Development of Communication Skills Training in Diabetes Care for General Practitioners in China

By

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ABSTRACT

Background

China has more ascertained cases of diabetes than any other country. Much of the care of people with type 2 diabetes (T2DM) in China is being managed by general practitioners (GPs), and this will increase with the implementation of health care reforms over the next ten years. Such a shift of chronic disease management into primary care will need to be supported by new training systems for the existing workforce and for a very large number of new entrants. Diabetes care requires effective communication between physicians and patients, yet little is known about this area and how it might relate to training needs in Chinese primary care.

Aim and objectives

To develop an evidence-based communication skills training program in diabetes care for general practitioners in China.

Methods

A systematic review was conducted in finding existing evidence in communication skills training in diabetes care worldwide. Two focus group studies were conducted with GPs and diabetes patients in Guangzhou City, China. Data from the above studies were combined to inform potential

communication skills components for training. A nominal group technique (NGT) with GPs was used to identify the most important and feasible communication skills training components for Chinese GPs in diabetes care.

Results

Key ingredients for successful communication training for diabetes care were found in the systematic review. 4 focus groups with 15 GPs and 5 groups with 22 diabetes patients were involved. Chinese GPs faced challenges in communication with diabetes patients. People with type 2 diabetes require more access to trustworthy diabetes information and wish for better channels of communication with their GPs. 60 GPs participated in 8 NGT groups. Priorities of diabetes communication skills in training GPs were identified: health education in clinical encounters, discussion of blood glucose monitoring and explanation, diabetes complications and cardiovascular disease risk communication.

Conclusions

Communication skills training priorities for Chinese GPs in diabetes care were identified. With the changes in communication quality and the delivery of diabetes care in primary care in China, significantly improved outcomes should be seen for the whole diabetes population in the long term.

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ABBREVIATIONS

ADA	American Diabetes Association
BG	Blood Glucose
BMI	Body mass index
CCM	Chronic Care Model
CDSR	Cochrane Database of Systematic Reviews
CENTRAL	Cochrane Central Register of Controlled Trials
CHD	Coronary heart disease
CI	Confidence interval
CKD	Chronic kidney disease
COPD	Chronic obstructive pulmonary disease
COREQ	Consolidated Criteria for Reporting Qualitative Research
CVDs	Cardiovascular diseases
DALY	Disability-adjusted life year
DBP	Diastolic blood pressure
EASD	European Association for the Study of Diabetes
FG	Focus group
GBD	Global Burden of Disease
GP	General practitioner
HbA1c	Hemoglobin A1C
HDL	High-density lipoprotein

IDF	International Diabetes Federation
LDL	Low-density lipoproteins
MI	Motivational interviewing
MRC	Medical Research Council
NGT	Nominal group technique
NICE	National Institute for Health and Care Excellence
RCT	Randomised controlled trials
SBP	Systolic blood pressure
SD	Standard Deviation
SDM	Shared decision-making
SGLT2	Sodium-glucose Cotransporter-2
T2DM	Type 2 diabetes mellitus
TCM	Traditional Chinese medicine
WHO	World Health Organization

LIST OF PAPERS

During my PhD study, several chapters of work were accepted for publication. The full list of disseminated research is listed below.

Accepted publications

Yao M, Zhou X-y, Xu Z-j, et al. The impact of training healthcare professionals' communication skills on the clinical care of diabetes and hypertension: a systematic review and meta-analysis. BMC Family Practice 2021;22(1):152. doi: 10.1186/s12875-021-01504-x

Yao M, Zhang D-y, Fan J-t, et al. The experiences of Chinese general practitioners in communicating with people with type 2 diabetes—a focus group study. BMC Family Practice 2021;22(1):156. doi: 10.1186/s12875-021-01506-9

Yao M, Zhang D-y, Fan J-t, et al. The experiences of people with type 2 diabetes in communicating with general practitioners in China – a primary care focus group study. BMC Primary Care 2022;23(1):24. doi: 10.1186/s12875-022-01632-y

In submission

Yao M, Yuan G, Lin K, et al. Using a mixed method to identify communication skills training priorities for Chinese general practitioners in diabetes care. BMC Primary Care

CHAPTER 1. INTRODUCTION

1.1 A personal perspective on the challenges of delivering diabetes care in primary care in China

As a doctor in China, I have seen the problems and difficulties experienced by people with diabetes, witnessed the impact of the disease on their lives, and seen the problems and changes presented by the healthcare system. Diabetes is a complex condition with a wide spectrum of severity ranging from being asymptomatic to life-changing to fatal. It is highly prevalent and requires lifelong management. Partnership and trust between people with diabetes and health professionals play important roles in the long-term management and in improving outcomes.

Diabetes care in China is currently delivered in secondary care. However, primary care should take over a major part of type 2 diabetes (T2DM) management. I am a young Chinese general practitioner (GP) in primary care. When I first became the first official GP specialty trainee in China 10 years ago, the word ‘GP’ was a very new and unfamiliar concept to most people, even unknown by medical professionals in China. Many people have asked me, “what is general practice?” and “what is the function of a GP?”. At that time, China was lacking GPs and patients always chose to first seek a hospital specialist even when presenting with minor medical problems, and likely waited in long queues for a very short specialist consultation. Both doctors and patients feel very tired of this inefficient process. The healthcare system was heavily

reliant on hospital care while primary care remained grossly underdeveloped. China has recognised these problems and implemented large-scale health reforms to improve primary care with GP training and investment in primary care infrastructure.

Although those approaches make it possible for people with chronic conditions to gradually move from secondary care to primary care, the challenges remain huge with few Chinese GPs having been trained in chronic disease management and in the communication skills that are needed to maintain long term relationships with patients. While investments in increasing primary care capacity and the clinical competence of GPs is ongoing, the challenge remains in changing practices in doctor-patient communication and strengthening their relationship. I have personally seen poor communication between doctors and patients in practice and the effects it's had on clinical outcomes. I also realised that there is currently a lack of training opportunities on communication skills for diabetes care for GPs in China. There is a need for research on communication skills training in diabetes care for GPs, which is the focus of my PhD program. I hope it goes some way towards providing evidence for the future development of both diabetes care and other chronic condition services in primary care in China.

1.2 Epidemiology and burden of T2DM in China

1.2.1 Prevalence and trends

Diabetes is a complex chronic condition associated with significant complications and increased risk of mortality worldwide. China has the largest number of people with diabetes in the world. The prevalence of diabetes in China increased in recent decades, from 9.7% in 2008 to 10.4% in 2013 and further to 11.2% in 2017 [1-3]. The total number of people affected by diabetes in China is estimated at 154.5 million based on a total population of 1.38 billion people [4]. It is estimated that type 2 diabetes mellitus (T2DM) accounts for more than 90% of the diabetes population (139 million) in China [5]. This number is likely to see a further increase in the future. A lot of factors contributed to the rise in diabetes prevalence in China including increasing sedentary behaviour and body mass index (BMI) [6, 7]. Diabetes is an important health problem and poses a great challenge to China, which is undergoing rapid economic development, urbanization, and healthcare system reforms.

1.2.2 Complications

The course of T2DM varies widely across individuals and the prediction of complications can be difficult. Diabetes patients are at increased risk of long-term microvascular and macrovascular complications including heart disease, stroke, blindness, kidney failure and extremity amputations [8, 9]. However,

large-scale studies and data on the prevalence of diabetes complications in China are limited [10]. One survey on outpatient visits conducted between 2007 to 2008 found that 52.0% of diabetes patients had at least one complication [11]. One cross-sectional hospital-based study in four major Chinese cities (Shanghai, Chengdu, Beijing, and Guangzhou) found that 52.0% had at least one chronic complication, 33.4% presented with macrovascular complications, and 34.7% with microvascular complications among 1,524 individuals. The prevalence of heart disease, neuropathy, ocular lesions, nephropathy, stroke, and foot disease were 30.1%, 17.8%, 14.8%, 10.7%, 6.8%, and 0.8%, respectively [12].

Another study conducted in inner-city Shanghai found that the prevalence of albuminuria was 49.6% among T2DM patients aged over 30, 41.4% with microalbuminuria and 8.2% with macroalbuminuria [13]. A study on the prevalence of chronic kidney disease across levels of glycemia among Chinese adults found that the prevalence of albuminuria, decreased kidney function and CKD (chronic kidney disease) each increased with higher glycaemic levels and 30.9% were diagnosed diabetes [14].

A meta-analysis with 329,316 diabetes patients found that the prevalence of diabetic retinopathy was 23% [15]. The Action in Diabetes and Vascular Disease (ADVANCE) study showed that the Chinese diabetes population have

a higher risk of diabetic nephropathy and cerebrovascular events compared with western countries [16]. However, most of those findings came from hospital-based cohorts in cities, which may not be representative of the wider population of patients with diabetes in non-urban settings and those managed in primary care. Countries with systematic primary health care systems have seen the prevalence of diabetes complications fall substantially over time. For example, the UK has seen reductions in major foot and leg amputations for diabetes between 2001 to 2018 [17]. This could be explained by health promotion and prevention, such as tobacco control and tackling obesity. At the same time, a good primary health care system can ensure people with diabetes be timely diagnosed and blood glucose management at their local health facility, reducing the delay of starting treatment and focusing on controlling vascular risk factors such as hypertension and cholesterol. All of those efforts play a role in reducing diabetes complications. This highlight potential benefits in China of strengthening diabetes care in primary care, where much of the care and research so far has been embedded in hospital systems.

