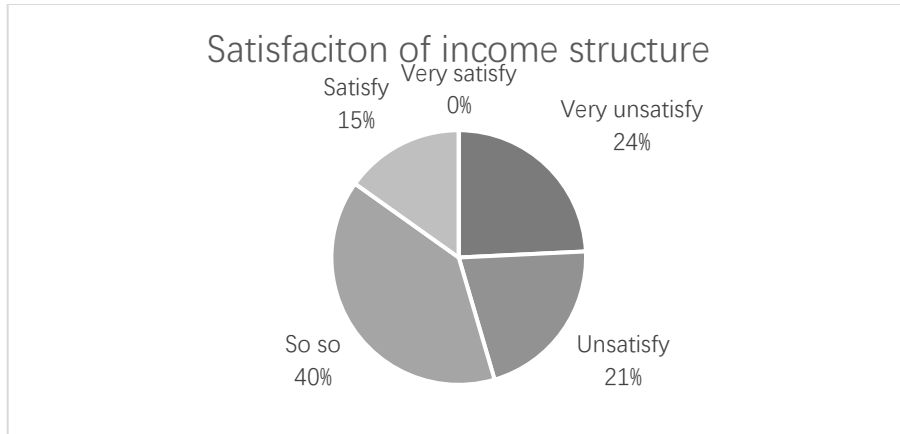


Figure 14. BLH medical providers' satisfaction of income structure

The result showed that 40% of the participants think common in their income structure however there are 21% of the participants who are not satisfied with their income structure and even 24% of the participants quite unsatisfied with it. Only 15% of the participants think the income structure is satisfy.

The third index is the wish of increasing income by doing part-time work.

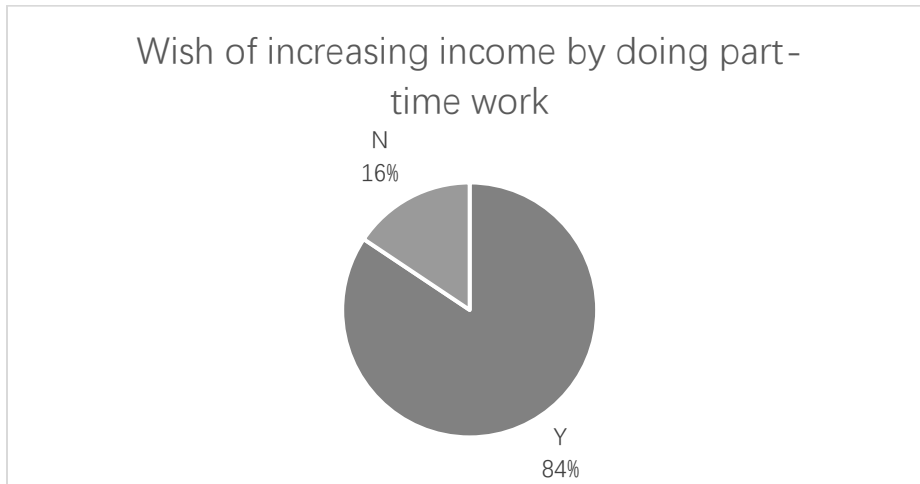


Figure 15. BLH medical providers' wish of increasing income by doing part-time work

The result showed that 84% of the participants would like to increase income by doing part-time work however the other 16% of the participants didn't want to.