1.2.3 Comorbidities

Comorbidities or multimorbidity, defined as the co-occurrence of more than one chronic condition, are common in diabetes patients, especially among the older population [18, 19]. It is estimated that as many as 40% of people with diabetes have at least three comorbid chronic diseases, such as hypertension, coronary

heart disease (CHD), CKD, heart failure, atrial fibrillation, depression, rheumatoid arthritis, chronic obstructive pulmonary disease (COPD) and cancer [20-25].

China has a high prevalence of comorbidities in diabetes. The Reaction study on the prevalence of CHD-related comorbidities in diabetes found that among 18,696 participants aged over 40 years, the proportion of diabetics with an additional condition was 88.8%, with 53.2% having more than two comorbidities. Dyslipidaemia (71.97%) was the most common comorbidity, followed by hypertension (58.19%), and hypothyroidism (21.24%) [26].

One systematic review extracted data from 80 cross-sectional studies involving 31,874 Chinese T2DM patients found that the pooled prevalence of depressive symptoms, anxiety symptoms, and diabetes distress were 37.8%, 28.9%, and 50.5%, respectively [27]. However, studies focused on comorbidity in China were few and based in the context of hospital-based care.

Comorbidity has considerable consequences for diabetes management and organisation of healthcare services, and has a great impact on diabetes patients' quality of life (e.g., depression and arthritis), self-care behaviours, and treatment options [28, 29]. The great impact of comorbidities on the Chinese population with diabetes is now clearly established. It is unfeasible for

endocrinologists in a country without a good primary health care system to provide care for the vast number of people with diabetes and comorbidities. Despite the challenges, GPs in primary care have the unique advantages in caring for people with diabetes as they care for the whole person and are used to dealing with the complexities posed by multimorbidity.

1.2.4 Mortality

Diabetes ranked 20th in the leading causes of death in China based on years of life lost (YLLs) in 2017 [30]. Diabetes-related mortality was 1.84 per 1,000 people in urban areas and 1.45 per 1,000 people in rural in 2018. It is estimated that over 800,000 lives were lost to diabetes and complications in 2019[4]. Diabetes was associated with increased mortality for CKD and a range of cardiovascular conditions. In a 7-year nationwide prospective study of 512,869 adults aged 30-79 years from 10 regions in China, 30,280 had diabetes. During 3.64 million person-years of follow-up, compared with adults without diabetes, individuals with diabetes had a significantly increased risk of all-cause mortality (1373 vs 646 deaths per 100 000; adjusted relative risk, 2.00 [95% CI, 1.93-2.08]). The presence of diabetes was associated with increased mortality in CKD (RR 13.10 [95% CI, 10.45-16.42]), ischemic heart disease (RR 2.40 [95% CI, 2.19-2.63]), stroke (RR 1.98 [95% CI, 1.81-2.17]), chronic liver disease (RR 2.32 [95% CI, 1.76-3.06]), infections (RR 2.29 [95% CI, 1.76-2.99]), and cancer of the liver (1.54 [95% CI, 1.28-1.86]), pancreas (RR, 1.84 [95% CI, 1.35-2.51]),

female breast (RR, 1.84 [95% CI, 1.24-2.74]). Moreover, greater excess mortality existed in rural areas compared to urban areas, despite diabetes prevalence being higher in urban areas [31]. Diabetes-related mortality is likely to increase as the population with diabetes grows.

1.2.5 Burden and healthcare costs

Diabetes is imposing a huge burden and healthcare costs for both patients and wider society in China. Besides mortality and prevalence, the overall disease burden can be assessed using the disability-adjusted life year (DALY). DALYs combine years of life lost due to premature mortality and years lived with disability [32]. According to the Global Burden of Disease (GBD) study, diabetes is the eighth leading cause of DALYs in China in 2017 (635 DALY per 100,000 people) [33]. The absolute numbers and rates per 100,000 population for all-age DALYs increased by 125.3% for diabetes between 1990 and 2017 [30].

National research on healthcare expenditure related to diabetes in China are scarce. According to the International Diabetes Federation (IDF), it is estimated that the total health care cost of diabetes management in China is $109 billion USD in 2019 (second to the USA, which spends $294 billion), accounting for 22% of the total health expenditure of China [34]. This cost will almost certainly increase over time.

One study conducted in Tianjin city (a more economically developed region which has a higher GDP per capita than the overall nation of USD 14,197 vs 11,137) of China provided a reliable individual-level cost estimate of managing and treating diabetes-related complications in newly diagnosed patients with T2DM by using the Urban Employee Basic Medical Insurance Claims database (UEBMI). The cost for a male patient aged 50–59 years without any complications for 3 months was USD 369. Patients with a history of complications had higher costs relative to those who did not experience any complications, with the additional costs varying between USD 8 and USD 336. The immediate additional costs when complications occurred were highest for myocardial infarction (USD 3,084), followed by stroke (USD 1564), and chronic heart failure (USD 662) [35].

1.3 Current diabetes care and clinical pathways in China and GPs training

1.3.1 Measures of diabetes care in China

Diabetes requires continuous medical care incorporating several strategies including ongoing diabetes self-management education, dietary advice, managing cardiovascular risk, managing blood glucose levels, and identifying and managing long-term complications. The goals of diabetes care are to minimize complications and maximize quality of life [36, 37].

T2DM can potentially be prevented through lifestyle interventions, dietary

changes, increased physical activity, and reduced obesity in the population [38]. Glycaemic control, management of CVD risks, early screening for complications and access to essential medications can reduce complications and extend life for people diagnosed with diabetes [39].

Five core metrics for countries were recommended by the Diabetes Targets Expert Consultation Group in WHO [40]. These include the proportion of cases that are diagnosed, the proportion of adults with diagnosed diabetes with controlled HbA1c, the proportion of adults with diagnosed diabetes who have controlled blood pressure, the proportion of adults with diagnosed diabetes who are at least 40 years of age taking lipid-lowering medications and the availability of essential medications.

The diagnosis, treatment, and control of diabetes are currently suboptimal in China. In a national cross-sectional survey in China, the proportion of diabetes patients who were aware of their condition was 36.5% among the Chinese general population, and only 32.3% had received treatment for diabetes and 49.2% of those treated had adequate glycaemic control [5]. Very few patients had prescribed drugs to prevent cardiovascular disease, particularly antihypertensive drugs, and statins [41].

1.3.2 Health care delivery for diabetes in China

A typical patient with diabetes presents to the hospital with symptoms of diabetes or a screening test that reveals elevated blood sugar. They find an endocrinologist or are referred to an endocrinologist by other hospital specialists. Tests relevant to diabetes are then completed in the hospital outpatient clinic or as in an inpatient. Endocrinologists screen for acute and chronic complications of diabetes. Through hospitalisation, patients receive systematic diabetes health education, a nutrition programme involving a dietitian, and blood glucose monitoring. Endocrinologists also develop an individualised treatment plan for patients and guide the appropriate use of medication. Standardised treatment is also provided for hypertension and dyslipidaemia associated with diabetes. The usual length of hospital stay is about one week. After hospital discharge, patients are seen by a specialist for regular follow-up and diabetes monitoring, such as measurement of HbA1c every three months and annual systematic medical check-ups. Some patients are also discharged from the hospital to a GP at a community practice close to their home for regular follow-up. When patients develop complications, most are seen by a hospital specialist [42].

From this typical diabetes patient journey, fragmentation and variation in the health care system can be seen and are major barriers to optimal diabetes care in China [43]. There are three main diabetes care models in China including

hospital-based care, community-based care, and a combination of both [44]. The function, advantages, and disadvantages of the three models are summarized in the table below.

Table 1.1. Three diabetes care models in China

	Hospital-based Care	Community-based Care	Hospital-Community Care
Function	A very common diabetes care model in China. Diabetologists based in tertiary and secondary care hospitals are the main providers for diabetes care, with other specialists in cardiology, neurology, ophthalmology, and nephrology taking part in a multidisciplinary team [45]. The care is hospital centred, mainly focussing on diagnosis and treatment in outpatients and inpatients. Nurses in hospitals provide health education for diabetes patients.	This care model is based on general practitioners and nurses in primary care and promoted by the national chronic disease management plan by the Chinese government in recent years. A lot of community health service centres were built in cities and rural areas in recent years. There is a state service (contract) agreement between primary care teams and diabetes patients. Community-based care mainly includes treatment, screening for diabetes complications, health education, establishing patients' health records and supporting self-management [46, 47].	In this model, hospitals have overall responsibility for the diagnosis and treatment of diabetes and screening and treatment of complications. Hospitals also have the responsibility for training GPs to improve their diabetes knowledge and clinical skills. Community health care providers are responsible for screening and following up high-risk patients with diabetes in their community. A referral system for diabetes patients is established between hospital and community services. Some of the diabetologists in hospitals are encouraged to set up clinics in the community [48].
Advantages	Diabetologists and specialist nurses have	Easily accessible for both patients in cities and rural	Health care sources are shared between hospitals and

	comprehensive knowledge and clinical skills in relation to diabetes diagnosis and management [49].	areas. It is more convenient and faster for patients with diabetes to receive care in community health service centres as compared to hospital-based care. Medical costs are less than that incurred from secondary care. Regular long-term follow-up and reminders for diabetes patients are easier to implement and have higher compliance. GPs can provide holistic care for patients, especially for those with comorbidities.	community health service centres. This model allows diabetes patients at different stages to receive a timelier and appropriate diagnosis and treatment plan.
Disadvantages	Not accessible to patients in rural areas. For urban areas, patients often freely visit multiple hospitals resulting in variation and duplication in care. Hospitals are often crowded with patients and doctors' consultation times are very limited in outpatient settings. Although hospitalized patients can achieve ideal blood glucose control, this often	Primary care physicians have only a basic knowledge of diabetes and associated clinical skills. Patients generally have more trust in the information and management they receive from hospital specialists than from GPs. Only a minority of primary care patients with diabetes in China are diagnosed, and	Hospitals take the leading role. Both hospitals and general practices are paid by a fee-for-service related to the care they complete for patients. Few patients are referred by hospital physicians from hospital to community. Communication between hospitals and general practices need improvement.

	deteriorates following hospital discharge. Long term follow-up and reminders for diabetes patients are seldom in place. Medical costs are huge. Holistic care is often neglected for patients with comorbidities.	few among them achieve optimal control. However, the current number of general practitioners is insufficient. Many new GPs are still under training.	

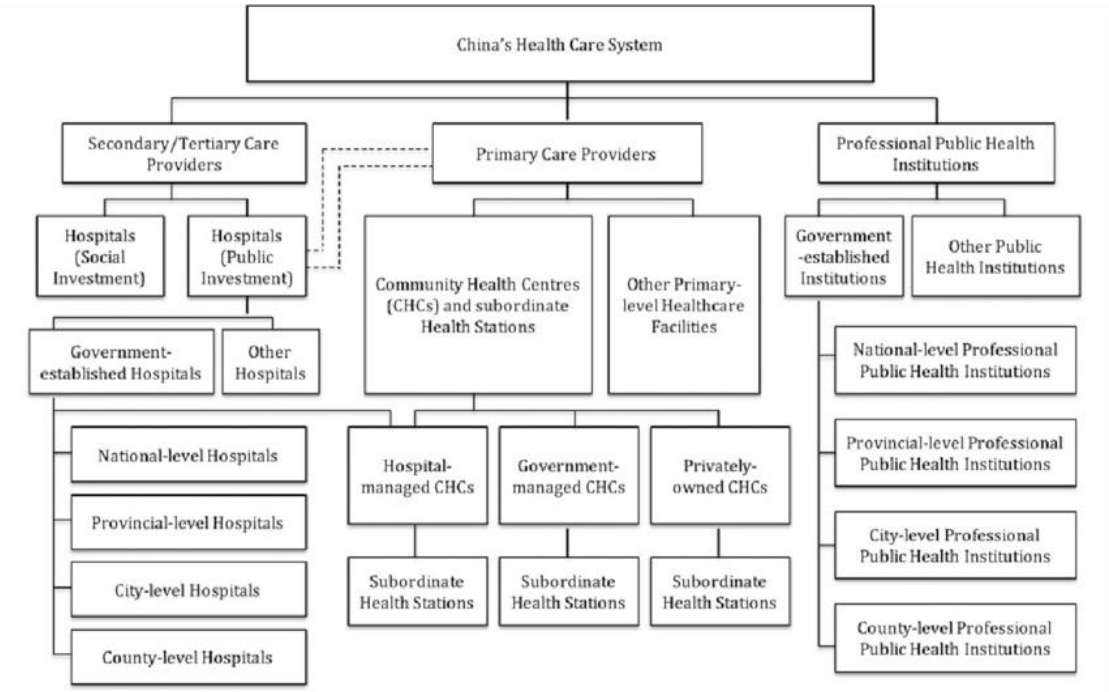
The Chronic Care Model (CCM) has been recommended for diabetes care by research and clinical guidelines [36, 50]. It consists of several elements that help to optimize the care of diabetes patients, especially in the context of a fragmented care delivery system. The core elements of the CCM are delivery system design, self-management support, decision support, clinical information systems, community resources and policies, and a quality-oriented culture in the health system. However, there are few studies on the use of the CCM in diabetes care in China. One research study conducted in twelve communities served by a community health service centre in Hangzhou city showed the benefits of CCM-based interventions in improving health behaviours, clinical outcomes, and the quality of life of 258 patients with T2DM in the short term [51]. However, no research has been reported on how the CCM can be implemented in both community service centres and hospitals and its clinical and cost-effectiveness.

1.3.3 Primary care system in China

Although there are several diabetes care models in China, primary care based in the community has become a central point for diabetes management. This is because the rising burden of diabetes, diabetes complications, multimorbidity and the increasingly ageing population, has brought great challenges to a healthcare system with an over-reliance on secondary care. It is now unfeasible for hospital-based endocrinologists to deliver the majority of care for diabetes patients.

From the experience of several countries around the world, a well-developed primary healthcare system, where the majority of people with type 2 diabetes are managed, appears to be a good foundation for better clinical outcomes [52]. This enables diabetes patients to receive timely, local access to medical support and holistic care. The WHO has therefore recommended to expand the delivery of and prioritize primary health care as a cornerstone of sustainable, people-centred, community-based, continuous, and integrated diabetes care, and to have good referral systems between primary and other levels of care [53]. The structure of the health care system and primary care providers in China is shown in **Figure 1.1** below.

Figure 1.1 The structure of the health care system and primary care providers in China



Source (with permission): Harry H. X. Wang et al, 2015. The dashed lines denote dual referral channels between primary care and secondary (tertiary) care providers. [54].

With the 2009 health care reforms, China made dramatic progress in strengthening the primary health care system. A universal health insurance coverage scheme, a basic public health service program, and a national essential drug system were developed by the government to improve access and affordability in primary health care [55]. For health insurance, the policies of reimbursement rates (normally a 70% government subsidy and 30% individual premium), deductibles and annual caps varied across regions [56].

The basic public health service program includes vaccinations, health education, child, maternal and elderly health management, traditional Chinese medicine, chronic conditions management (hypertension, type 2 diabetes, psychosis, and tuberculosis) and reporting of infectious diseases. The capacity building and performance assessment of those basic public health services were directed by disease control and prevention agencies in China [55].

In 2009, the Chinese government introduced the national essential medicine (NEM) system for public primary health care facilities. This program was a new policy in China and advocated prioritizing the use of essential medicines and the rational use of essential medicines [57]. The revised NEM list (2018) contains 685 drugs, with 165 drugs that were added in addition to the 2012 list. However, the number of diabetes and cardiovascular medications were relatively small, with 36 and 48, respectively [58]. Compared with the WHO Model List of Essential Medicines, long-acting insulin analogues and SGLT2 inhibitors which were widely used in the management of type 2 diabetes and improved outcomes were not seen in China NEM [59].

In 2018, there were 943,639 primary health care centres in China, including 34,997 urban community health centres, and 658,462 rural community health centres or village clinics. There were about 379,915 licensed doctors or

licensed assistant doctors in urban areas in primary care, as well as 768,813 licensed doctors or licensed assistant doctors in rural areas. Among those doctors, the number of qualified general practitioners is 308,740 [4].

Although primary care doctors were considered the first point of contact for diabetes patients, several studies found that they lacked knowledge, skills and confidence in diabetes care, and care provided by them was varied and less efficient than care delivered by hospital specialists [60]. Chinese health care needs a strong primary care system to deal with increasing demand and an adequate number of GPs in the workforce is seen to be a key part of the solution. However, this group of professionals may currently be underequipped for the task without significant investment in training and support.