4.1.8 Attitude toward "multi-sited license"

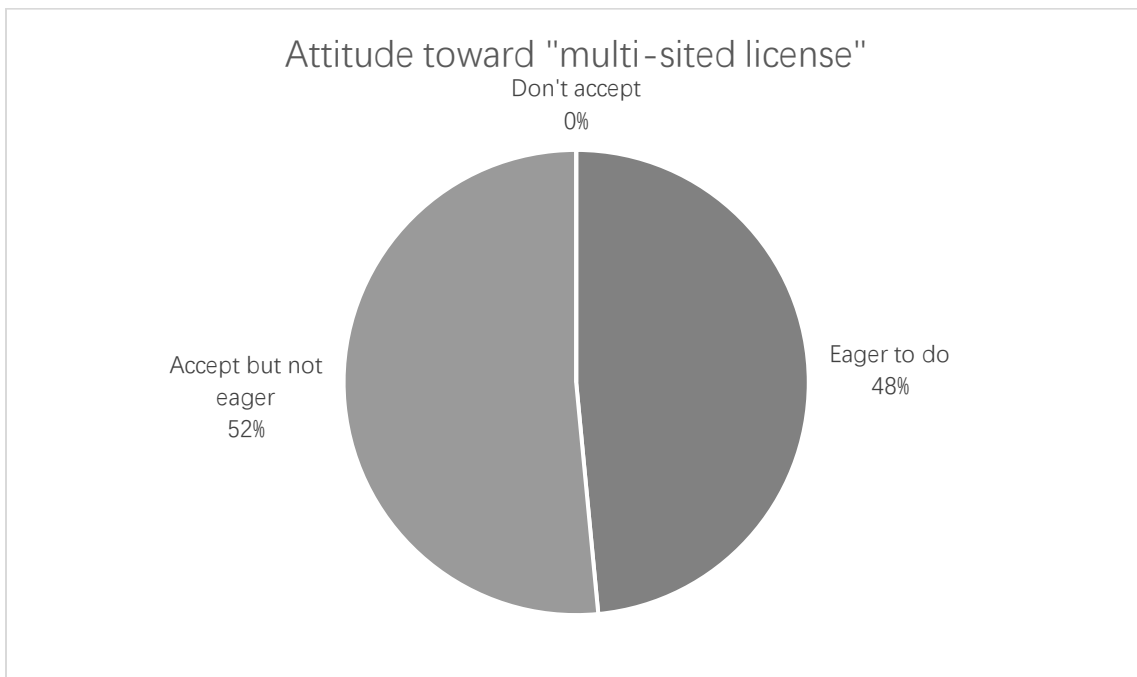


Figure 16. BLH medical providers' attitude toward "multi-sited license"

The results showed that all the participants accept “multi-sited license” and even 48% of the participants long for it. There is no participant disagree with it.

4.1.9 Attitude toward accepting patients transferred from the BH



Figure 17. BLH medical providers' attitude toward accepting patients transferred from the BH

The results showed that all the participants support this activity however most (91%) of the participants will support it when get paid.

4.2.0 Interview

4.2.1 BH doctors' perception of workload

The key words that showed the workload of each participants are as follows.

Key words	Department	Title	Working years
So hard..Very busy.. Work start from 7:30am to 6:00pm.. I don't have time to do this (multi-sited license)..	neurology	Visiting staff	7 years
Not that busy..2 hours spare time every day	endocrinology	Resident doctor	4 years
General..Except for ward round..	endocrinology	Resident doctor	5 years
General..Want more clinic patients and have a try on online medical service..	internist	Resident doctor	5 years
Not that busy..1 hours spare time every day..	gastroenterology	Chief physician	30 years
General..Have some fragmentation of time sometimes between two doctor's visit	endocrinology	Chief physician	25 years

Table 5. BH doctors' perception of workload

The results showed that 1/3 of the participants regard their workload as hard and 1/3 of the participants regard their workload as general. Another 1/3 of the participants regard their workload as general. However, Although the 1/3 of the participants who think their workload is not satisfied with the content of their work. Participants who think they are not that busy are mainly (1/2) from the endocrinology department and are mainly (1/3) with a high title (chief physician).

4.2.2 BH doctors' perception of income

The key words that showed the perception of income are as follows.

Key words	Department	Title	Working years
Amount is ok..However work so hard	neurology	Visiting staff	7 years
Fair..	endocrinology	Resident doctor	4 years
A little bit low compared with the workload..	endocrinology	Resident doctor	5 years
A little bit low..The hospital exploits us..	internist	Resident doctor	5 years
Not care much about my income..	gastroenterology	Chief physician	30 years
Satisfied..Would like to earn more..	endocrinology	Chief physician	25 years

Table 6. BH doctors' perception of income

The results showed that 2/3 of the participants are satisfied with the amount of the income and the other 1/3 of the participants just have a little dissatisfaction. However, 1/2 of the participants think they deserve more considering with their contribution. We can see that higher title doctors care about their income less.