1.3.4 GP training in China

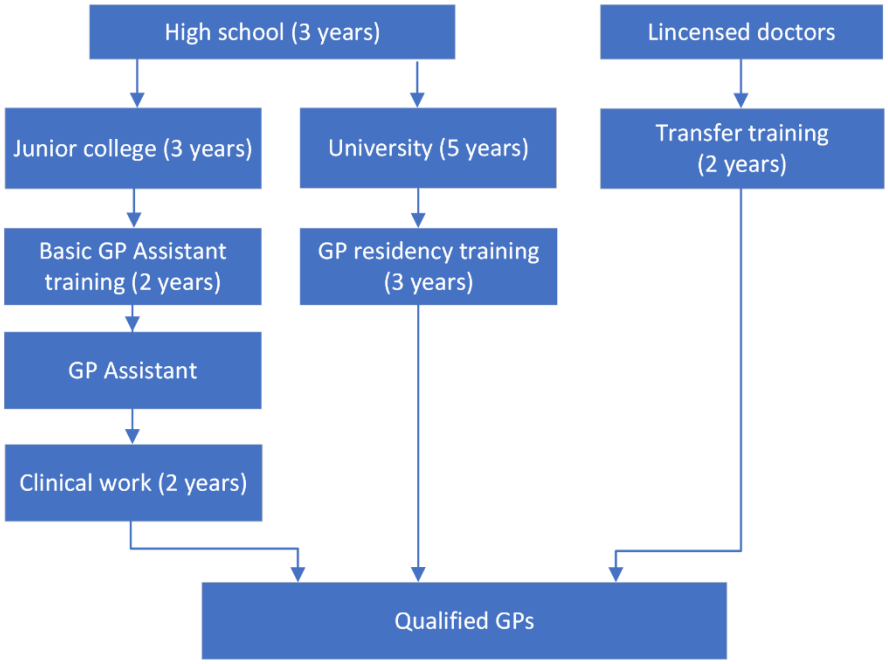
Long-term management of diabetes also requires a well-trained primary care workforce, which requires improvements in GP training. Formal medical training for primary health care doctors has three levels: medical college (5 years of medical education after 12 years of primary and secondary education to get a bachelor's degree in medicine); junior medical college (3 years of medical education after 12 years of primary and secondary education); and technical school (3 years of medical education after 9 years of primary and secondary education) [61].

In 2014, China formally established a system of national standardized medical residency training to improve the quality of physician training. Residency programs were set at 3 years in duration regardless of speciality and had to comply with these standards [62]. Medical students who have graduated from medical college and completed the national standardized medical residency training in general practice are qualified GPs. In the Chinese national GP training program, there is an aim to train up to 400,000 new GPs by 2030, to produce a total workforce of 700,000, equivalent to 2–3 per 1,000 population [63]. Predictably, much of the care of patients with T2DM are likely to move into general practice.

There are three main pathways to train GPs in China (see **Figure 1.2.**). First, the '3+2 pathway' to assistant GPs requires 3 years of junior college and 2 years of clinical training. Second, the 'transfer pathway' for current physicians (primary health care doctors or specialists) requires 2 years of postgraduate training. Third, the '5+3 pathway' comprises 5 years of a bachelor of science degree training in clinical medicine and 3 years of standardized residency training [61]. Although huge investment was made into establishing these pathways of GP training, many challenges remain within such a short time frame with many new GPs being trained. Variable quality of training including in the development of the curriculum, evaluation of training, and training of GP trainers, are all potential barriers to the development of an adequately trained

workforce [64]. Heterogeneity of GP training in China may have a negative effect on the quality and consistency of primary care in China.

Figure 1.2. GP training main pathways in China



1.4 Physician-patient communication in diabetes care and communication skills training

1.4.1 Importance of physician-patient communication in diabetes care

Diabetes care requires close collaboration between physicians and patients. Physician-patient communication can enhance collaboration and is a key element for achieving positive diabetes outcomes [65, 66]. Numerous cross-sectional studies and reviews have demonstrated that good physician-patient

communication can promote their relationship as well as improve diabetes patients' health outcomes, medication adherence, self-management, and patient experience and satisfaction [67-73]. Statements from the American Diabetes Association (ADA), the European Association for the Study of Diabetes (EASD) and NICE encourage physicians to use patient-centred communication styles [36, 37, 74].

Communication with diabetes patients includes skills to gather information, identify problems, establish an accurate diagnosis, discuss treatment options, offer therapeutic instructions and plans, establish long-term caring relationships with patients, and help patients to develop or strengthen their skills and confidence for effective diabetes self-care [75].

Communication is not only relevant to physical health issues but also emotional ones for diabetes patients. Poor mental health (e.g., depression and anxiety) is relatively common in people with diabetes and impacts self-care and quality of life in living with diabetes [76]. Communication on how diabetes impacts mental health can provide patients the opportunity to express their feelings and help patients gain confidence that doctors understand their perspectives and experiences [77].

Trust is another core element derived from good communication and long-term

physician-patient relationships [78-80]. Diabetes patients and physicians should trust each other that they are working in their best interests to achieve the best health outcomes. Trust can enhance diabetes patients continuing with their doctors, adherence to recommendations and overall satisfaction with care. One cross-sectional study showed that higher trust levels were associated with lower levels of difficulty in completing recommended care activities [81].

1.4.2 A brief review of physician-patient relationship theories and how it affects diabetes care

Theories of physician-patient relationships can provide a map for conceptualising and understanding how and why things happen and how individuals act. There are four main theoretical models to describe the physician-patient relationship, including the paternalistic model, the informative model, the interpretive model and the deliberative model (see **Table 1.2.**).

Table 1.2. Four models of the physician-patient relationship

	Paternalistic	**Informative**	**Interpretive**	**Deliberative**
Patient values	Objective and shared by physician and patient	Defined, fixed, and known to the patient	Inchoate and conflicting, requiring elucidation	Open to development and revision through moral discussion
Physician's obligation	Promoting the patient's wellbeing independent of the patient's current preferences	Providing relevant information and implementing patient's selected intervention	Elucidating and interpreting relevant patient values as well as informing the patient and implementing the patient's selected intervention	Articulating and persuading the patient of the most admirable values as well as informing the patient and implementing the patient's selected intervention
Patient autonomy	Assenting to objective values	Choice of, and control over, medical care	Self-understanding relevant to medical care	Moral self-development relevant to medical care
Physician's role	Guardian	Competent technical expert	Counselor or adviser	Friend or teacher

Source (with permission): Emanuel EJ et al, 1992 [82].

The paternalistic model is a traditional physician-patient relationship and is common in diabetes care in China. In this model, the patient is in a passive role and has no active involvement in decision making. A physician presents a patient with specific information and encourages the patient to consent. One

qualitative study on GPs' perspectives of type 2 diabetes patients' adherence reported that GPs often become directing and paternalistic to cope more easily with communication barriers. The paternalistic model can be seen when physicians shock their patients with worrying information, or pressure and threaten to send them to hospital to improve compliance and adherence. However, this paternalistic attitude can induce guilt and anxiety in patients [83].

The deliberative model is a more ideal model of the physician-patient relationship and is closely linked with shared decision-making (SDM). In SDM, the physician and patient share medical information and make decisions together in deliberative dialogue. The patient expresses his or her preferences for treatment and the physician presents different choices and the benefits and harms of each [84]. Several diabetes guidelines recommend SDM for physicians and patients and to select treatments when considering patient needs, values and preferences [85].

SDM can be facilitated by decision aids (e.g., Diabetes Medication Choice Decision Aid) for diabetes management, which can facilitate patients and physicians to discuss the goals and treatment choices in the context of patient preferences [86]. Several clinical trials on SDM and diabetes identified that SDM increased knowledge and realistic expectations regarding individual cardiac risk and probabilities of the benefits and harms of preventive treatment

options [87, 88]. One systematic review on SDM and outcomes in T2DM, which included 16 studies, found a positive association between SDM and improved decision quality, patient knowledge and patient risk perception [89].

It is worth noting that there has been little research investigating the communication experiences of patients with diabetes and GPs in China by considering the current models of the physician-patient relationship and how this impacts on diabetes care and self-management. It is likely that GPs trained to have good communication skills can improve the patient-physician relationship and increase trust between patients and doctors, and thereby improve diabetes outcomes.

1.4.3 Communication core skills and principles

Communication skills are one of the most important competencies for physicians and are required for the effective practice of medicine [90, 91]. There are several aspects to communication skills including active listening, the use of open questions, picking up verbal/ non-verbal cues, facilitation, clarification, reflection, silence, empathy, sharing information, shared decision making, motivational interviewing and breaking bad news [92]. One systematic review on physician-patient communication in primary care found several verbal and non-verbal behaviours were positively associated with health outcomes. Verbal behaviours included empathy, reassurance and support, various patient-

centred questioning techniques, positive reinforcement, humour, psychosocial talk, health education and information sharing, summarising and clarification. Non-verbal behaviours included head nodding, leaning forward, direct body orientation, uncrossed legs and arms, arm symmetry, and less mutual gaze [93].

1.4.4 Communication skills training and its evidence in China

Training in communication skills is vitally important for physicians to undertake their role effectively and it is not a skill that can necessarily be naturally acquired through clinical practice alone. Furthermore, surveys have found that physicians tend to overestimate their communication skills and patients want better communication with their physicians [72]. Studies have also shown that physicians communication skills tend to decline and lose their focus on patient-centred care over time [94]. However, training has been found to improve doctor-patient communication [95-98].

In China, poor communication and relationships between doctors and patients have been reported in recent studies, which has led to a low level of trust [99-101]. This suggests that there is a large unmet need for training physicians in communication skills. However, studies and reviews on doctor-patient communication skills training in China found that communication skills training is currently rarely provided in medical schools, or in continuing medical education for residents and practicing physicians in China [102]. Before these

studies can happen, research is first needed to develop high quality training programmes on communication skills.