4.2.3 BH doctors' perception of "multi-sited license"

The key words of perception of "multi-sited license" are as follows.

Key words	Department	Title	Working years
Don't have time to do this..	neurology	Visiting staff	7 years
Suitable for high-level title doctors..I can go to BLHs to help and give instruction..	endocrinology	Resident doctor	4 years
Suitable for high level title doctors..Want to do but don't have chance..	endocrinology	Resident doctor	5 years

Suits for high level title doctors..They have more flexible time..Just want to do my job now..	internist	Resident doctor	5 years
It is not responsible..Suits for surgery doctors..Don't want to work on spare time..	gastroenterology	Chief physician	30 years
I would like to do it in my spare time..it can increase my income..I can help people..	endocrinology	Chief physician	25 years

Table 7. BH doctors' perception of "multi-sited license"

The results showed that primary title doctors want to do "multi-sited license" however they concerned about their title. They all said "multi-sited license" suits for high level title doctors. However, for those high-level title doctors each one has their own attitude. one of them don not have time to do it and one of them think it is not responsible and only one of them want to do this and one of the reason is about increasing income.

4.2.4 BH doctors' perception of diabetes management by teamwork

The key words of perception of diabetes management buy team work are as follows.

Key words	Department	Title	Working years
Specialists should care for complicated patients..advise them to go home or the basic level medical units if they do not need to take inpatient care..I can provide diagnose and prescribe service.. Also like to do management however I am	neurology	Visiting staff	7 years

busy..Already have held diabetes management education regularly..			
Some simple management can be done in the basic level medical units..However they are not professional..can just do some simple work..Specialists give advise and general practitioners surprise the patients..1/3 of the patients need an accurate control..Need both my advise and assistants' supervision..	endocrinology	Resident doctor	4 years
I can give advise and diagnose..management and follow-up should be done in the basic level medical units..	endocrinology	Resident doctor	5 years
Just treat patients and educate them before they leave hospital..Have our own doctor-patient communicating chat group..Transferring patients can save the BHs' resources..Minor illness would not reflect the value of specialists..	internist	Resident doctor	5 years
Work as a specialist..Would like to follow up patients..if possible can transfer them to BLHs..	gastroenterology	Chief physician	30 years
I would like to work as a specialist.. Reflect values of different level doctors..	endocrinology	Chief physician	25 years

Table 8. BH doctors' perception of diabetes management by teamwork

The results showed that all the participants agreed that specialists should work as an advisor to give instruction and diagnose. Also the prescribing need to be done by professional specialists. And they all recommend to manage diabetes through the basic level units. Besides, 1/3 of the participants mentioned that they have already had initiative follow-up methods however they prefer to let the basic level medical units do this.

4.2.5 BH doctors' perception of online medical service

The key words of perception of online medical service are as follows.

Key words	Department	Title	Working years
High level title doctors suit to do..Their time are more flexible..	neurology	Visiting staff	7 years
I know that..Not familiar with that..	endocrinology	Resident doctor	4 years
Yes I use it in my spare time..increase my popularity..earn money..but it is more suitable for the high level title doctors..	endocrinology	Resident doctor	5 years
Not familiar with that..	internist	Resident doctor	5 years
Don't want to do this..it is a tendency..don't want to use my rest time..	gastroenterology	Chief physician	30 years
Yes I use it frequently..i like to try it..it is the tendency..	endocrinology	Chief physician	25 years

Table 9. BH doctors' perception of online medical service

The results showed that all the participants have heard about online medical service however only 1/3 of them often use it. Half of the participants think it suits for high level title doctors. The

two high level title doctors both think it is a tendency however they took opposite actions, one use it frequently and another don't want to use it.

4.2.6 BLH doctors' perception of workload

Key words	Department	Title	Working years
4-5 clinic patients..One time a week..Ohter time ward rounds..Not much patients..	Ophthalmology	Resident doctor	4 years
Not that free..Not that full too..10 clinic patients per day..Want to have more..	Gynecologist	Associate chief physician	30 years
Not busy..Half of the day I am free..Doctorts have 1-2 hours spare time per day..Hope to have more work..	Mediastinus	Assistant	8 years
Busy..10 patients per day..	Imaging	Resident doctor	7 years
Not that busy..	Internist	Resident doctor	5 years
Response for about 100 patients' follow-up..Busy..	Community	Advanced nurse	30 years

Table 10. BLH medical providers' perception of workload

The results showed that most (2/3) of the patients think they are not busy in work. And they want to have more work. There is only one advanced nurse from community and she can represent other medical staffs in the community like her. The community work seemed to be busy than BLH in this research.