From a constructivist perspective in the healthcare professional training, knowledge, skills and attitudes are acquired in the process of active learning. Knowledge is the condition of being aware of facts and concepts which are the foundation for the ability to apply the skills to perform a task or to modify an attitude. Attitude is a way of thinking or feeling about objects, people and situations and is reflected in a person's behaviour. Changes in attitude will bring about changes in people's behaviour. Understanding Chinese doctors' attitudes and beliefs towards communication skills will have fundamental importance for training program designers and teachers.

Diabetes poses a huge healthcare burden given its high prevalence and complexity. Diabetes care is gradually moving from secondary to primary care in a transitioning healthcare system in China, where the GP workforce may be ill-prepared for the challenge. Good care for a complex condition needs physician-patient communication where this complexity can be discussed, challenges navigated, and information conveyed in a way that helps patients feel informed and in control of their condition. However, most GPs in China currently lack the communication skills required. Thus, it is necessary to develop a training model with sound evidence of effectiveness and which

appropriately considers the context of China's health care system.

1.5 Aims and objectives of this thesis

The aim of this thesis is to develop an evidence-based communication skills training program in diabetes care for general practitioners in China. The specific objectives are:

1. To summarize the findings of randomized controlled trials on the effectiveness of communication skills training for healthcare professionals on the outcomes and experience of patients with diabetes.

2. To explore GPs' experiences in communicating with diabetes patients and how these may relate to communication skills training needs.

3. To explore diabetes patients' experiences in communicating with GPs and how these may relate to GPs' communication skills training needs.

4. To develop and tailor communication skills training for Chinese GPs in diabetes care.

1.6 Overview of this thesis

Chapter 2

Methodological considerations for this thesis are discussed in this chapter. Due to the numerous components in communication skills, several frameworks and theories are considered and a conceptual framework for this thesis is presented.

Chapter 3

In this chapter, a systematic review summarises the findings of randomized controlled trials on the effectiveness of communication skills training for healthcare professionals on the outcomes and experience of patients with diabetes and hypertension. Key ingredients for successful communication skills training for diabetes care are summarised and research gaps highlighted.

Chapter 4

This chapter reports a focus group study exploring the perceptions of GPs in China, particularly in relation to their experiences of communicating with diabetes patients, doctor-patient relationships, and the socio-cultural context impacting on diabetes care and self-management, as well as training issues. Following thematic analysis, themes on GPs' communication experiences are described as well as key issues for the development of primary care-based management of diabetes in China. These findings can help inform the development of an appropriate communication skills training program for the primary care workforce.

Chapter 5

This chapter reports a focus group study with Chinese diabetes patients on their experiences of communicating with GPs in relation to their diabetes care. This

describes the need for people with type 2 diabetes to have more access to trustworthy diabetes information and their wish for better channels of communication with their GPs. This study identifies key elements of patients' communication experience with GPs and enriches the information available for developing an appropriate communication skills training program for diabetes care.

Chapter 6

This chapter reports the process of identifying training priorities and unresolved communication issues for Chinese GPs in diabetes care by using a modified nominal group technique. Based on the systematic review of the literature, and qualitative research with GPs and patients, a provisional list of communication skills training priorities was developed. Through group discussions and rating, priorities for communication skills training for Chinese GPs in diabetes care were identified as well as major gaps in diabetes management in primary care.

Chapter 7

This chapter summarises the overall key findings from the thesis and discusses its implications for policy, clinical practice, and future research.

1.7 References

1. Wang L, Gao P, Zhang M, Huang Z, Zhang D, Deng Q, Li Y, Zhao Z, Qin X, Jin D *et al*: **Prevalence and Ethnic Pattern of Diabetes and Prediabetes in China in 2013**. *JAMA* 2017, **317**(24):2515-2523.

2. Xu Y, Wang L, He J, Bi Y, Li M, Wang T, Wang L, Jiang Y, Dai M, Lu J *et al*: **Prevalence and Control of Diabetes in Chinese Adults**. *JAMA* 2013, **310**(9):948-959.

3. Li Y, Teng D, Shi X, Qin G, Qin Y, Quan H, Shi B, Sun H, Ba J, Chen B *et al*: **Prevalence of diabetes recorded in mainland China using 2018 diagnostic criteria from the American Diabetes Association: national cross sectional study**. *BMJ* 2020, **369**:m997.

4. National Health Commission of People's Republic of China: **China health statistical yearbook 2019**. Beijing: Peking union medical college publishing house; 2019.

5. Jia W, Weng J, Zhu D, Ji L, Lu J, Zhou Z, Zou D, Guo L, Ji Q, Chen L *et al*: **Standards of medical care for type 2 diabetes in China 2019**. *Diabetes Metab Res Rev* 2019, **35**(6):e3158.

6. Ma RCW, Lin X, Jia W: **Causes of type 2 diabetes in China**. *The Lancet Diabetes & Endocrinology* 2014, **2**(12):980-991.

7. Zhang B, Zhai FY, Du SF, Popkin BM: **The China Health and Nutrition Survey, 1989-2011**. *Obes Rev* 2014, **15 Suppl 1**(0 1):2-7.

8. Buse JB, Ginsberg HN, Bakris GL, Clark NG, Costa F, Eckel R, Fonseca V, Gerstein HC, Grundy S, Nesto RW *et al*: **Primary**

Prevention of Cardiovascular Diseases in People With Diabetes Mellitus. *Diabetes Care* 2007, **30**(1):162.

9. Tuttle KR, Bakris GL, Bilous RW, Chiang JL, de Boer IH, Goldstein-Fuchs J, Hirsch IB, Kalantar-Zadeh K, Narva AS, Navaneethan SD *et al*: **Diabetic Kidney Disease: A Report From an ADA Consensus Conference**. *Diabetes Care* 2014, **37**(10):2864.

10. Ma RCW: **Epidemiology of diabetes and diabetic complications in China**. *Diabetologia* 2018, **61**(6):1249-1260.

11. Pan C, Yang W, Jia W, Weng J, Tian H: **Management of Chinese patients with type 2 diabetes, 1998–2006: the Diabcare-China surveys**. *Current Medical Research and Opinion* 2009, **25**(1):39-45.

12. Liu Z, Fu C, Wang W, Xu B: **Prevalence of chronic complications of type 2 diabetes mellitus in outpatients - a cross-sectional hospital based survey in urban China**. *Health and Quality of Life Outcomes* 2010, **8**(1):62.

13. Lu B, Wen J, Song XY, Dong XH, Yang YH, Zhang ZY, Zhao NQ, Ye HY, Mou B, Chen FL *et al*: **High prevalence of albuminuria in population-based patients diagnosed with type 2 diabetes in the Shanghai downtown**. *Diabetes Research and Clinical Practice* 2007, **75**(2):184-192.

14. Zhou Y, Echouffo-Tcheugui JB, Gu J-j, Ruan X-n, Zhao G-m, Xu W-h, Yang L-m, Zhang H, Qiu H, Narayan KMV *et al*: **Prevalence of chronic kidney disease across levels of glycemia among adults in Pudong New Area, Shanghai, China**. *BMC Nephrol* 2013, **14**:253-253.

15. Liu L, Wu X, Liu L, Geng J, Yuan Z, Shan Z, Chen L: **Prevalence of diabetic retinopathy in mainland China: a meta-analysis**. *PLoS One* 2012, **7**(9):e45264-e45264.

16. Clarke PM, Glasziou P, Patel A, Chalmers J, Woodward M, Harrap SB, Salomon JA, Group AC: **Event rates, hospital utilization, and costs associated with major complications of diabetes: a multicountry comparative analysis**. *PLoS Med* 2010, **7**(2):e1000236-e1000236.

17. Pearson-Stuttard J, Bennett J, Cheng YJ, Vamos EP, Cross AJ, Ezzati M, Gregg EW: **Trends in predominant causes of death in individuals with and without diabetes in England from 2001 to 2018: an epidemiological analysis of linked primary care records**. *Lancet Diabetes Endocrinol* 2021, **9**(3):165-173.

18. Gijsen R, Hoeymans N, Schellevis FG, Ruwaard D, Satariano WA, van den Bos GAM: **Causes and consequences of comorbidity: A review**. *Journal of Clinical Epidemiology* 2001, **54**(7):661-674.

19. Piette JD, Kerr EA: **The Impact of Comorbid Chronic Conditions on Diabetes Care**. *Diabetes Care* 2006, **29**(3):725.

20. Wolff JL, Starfield B, Anderson G: **Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly**. *Archives of Internal Medicine* 2002, **162**(20):2269-2276.

21. Maddigan SL, Feeny DH, Johnson JA: **Health-related quality of life deficits associated with diabetes and comorbidities in a Canadian National Population Health Survey**. *Quality of Life Research* 2005, **14**(5):1311-1320.

22. Nowakowska M, Zghebi SS, Ashcroft DM, Buchan I, Chew-Graham C, Holt T, Mallen C, Van Marwijk H, Peek N, Perera-Salazar R *et al*: **The comorbidity burden of type 2 diabetes mellitus: patterns, clusters and predictions from a large English primary care cohort**. *BMC Medicine* 2019, **17**(1):145.

23. Anderson RJ, Freedland KE, Clouse RE, Lustman PJ: **The Prevalence of Comorbid Depression in Adults With Diabetes: A meta-analysis**. *Diabetes Care* 2001, **24**(6):1069-1078.

24. The Emerging Risk Factors C: **Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies**. *The Lancet* 2010, **375**(9733):2215-2222.

25. Waeber B, Feihl F, Ruilope L: **Diabetes and Hypertension**. *Blood Pressure* 2001, **10**(5-6):311-321.

26. Gao N, Yuan Z, Tang X, Zhou X, Zhao M, Liu L, Ji J, Xue F, Ning G, Zhao J *et al*: **Prevalence of CHD-related metabolic comorbidity of diabetes mellitus in Northern Chinese adults: the REACTION study**. *Journal of Diabetes and its Complications* 2016, **30**(2):199-205.

27. Li J-Q, Wang Y-H, Lu Q-D, Xu Y-Y, Shi J, Lu L, Bao Y-P: **Prevalence of psychological distress in type ii diabetes in China: A systematic review and meta-analysis**. 2019, **3**(4):147-152.

28. Ricci-Cabello I, Stevens S, Kontopantelis E, Dalton ARH, Griffiths RI, Campbell JL, Doran T, Valderas JM: **Impact of the Prevalence of Concordant and Discordant Conditions on the Quality of Diabetes**

Care in Family Practices in England. *The Annals of Family Medicine* 2015, **13**(6):514.

29. Krein SL, Heisler M, Piette JD, Makki F, Kerr EA: **The Effect of Chronic Pain on Diabetes Patients' Self-Management**. *Diabetes Care* 2005, **28**(1):65-70.

30. Zhou M, Wang H, Zeng X, Yin P, Zhu J, Chen W, Li X, Wang L, Wang L, Liu Y *et al*: **Mortality, morbidity, and risk factors in China and its provinces, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017**. *The Lancet* 2019, **394**(10204):1145-1158.

31. Bragg F, Holmes MV, Iona A, Guo Y, Du H, Chen Y, Bian Z, Yang L, Herrington W, Bennett D *et al*: **Association Between Diabetes and Cause-Specific Mortality in Rural and Urban Areas of China**. *JAMA* 2017, **317**(3):280-289.

32. Chen A, Jacobsen KH, Deshmukh AA, Cantor SB: **The evolution of the disability-adjusted life year (DALY)**. *Socio-Economic Planning Sciences* 2015, **49**:10-15.

33. Khan MAB, Hashim MJ, King JK, Govender RD, Mustafa H, Al Kaabi J: **Epidemiology of Type 2 Diabetes - Global Burden of Disease and Forecasted Trends**. *J Epidemiol Glob Health* 2020, **10**(1):107-111.

34. **IDF diabetes atlas, ninth edition. 2019. Date accessed: 13th Oct 2021.** [https://diabetesatlas.org/en/resources/]

35. He X, Zhang Y, Zhou Y, Dong C, Wu J: **Direct Medical Costs of Incident Complications in Patients Newly Diagnosed With Type 2 Diabetes in China**. *Diabetes Therapy* 2021, **12**(1):275-288.

36. Association AD: **Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes—2021**. *Diabetes Care* 2021, **44**(Supplement 1):S7.

37. Cosentino F, Grant PJ, Aboyans V, Bailey CJ, Ceriello A, Delgado V, Federici M, Filippatos G, Grobbee DE, Hansen TB *et al*: **2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD: The Task Force for diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and the European Association for the Study of Diabetes (EASD)**. *European Heart Journal* 2020, **41**(2):255-323.

38. Balk EM, Earley A, Raman G, Avendano EA, Pittas AG, Remington PL: **Combined Diet and Physical Activity Promotion Programs to Prevent Type 2 Diabetes Among Persons at Increased Risk: A Systematic Review for the Community Preventive Services Task Force**. *Annals of Internal Medicine* 2015, **163**(6):437-451.

39. **Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38**. *BMJ* 1998, **317**(7160):703.

40. **Improving Health Outcomes of People with Diabetes Mellitus: Target Setting to Reduce the Global Burden of Diabetes Mellitus by 2030. 2021. Date accessed: 13th Oct 2021.** [https://cdn.who.int/media/docs/default-source/searo/india/health-topic-pdf/noncommunicable-diseases/eb150---annex-2-(diabetes-targets)---final-(for-web).pdf?sfvrsn=c2fa5e2c_3&download=tru]

41. Ji L, Hu D, Pan C, Weng J, Huo Y, Ma C, Mu Y, Hao C, Ji Q, Ran X *et al*: **Primacy of the 3B approach to control risk factors for cardiovascular disease in type 2 diabetes patients**. *Am J Med* 2013, **126**(10):925 e911-922.

42. **Sohu Health: Tips on how to access healthcare for the diabetes population. 2016. Date accessed: 5th Jan 2022.** [https://www.sohu.com/a/114541443_104952]

43. Yip W, Hsiao W: **Harnessing the privatisation of China's fragmented health-care delivery**. *Lancet (London, England)* 2014, **384**(9945):805-818.

44. Jia W, Tong N: **Diabetes prevention and continuing health-care reform in China**. *The Lancet Diabetes & Endocrinology* 2015, **3**(11):840-842.

45. Wang J W LY, Li L X: **Diabetes management in China：types and reflections**. *Chinese General Practice* 2021, **24**(24):3019-3025.

46. Li Y F WHX, Wang J J: **Study of the interventions of contracted service model for community general practice team on multiple chronic diseases**. *Chinese Community Doctors* 2020, **36**(22):77-78.

47. Chinese Diabetes Society NOFPD: **National guidelines for the prevention and control of diabetes in primary care**. *Chinese Journal of Internal Medicine* 2018, **57**(12):885-893.

48. Ma LH XJ, Xie DH: **Study on effect of hospital-community integration model on blood glucose management in diabetic patients**. *Hospital Management Forum* 2020, **37**(3):78-80.

49. Zhu CM LKH, Feng LY: **The effect of health education and self-management model on diabetes mellitus: a review**. *Chinese Health Service Management* 2017, **34**(5):392-394.

50. Bodenheimer T, Wagner EH, Grumbach K: **Improving Primary Care for Patients With Chronic Illness**. *JAMA* 2002, **288**(14):1775-1779.

51. Kong J-X, Zhu L, Wang H-M, Li Y, Guo A-Y, Gao C, Miao Y-Y, Wang T, Lu X-Y, Zhu H-H *et al*: **Effectiveness of the Chronic Care Model in Type 2 Diabetes Management in a Community Health Service Center in China: A Group Randomized Experimental Study**. *Journal of Diabetes Research* 2019, **2019**:6516581.

52. Renders CM, Valk GD, Griffin SJ, Wagner EH, Eijk van JT, Assendelft WJJ: **Interventions to Improve the Management of Diabetes in Primary Care, Outpatient, and Community Settings: A systematic review**. *Diabetes Care* 2001, **24**(10):1821-1833.

53. **WHO global strategy on people-centred and integrated health services. 2015. Date accessed: 13th Oct 2021.** [https://apps.who.int/iris/bitstream/handle/10665/155002/WHO_HIS_SDS_2015.6_eng.pdf]

54. Wang HHX, Wang JJ, Wong SYS, Wong MCS, Mercer SW, Griffiths SM: **The development of urban community health centres for strengthening primary care in China: a systematic literature review**. *Br Med Bull* 2015, **116**:139-153.

55. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H *et al*: **The primary health-care system in China**. *Lancet (London, England)* 2017, **390**(10112):2584-2594.

56. Meng Q, Fang H, Liu X, Yuan B, Xu J: **Consolidating the social health insurance schemes in China: towards an equitable and efficient health system**. *The Lancet* 2015, **386**(10002):1484-1492.

57. Song Y, Bian Y, Petzold M, Li L, Yin A: **The impact of China's national essential medicine system on improving rational drug use in primary health care facilities: an empirical study in four provinces**. *BMC Health Services Research* 2014, **14**(1):507.

58. He J, Tang M, Ye Z, Jiang X, Chen D, Song P, Jin C: **China issues the National Essential Medicines List (2018 edition): Background, differences from previous editions, and potential issues**. *Biosci Trends* 2018, **12**(5):445-449.

59. **WHO Model List of Essential Medicines—22nd list. 2021. Date accessed: 1st Feb 2022.** [https://www.who.int/publications/i/item/WHO-MHP-HPS-EML-2021.02]

60. Woolley A, Li L, Solomon J, Li J, Huang K, Chahal P, Chahal P, Tu G, Chahal P, Chattopadhyay K: **What are the development priorities for management of type 2 diabetes by general practitioners in Ningbo, China: a qualitative study of patients' and practitioners' perspectives**. *BMJ Open* 2020, **10**(9):e037215.

61. Lian S, Chen Q, Yao M, Chi C, Fetters MD: **Training Pathways to Working as a General Practitioner in China**. *Fam Med* 2019, **51**(3):262-270.

62. Lio J, Ye Y, Dong H, Reddy S, McConville J, Sherer R: **Standardized residency training in China: the new internal medicine curriculum**. *Perspect Med Educ* 2018, **7**(1):50-53.