4.2.7 BLH doctors' perception of income

Key words	Department	Title	Working years
I earn a little..Not satisfied with my income.. equal to my work contribution..	Ophthalmology	Resident doctor	4 years
Would like to get more money..	Gynecologist	Associate chief physician	30 years
Very low..	Mediastinus	Assistant	8 years
Have assignment to visit the community and the pay is 300 yuan, too little..	Imaging	Resident doctor	7 years
The performed salary has ceiling..	Internist	Resident doctor	5 years
Not much..	Community	Advanced nurse	30 years

Table 11. BLH medical providers' perception of income

The results showed that all the participants are not satisfied with their income and 1/3 of them regarded the income as very low. One of them has the wish to increase their income and one of them think its fair. Some (1/3) of the participants didn't say much about their income although they think it's low. It seems they don't want to make a change or complain.

4.2.8 BLH doctors' perception of "multi-sited license"

Key words	Department	Title	Working years
A higher is suitable..I am willing to do the primary work..Want to have the chance to do more work..	Ophthalmology	Resident doctor	4 years

It means work at other hospitals..Supposed my role as a special counselor with a good pay..	Gynecologist	Associate chief physician	30 years
Don't have much idea..Hope there will be some suitable position..	Mediastinus	Assistant	8 years
Just suits high title doctors..Not confident enough..	Imaging	Resident doctor	7 years
Not familiar with that..	Internist	Resident doctor	5 years
No idea..	Community	Advanced nurse	30 years

Table 12. BLH medical providers' perception of "multi-sited license"

The results showed that half of the participants are not familiar with "multi-sited license". And these people with little or no idea about "multi-sited license" are mainly primary title doctors and lower level medical providers. The only one high level title doctor said she want to be as a specialist in the model. 1/2 of the participants have enthusiasm to work in the model however one primary title doctor showed her concern about her ability.

4.2.9 BLH doctors' perception of diabetes management by teamwork

Key words	Department	Title	Working years
There is no team work to help patient manage diabetes..I would like to do management because I cannot do diagnose for diabetes..I would like to	Ophthalmology	Resident doctor	4 years

learn although I am not familiar with diabetes management..			
Although I am gynecologist, I have general practitioner license..I would like to do chronic disease management..Follow-up is a physical work however I would still like to do..However clinic patients hardly being transferred to BLHs..I can educate patients..Give lifestyle guidance..Test blood sugar..Even work as a volunteer to improve our popularity..	Gynecologist	Associate chief physician	30 years
Don't want to relearn a general practitioner license..I would like to do some assisting work..	Mediastinus	Assistant	8 years
We want to use our spare time efficiently..We can do follow-up and management..The specialist diagnose and prescribe..we can assist..	Imaging	Resident doctor	7 years
I would like to do the managing work with money.. Don't have that time now..Hope to have specific people doing management because we doctors are busy..Need a convenient colmmunication..Patients we meet usually has been diagnosed by BH doctors..They come here to review..	Internist	Resident doctor	5 years

We can do management..Our job is doing this..	Community	Advanced nurse	30 years
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Table 13. BLH medical providers' perception of diabetes management by teamwork

The results showed that either diabetes specialists or other medical providers in the interview would like to do by themselves or let BLH medical providers do diabetes management. 2/3 of the participants are not allowed to do diagnose or prescribe however they showed interest in doing diabetes management such as follow-up and assisting.

4.2.10 BLH doctors' perception of online medical service

Key words	Department	Title	Working years
Haven't used it..Mainly used in education..	Ophthalmology	Resident doctor	4 years
Have used WeDoctor before..Use it after work..online visit is rare..Know it through the hospital's publicity..	Gynecologist	Associate chief physician	30 years
Heard little about that..Mainly used for refistration..	Mediastinus	Assistant	8 years
Never use that..It sounds not that much used..	Imaging	Resident doctor	7 years
Convenient to patients..Increase doctors' income..not as well as face to face visit..More suits for chronic disease management..	Internist	Resident doctor	5 years
Use online system to build EMR..	Community	Advanced nurse	30 years

Table 14. BLH medical providers' perception of online medical service

The results showed that 2/3 of the participants have little knowledge of online medical service and their perception of it is very different. Only one of the participants mentioned online medical service touch upon chronic disease management.

CHAPTER 5

CONCLUSIONS SUMMARY IMPLICATIONS FOR FUTURE RESEARCH

5.0.0 Introduction

This study used methods such as literature review, observation, interview, and survey to investigate the main topics and questions. The main question was, How much are medical practitioners willing to use online diabetes management service?. As the study planned, it first investigated workload and income information of the BH doctors and BLH medical providers in different aspects such as their current situations and their expectations. And then the study explored the current and potential approaches of diabetes management. Thirdly, the study explored perceptions and acceptance of online medical services among the BH doctors and the basic level medical providers. The results of this study answered the questions at play. The research findings are described through the following topics.

5.0.1 Current situations and expectations of the workload

The study has a rough insight of participants' current daily work time, satisfaction of work time and work content, expectation of work time and work content, possibility of doing part-time work, and perception of "multi-sited license". The results showed in 4.1.1 and 4.2.1 answered the question posed in 3.1.1 "How do BH doctors perceive their workload?". And the results showed in 4.1.6 and 4.2.6 answered the first question in 3.1.2 "How do BLH doctors and other medical assistants perceive their workload?". Separately speaking, the fact of workload and the perceptions of workload are different between the BH doctors and BLH medical providers. As to the BH doctors, according to the survey results in 4.1.1, generally participants are not satisfied with their workload. The dissatisfactions are reflected through the need to work overtime hours, unprepossessing work content and the unreasonable division of labor. Doctors in the BH do not have time to do part-time work during their work hours and even have less time after work. However, there is a possibility of changing their working content since most of them are not that satisfied with their work content. One of the changes includes reducing the general disease

visiting and transferring minor patients to BLHs. The interview results in 4.2.1 showed that although 2/3 of the participants think their work is busy however there is still 1/3 of the participants think the workload is acceptable. This result showed that estimating doctors' availability should not just through comparing the amounts of working hours. Some doctors in the BH still have a potential ability of doing extra work, especially those from the endocrinology department and the high title doctors. However, things are different with medical providers from BLH. Both the survey results showed in 4.1.6 and the interview results showed in 4.2.6 showed an opposite circumstance than the BH doctors'. Most participants are showed not that busy at work either in the amounts of working hours or the perception of busy. Medical providers in BLH are more dissatisfied with their work content from the results in 4.1.6. The survey didn't explore in-depth the reason of dissatisfaction of work content however another index in the survey, extra work want to do, showed a proportion of interviewees want to have extra work. This result can also be showed in the interview in 4.2.6. The interview in 4.2.6 also showed the applicability of the perception because the participants are from six departments and their status includes doctors and medical assistants. In a word, the BH doctors' change potential in workload aspect is mainly about changing work content, while BLH medical providers' change potential in workload aspect is mainly about working hour lifting space.

The results in 4.1.3, 4.1.8, 4.2.3 and 4.2.8 reflect the perception of workload from the side. For both big and BLH participants according to the surveys, all of them accept "multi-sited license" and almost half of them long for it. This result showed the high acceptance of getting part-time work. However, the interviews showed the differences between high level title doctors and the low level title medical providers. Medical providers with a low level title are not familiar with "multi-sited license", and have concern about their abilities. This distinction from the enthusiasm showed from the survey may be understood as they just want to do part-time work and "multi-sited license" is one kind of part-time work.