63. **General Office of the State Council of the People's Republic of China: Opinions of the General Office of the State Council on Reforming and Improving General Practitioner Training and Incentive Mechanisms. 2018. Date accessed: June 30 2021.** [http://www.gov.cn/zhengce/content/2018-01/24/content_5260073.html]

64. Zou C, Liao X-y, Spicer J, Hayhoe B: **Ten years' GP training in China: progress and challenges**. *British Journal of General Practice* 2020, **70**(699):511.

65. Parchman ML, Flannagan D, Ferrer RL, Matamoras M: **Communication competence, self-care behaviors and glucose control in patients with type 2 diabetes**. *Patient Educ Couns* 2009, **77**(1):55-59.

66. Jones A, Vallis M, Cooke D, Pouwer F: **Working Together to Promote Diabetes Control: A Practical Guide for Diabetes Health Care Providers in Establishing a Working Alliance to Achieve Self-Management Support**. *J Diabetes Res* 2016, **2016**:2830910.

67. Piette JD, Schillinger D, Potter MB, Heisler M: **Dimensions of patient-provider communication and diabetes self-care in an ethnically diverse population**. *J Gen Intern Med* 2003, **18**(8):624-633.

68. Ratanawongsa N, Karter AJ, Parker MM, Lyles CR, Heisler M, Moffet HH, Adler N, Warton EM, Schillinger D: **Communication and**

medication refill adherence: the Diabetes Study of Northern California. *JAMA Intern Med* 2013, **173**(3):210-218.

69. Holt RI, Nicolucci A, Kovacs Burns K, Escalante M, Forbes A, Hermanns N, Kalra S, Massi-Benedetti M, Mayorov A, Menéndez-Torre E *et al*: **Diabetes Attitudes, Wishes and Needs second study (DAWN2™): cross-national comparisons on barriers and resources for optimal care--healthcare professional perspective**. *Diabet Med* 2013, **30**(7):789-798.

70. Naik AD, Kallen MA, Walder A, Street RL, Jr.: **Improving hypertension control in diabetes mellitus: the effects of collaborative and proactive health communication**. *Circulation* 2008, **117**(11):1361-1368.

71. Stewart MA: **Effective physician-patient communication and health outcomes: a review**. *CMAJ* 1995, **152**(9):1423-1433.

72. Ha JF, Longnecker N: **Doctor-patient communication: a review**. *Ochsner J* 2010, **10**(1):38-43.

73. Peimani M, Nasli-Esfahani E, Sadeghi R: **Patients' perceptions of patient–provider communication and diabetes care: A systematic review of quantitative and qualitative studies**. *Chronic Illness* 2020, **16**(1):3-22.

74. **Type 2 diabetes in adults: management. 2020. Date accessed: June 30 2021.** [https://www.nice.org.uk/guidance/ng28/chapter/Recommendations#individualised-care]

75. Cradock S, Barnard KD: Psychology and Diabetes Care. London: Springer; 2012.

76. de Groot M, Golden SH, Wagner J: **Psychological conditions in adults with diabetes**. *Am Psychol* 2016, **71**(7):552-562.

77. Dickinson JK, Guzman SJ, Maryniuk MD, O'Brian CA, Kadohiro JK, Jackson RA, D'Hondt N, Montgomery B, Close KL, Funnell MM: **The Use of Language in Diabetes Care and Education**. *Diabetes Care* 2017, **40**(12):1790.

78. Crawshaw R, Rogers DE, Pellegrino ED, Bulger RJ, Lundberg GD, Bristow LR, Cassel CK, Barondess JA: **Patient-Physician Covenant**. *JAMA* 1995, **273**(19):1553-1553.

79. Mainous AG, 3rd, Baker R, Love MM, Gray DP, Gill JM: **Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom**. *Fam Med* 2001, **33**(1):22-27.

80. Thom DH: **Physician behaviors that predict patient trust**. *J Fam Pract* 2001, **50**(4):323-328.

81. Bonds DE, Camacho F, Bell RA, Duren-Winfield VT, Anderson RT, Goff DC: **The association of patient trust and self-care among patients with diabetes mellitus**. *BMC Family Practice* 2004, **5**(1):26.

82. Emanuel EJ, Emanuel LL: **Four Models of the Physician-Patient Relationship**. *JAMA* 1992, **267**(16):2221-2226.

83. Wens J, Vermeire E, Royen PV, Sabbe B, Denekens J: **GPs' perspectives of type 2 diabetes patients' adherence to treatment:**

A qualitative analysis of barriers and solutions. *BMC family practice* 2005, **6**(1):20-20.

84. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, Cording E, Tomson D, Dodd C, Rollnick S *et al*: **Shared decision making: a model for clinical practice**. *J Gen Intern Med* 2012, **27**(10):1361-1367.

85. Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, Peters AL, Tsapas A, Wender R, Matthews DR: **Management of Hyperglycemia in Type 2 Diabetes, 2015: A Patient-Centered Approach: Update to a Position Statement of the American Diabetes Association and the European Association for the Study of Diabetes**. *Diabetes Care* 2015, **38**(1):140.

86. Rodriguez-Gutierrez R, Gonzalez-Gonzalez JG, Zuñiga-Hernandez JA, McCoy RG: **Benefits and harms of intensive glycemic control in patients with type 2 diabetes**. *BMJ* 2019, **367**:l5887.

87. Branda ME, LeBlanc A, Shah ND, Tiedje K, Ruud K, Van Houten H, Pencille L, Kurland M, Yawn B, Montori VM: **Shared decision making for patients with type 2 diabetes: a randomized trial in primary care**. *BMC Health Services Research* 2013, **13**(1):301.

88. Buhse S, Kuniss N, Liethmann K, Müller UA, Lehmann T, Mühlhauser I: **Informed shared decision-making programme for patients with type 2 diabetes in primary care: cluster randomised controlled trial**. *BMJ Open* 2018, **8**(12):e024004.

89. Saheb Kashaf M, McGill ET, Berger ZD: **Shared decision-making and outcomes in type 2 diabetes: A systematic review and meta-analysis**. *Patient Education and Counseling* 2017, **100**(12):2159-2171.

90. Baig LA, Violato C, Crutcher RA: **Assessing clinical communication skills in physicians: are the skills context specific or generalizable**. *BMC Med Educ* 2009, **9**:22.

91. Batalden P, Leach D, Swing S, Dreyfus H, Dreyfus S: **General competencies and accreditation in graduate medical education**. *Health Aff (Millwood)* 2002, **21**(5):103-111.

92. Margaret Lloyd RB, Lorraine Noble: **Clinical Communication Skills for Medicine**, 4th edn. London: Elsevier; 2018.

93. Beck RS, Daughtridge R, Sloane PD: **Physician-patient communication in the primary care office: a systematic review**. *The Journal of the American Board of Family Practice* 2002, **15**(1):25.

94. Brown JB, Boles M, Mullooly JP, Levinson W: **Effect of clinician communication skills training on patient satisfaction. A randomized, controlled trial**. *Ann Intern Med* 1999, **131**(11):822-829.

95. Harms C, Young JR, Amsler F, Zettler C, Scheidegger D, Kindler CH: **Improving anaesthetists' communication skills**. *Anaesthesia* 2004, **59**(2):166-172.

96. Ranjan P, Kumari A, Chakrawarty A: **How can Doctors Improve their Communication Skills?** *J Clin Diagn Res* 2015, **9**(3):JE01-JE04.

97. Levinson W, Lesser CS, Epstein RM: **Developing physician communication skills for patient-centered care**. *Health Aff (Millwood)* 2010, **29**(7):1310-1318.

98. Bai S, Wu B, Yao Z, Zhu X, Jiang Y, Chang Q, Bai X, Tong T: **Effectiveness of a modified doctor–patient communication training Programme designed for surgical residents in China: a prospective, large-volume study at a single Centre**. *BMC Medical Education* 2019, **19**(1):338.

99. Pun JKH, Chan EA, Wang S, Slade D: **Health professional-patient communication practices in East Asia: An integrative review of an emerging field of research and practice in Hong Kong, South Korea, Japan, Taiwan, and Mainland China**. *Patient Educ Couns* 2018, **101**(7):1193-1206.

100. Ting X, Yong B, Yin L, Mi T: **Patient perception and the barriers to practicing patient-centered communication: A survey and in-depth interview of Chinese patients and physicians**. *Patient Educ Couns* 2016, **99**(3):364-369.

101. Zhang X, Sleeboom-Faulkner M: **Tensions between medical professionals and patients in mainland China**. *Camb Q Healthc Ethics* 2011, **20**(3):458-465.

102. Liu X, Rohrer W, Luo A, Fang Z, He T, Xie W: **Doctor-patient communication skills training in mainland China: a systematic review of the literature**. *Patient Educ Couns* 2015, **98**(1):3-14.