5.0.2 Current situations and expectations of the income

The study has a rough insight of participants' current amount and structure of income, satisfaction of amount and structure of income, and expectation of income. The results showed in 4.1.2 and 4.2.2 answered the second question in 3.1.1 "Do BH doctors satisfy with their income?". And the results showed in 4.1.7 and 4.2.7 answered the second question in 3.1.2 "Do BLH doctors and other medical providers satisfy with their income?". The satisfaction rate of income amount and structure in the BH are both very low, which indicate a huge potential motivation of changing. However, the satisfaction rate is about 2/3 according to the interview results. The difference between the results of survey and interview can be explained by the content of interviewee's words "deserve more considering with their contribution". Referring back to doctors' complain about work contents, in general, the dissatisfaction is mainly because of the cost performance of the pay. When it comes to BLH, the condition is a little bit optimistic however, most of the participants are not satisfied with or manage to the amount and structure of their income. The strong dissatisfaction can be seen too because 84% of the participants want to increase income by doing part-time work. Different from the BH, the interview results of BLH is in assist of the survey result. Participants use words like "a little", "very low", "too little" to describe their income. One of the participants used words such as "want to do more work", which can lead the study to conclude that the basic level medical providers have a huge requirement of searching extra work to increase income.

5.0.3 Current approaches of diabetes management

The study has a rough insight of participants' perception of two-way referral system, and ability of doing diabetes management. Results in 4.1.4, 4.1.9, 4.2.4 and 4.2.9 answered the first, the third and the fourth questions in 3.1.3 "How do doctors in BHs or BLHs think their roles in managing diabetes?", "In which way do doctors in BHs or BLHs want to cooperate in managing diabetes together with each other?" and "How do doctors in BHs or BLHs perceive "two-way transfer"?". Transferring patients to BLHs is a way in managing diabetes. The results showed that all the BH doctors are willing to transfer patients to BLHs if necessary. More than half (57%) of them will do

this without being paid and others (43%) want to make economic benefit at the same time. It showed that for BH doctors, earnings will become a big motivation in transferring patients to BLHs. The earnings need is enlarged in BLH since the rate of accepting patients transferred from the BH is only 9% and the other 91% of the participants want to get earnings at the same time. The results showed that the acceptance of transferring patients from the BH to the second level hospital is prevalent and earnings is a big motivation factor.

Besides, through 4.2.4 and 4.2.9, there is an awareness of external abilities in managing diabetes for different kinds of medical providers. The fact is diabetes diagnosing and prescribing can only be done by specialists. The other medical providers such as doctors from other departments and medical assistants can only do diabetes management such as follow-up and educating.

5.0.4 Different kinds of providers' roles in diabetes management

The study has a rough insight of participants' self-positioning and expectation in diabetes management and the possibility of working as a team in diabetes management. This topic discussed the second question in 3.1.3 "How do doctors in BHs or BLHs think their roles in managing diabetes?". Different from 5.0.3, this topic talked about internal expectation of one's role in diabetes management. And, the results in 4.1.5, 4.2.4 and 4.2.9 showed that more than half of the participants in the BHs are willing to do both the diagnose and follow-up work and participants just want to do diagnosing, (enter percentage), respectively.. Referring to the conclusion in 5.0.1 that participants are not satisfied with their work content, and combining with the interview results in 4.2.4 that "although I would like to do the follow-up, I still prefer to let the low level title medical providers do this work", the conclusion can be described as doctors in the BH prefer to just do diagnosing and prescribing if there is other people doing the follow-up and management. When it comes to BLH medical providers, those who do not have the ability and allowance to do diagnosing and prescribing are willing to do the primary follow-up work.

5.0.5 Perception and acceptance of online medical service

The study has a rough insight of participants' perception and acceptance of online medical services. Online technology has been more and more used in providing medical services. Results in 4.2.5 and 4.2.10 gave internal insights in the medical providers' perception and awareness of this new model. The answer to the question in 3.1.4 "How do doctors in BHs or BLHs perceive online medical service?" is doctors in the BH has a more wild and deep learning of online medical service than medical providers in BLHs. Participants' attitude is not very enthusiasm. Their awareness still maintained in online inquiry and online registration. They need more education about online medical service.

5.1.0 Design Implications

This is a feasibility study for potential online medical service design. As said above, there are problems such as the insufficiency of service capacity in primary health care institutions, the unclear function division of different levels and types of medical institutions, the lack of effective cooperation mechanisms and the lack of effective internal Incentive and restraint mechanisms, etc. (Li, 2015, Xiong, 2015, Yang et al, 2016).As said in chapter 1, the key point of the future is how can social capital respond to these great livelihood issues. This research described the feasibility through user research. Because as to patients with chronic disorders, the specialist acting as cognitive consultant may provide input episodically ("A Typology of Specialists' Clinical Roles", 2009), the service should emphasize the importance of providers and at the same time try to more efficiently take advantage of different level hospital providers. Besides, the quality of primary care services appears to be lower when provided by specialists than by generalists (Rosenblatt et al, 1998). As a result, theoretically, basic-level hospital providers that are "specialized" in diabetes management will have higher quality of patient service. The service should be designed to embody the high value of this group. As stated by Solomon, Wagner & Goes (2012) in section 2.1.1, web-based interventions can be an optimum effective way to activate what Francis, Fever & Smith (2007) refer to as patient self-efficacy in the support of the self-management of their chronic disease. It is regarded as an enable of change in the healthcare

field, shifting the care service to the promotion of wellness, prevention, and self-management (Akter, D'Ambra & Ray, 2010, Foundation, 2009). However, as Liao (2015) and Yang (2013) said in 2.1.2, now diabetes patients the disease characteristics of diabetes in China are mainly middle and old age group. They also have low education level and lived in rural areas (Liao, 2015, Yang, 2013). They cannot fluently using online service. They may need physical help. As a result, this research bring up with a potential service model to encourage social capital to recruit providers from both big and BLHs working together to help patients improve diabetes management. The service model is showed in Figure 2.

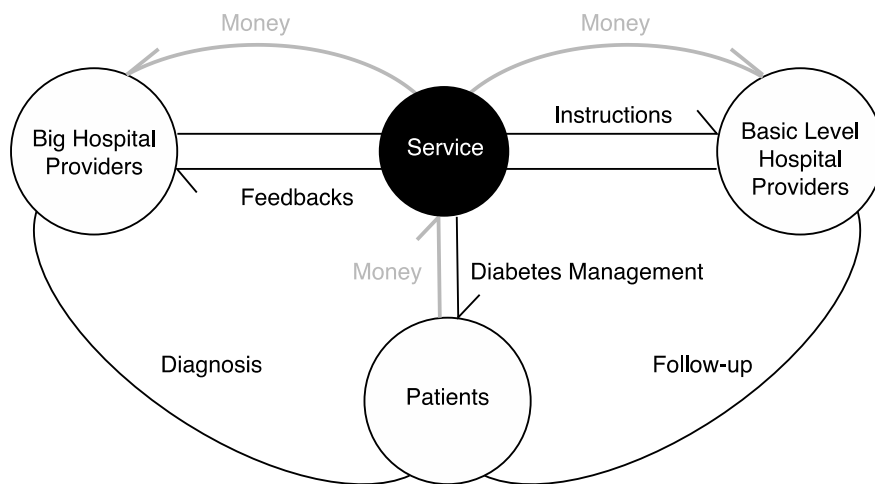


Figure 18. Service Model

The results mainly showed the feasibility through the availability of medical providers' time, the benefit drivers, expectation of working role and acceptance of online medical service. Generally speaking, there is a need of an online diabetes management service from a medical provider user end.

5.1.1 Availability of time

The study showed that most doctors in the BHs do not have enough time for new work, which is supposed to be an online diabetes management service. The new online service must be

designed to reallocate the current working time. However, a significant amount of medical providers in BLHs have spare time to do extra work. Their need is to efficiently use spare time. And, referring to the status of these providers, the most available times are given by the high title doctors and the medical assistants. In the time angle of view, these people should be laid stress on.

5.1.2 Benefit drivers

The benefit drivers showed that BH doctors want to lift the cost performance of their income. It indicated that the potential online service should be high valued. As to BLH medical providers, the main need is to increase the amount of income by doing more work, even low value work is acceptable. This difference may indicate a design of dividing the service by values and contribute different parts to different medical providers.

5.1.3 Expectation of working role

The study showed that the expectations of working role in diabetes management are different between the BH doctors and BLH medical providers. Doctor in the BHs mainly want to do diagnosing and prescribing and medical providers from BLH wish themselves to do the follow-up work. This indicated the service being designed pointed to these two groups of people. In the other words, the service need to be designed to allocate tasks rationally.

5.1.4 Acceptance of online medical service

The study showed that there is a need of education toward both the BH doctors and BLH medical providers about online diabetes management service. This is also an uncertainty of the feasibility of the potential service.

5.1.5 Functions and principles of online medical service design

First, as online medical service, the service should be accessed at the right time to the right person at the right place (Ahluwalia & Varshney, 2009, Chatterjee et al, 2009, Junglas, Abraham & Watson, 2008, Sneha & Varshney, 2009). Besides, because mHealth is regarded as an enable of change in the healthcare field, shifting the care service to the promotion of wellness, prevention, and self-management (Akter, D'Ambra & Ray, 2010, Foundation, 2009), the service also have the chance to pay attention to diabetes prevention. Functions such as habit forming, patient training, user activation remaining, payment willingness guidance, patient incentives guidance and information record remaining (Katz, Mesfin & Barr, 2012) should also be involved in this service. A successful mHealth home management health system requires attention to all of the links in the chain of chronic care and it is supposed to be with characteristics including accessibility, which means anytime and anywhere (Bauer et al. 2005, Varshney, 2009, Kahn, 2010), personalized, which means addressing a specific person's specific needs based on his/her own condition (Barnes, 2003, Barnes & Scornavacca, 2004), immediacy, which means focusing on relevant, targeted and timely information at right time (Barnes & Scornavacca, 2004, Barwise & Strong, 2002, Pousttchi & Widemann, 2009), location-based (Barnes, 2003, Varshney, 2005, Kahn, 2010), interactivity, which means cooperation through long-term and two-way interaction (Akter, D'Ambra & Ray, 2010, Barnes, 2003, Kahn, 2010), and mobility (Kakihara & Sorensen, 2009, Chatterjee et al. 2009). These are principles the service is supposed to follow as its basic characters. Second, according to the results this research finds, potential service should have two ends, BH doctor end and BLH provider end. The two ends will have differences due to the different work the two groups will do in this service. The BH end service should have functions of inputting diagnosis results and prescription information, distributing patients to BLH providers conveniently, gathering feedbacks from BLH providers and instructing them. The basic hospital end should have functions of gathering data from patients, giving feedbacks and getting instructions from BH providers. BLH providers should follow the BH providers' instructions and BH providers can supervise their performance.

5.2.0 Future Research

This research is a primary feasibility study which studied a limited scope of participants. And the interview and questionnaire questions is not deep enough. Further study is needed to enlarge the scope of participants to make the results more reliable. Second, there is a need to dig deeply in each of the research questions in this study. For example, this study explored the dissatisfaction of work content and income. However, the reasons of dissatisfaction is important which can help the future designer to design the detail of the service.

5.2.1 Challenges

The biggest challenge during this study is to recruit participants. This research used purposive sampling and these specialties are not easy to recruit because they are too busy. However, what the researcher learned is that we can use snow ball sampling to recruit more and more participants. Providers are professional which means researchers need to find them in specific places such as medical centers. And providers are usually work together, so usually one provider have connections with many other providers which can make the provider a key informant in snowball samplings.

5.2.2 Research opportunities revealed

This research has revealed an open field of opportunity. Although user research is common today, however, as to the online medical service, there is little study about medical providers' need and feasibility. Most study just focus on the consumers' needs. Efforts from providers, medical centers and other stakeholders aim to improve patients' satisfaction and treatment efforts. A lot of study needs to be done in the medical provider need field because medical providers are one of the main stakeholders in diabetes management service. Their aspirations and abilities of providing service is the footstone of the service. Besides, how to distribute the payment to the two level hospital providers is also a field to explore in the future. The service may

contain an online application so the user experience design, interaction design and user interface design are also worth exploring in future studies.

5.2.3 Improvement

The interview is not well organized. The record is refused since the second participants. So the pressure of documenting is much more bigger. At the same time because it is a semi-structured interview (Adams, McIlvain & Lacy, 2002), this research need to think a lot. So the interview seemed not that compact. And there may miss some information. Continued research in this area should recruit an assistant to help me organize the participants and document together with me.

Here ar my last comments:

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