CHAPTER 2. METHODOLOGICAL CONSIDERATIONS

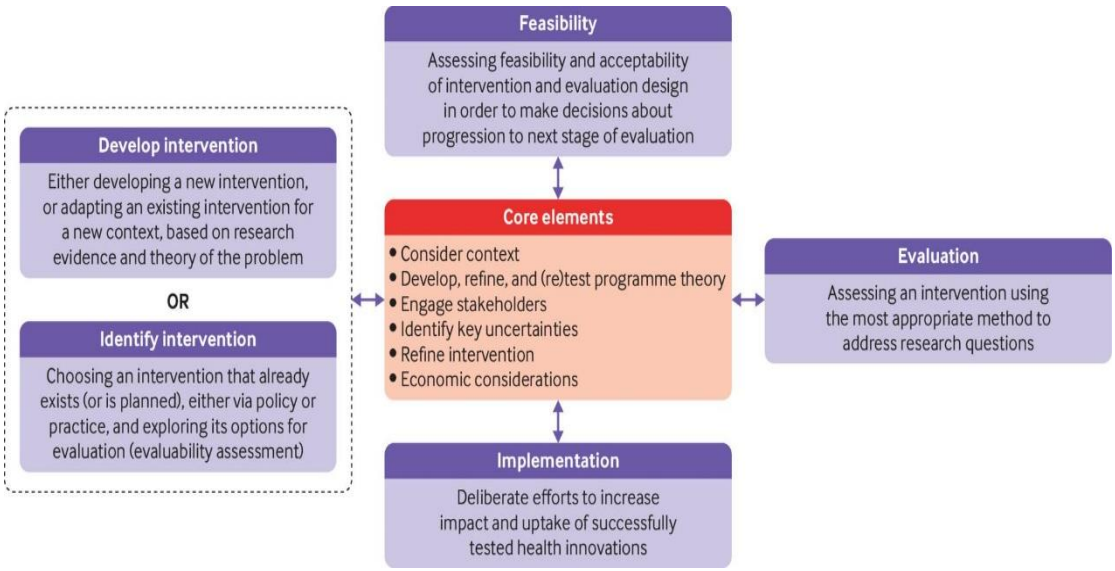
Communication skills are complex and consist of multiple components, therefore can be considered as a complex intervention. Existing research for GPs' communication skills training in China is limited [1]. General practice in China is still a relatively new speciality and, at the same time, most care of chronic conditions care is managed by secondary care. Given the changing and reforming health care system context in China and the diversity of GPs' behaviour in clinical practice and attitudes towards training, the development of communication skills training programs is challenging. For the above reasons, a variety of theoretical frameworks were considered to support the effective development, implementation, and evaluation of a complex intervention aiming to improve GPs' communication skills with diabetes patients. I will discuss three of these below: the Medical Research Council (MRC) framework [2], action research [3], and adult learning theories for developing and evaluating complex communication skills training interventions [4]. The first two frameworks are considered for research design, the last one is for understanding GPs' learning and practice behaviours. A designed conceptual framework for this thesis is presented at the end of this chapter.

2.1 Medical Research Council (MRC) framework

The United Kingdom's Medical Research Council has recommended a framework for the development, evaluation and implementation of complex intervention services, public health interventions, and educational programs [2,

5]. It plays an important role in supporting effective intervention development and delivery and contextualising it to real-world settings. The MRC framework follows the stages of developing or identifying interventions, testing feasibility, undertaking an evaluation and implementation [6]. (**Figure 2.1.**) Although the stages appear sequential, the phases can be iterative. The framework recommends that a systematic review is first needed to identify the evidence base and establish an appropriate theoretical basis for an intervention. Qualitative studies on stakeholders' views and experiences and exploring barriers and facilitators are also recommended by the MRC framework.

Figure 2.1. MRC framework for the evaluation of complex interventions



Source (with permission): Skivington et al, 2021[6].

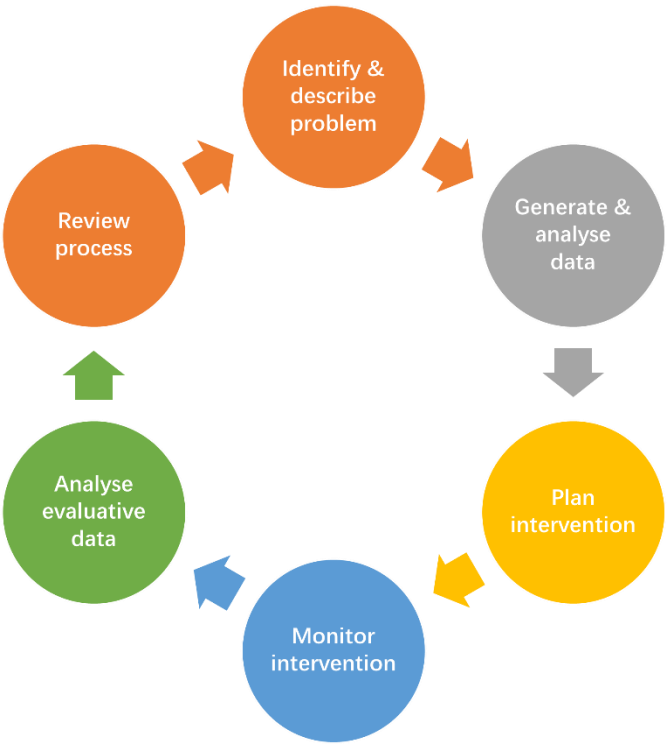
Communication skills training for doctors has multiple components, such as training material, training of trainers and training methods. It also requires attention to various outcomes, such as training experience and impact on patients' health outcomes. Owing to this complexity, which spans training design and evaluation, the MRC conceptual framework was considered in my research design. There are several benefits of using the MRC framework in developing a communication skills training program for doctors in China, including basing on evidence and testing feasibility. Those can answer: 1) what is the status of doctor-patient communication,2) how an effective doctor training program should be3) how doctors would accept the training program. However, the influence of context on a particular interaction was less focused in the version of the MRC framework that was reviewed at the outset of this PhD program (though the MRC framework has been updated to have a greater focus on context in its 2021 iteration). Another limitation of the MRC framework is that the collaboration between researchers and their research participants is seldom mentioned. Action research theory corrects this and is discussed in the following paragraphs.

2.2 Action research theory

Action research is a methodology for change and development. It is a systematic approach in which the action researchers and clients collaborate in the problem diagnosing and developing a solution based on the diagnosis. This

theory assumes that the social world is constantly changing, with both researchers and research being one part of that change [3, 7]. It also facilitates a focus on specific situations and the influence of context on research. It is found to be well suited for the development, investigation, implementation, and evaluation of complex interventions involving researchers and healthcare providers in the research process by suggesting changes in practices, especially for providing a richness of insight [8]. Action research follows several stages: problem identification, planning and action, reflection and learning [9]. (**Figure 2.2**) Action research is widely used in the healthcare and education context and facilitates implementation of realistic interventions to effect behavioural change in specific settings [10], such as developing and evaluating health care service, and improving healthcare providers' competencies [11, 12].

Figure 2.2. The cyclical action research process



Source: Somekh, 2006 [9] (an amended version).

Developing training programs for doctors is an education activity that involves interaction between designers, educators and learners. Exploration of such collaboration can be guided by action research approaches. More importantly, participants are also seen as experts on their own experience and feelings in action research. In this thesis, focus group studies with diabetes patients and GPs were designed to identify problems that exist in doctor-patient communication (step 1: describing problem). This approach recognised the participation and influence of researchers. Reflection was gathered after focus groups (step 2: generating and analysing data) and guided priorities that should be incorporated in an intervention on training communication skills explored using nominal group technique (step 3: planning intervention). GPs and education designers took part in these discussions to decide the optimal communication skills training strategies. Action research is a way to bring researchers and participants closer to each other within an interpretivist paradigm. As patients and GPs may see the world differently, an intervention that acknowledges their perspectives is important from the thoughts of the researcher.

Although action research places an emphasis on researcher participation and is widely used in the education context, it has much in common with MRC framework. Both recognise the systematic approach of developing and evaluating complex interventions and were used for this PhD research design.

However, when exploring how communication skills training might be accepted and implemented in daily work by GPs, the ways in which adults learn and behave should not be neglected, especially in the constantly changing health care system context in China, where there is a gradual strengthening of primary care. Therefore, adult learning theories were examined to see how they might inform the aim of this thesis.

2.3 Adult Learning Theories

Adult learning theories consider that adults learn in a different way compared to children [4, 13]. Malcolm Knowles introduced the concept of andragogy compared with pedagogy [14]. There are several characteristics in adult learning which include self-directed learning, using life experience to help with learning and applying new knowledge to real-life situations.[15]. Many adult learning theories use the perspective of constructivism, in which learning is based on learners past experience, and knowledge, attitudes and values [16]. Adult learning theories can be grouped into several categories including behaviourist learning theory, social learning theory, cognitive learning theory, humanistic theory, and transformative learning theory [13].

Considered from a constructivist approach, development of communication skills training for GPs in China needs to take into account that these learners

had their initial training in universities or colleges, and often went on to acquire further qualifications. As they developed within clinical practice, they also acquired experience and knowledge at the workplace and in contact with patients. In this thesis, qualitative studies were used to explore GP's experience as well as their attitudes and preferences.

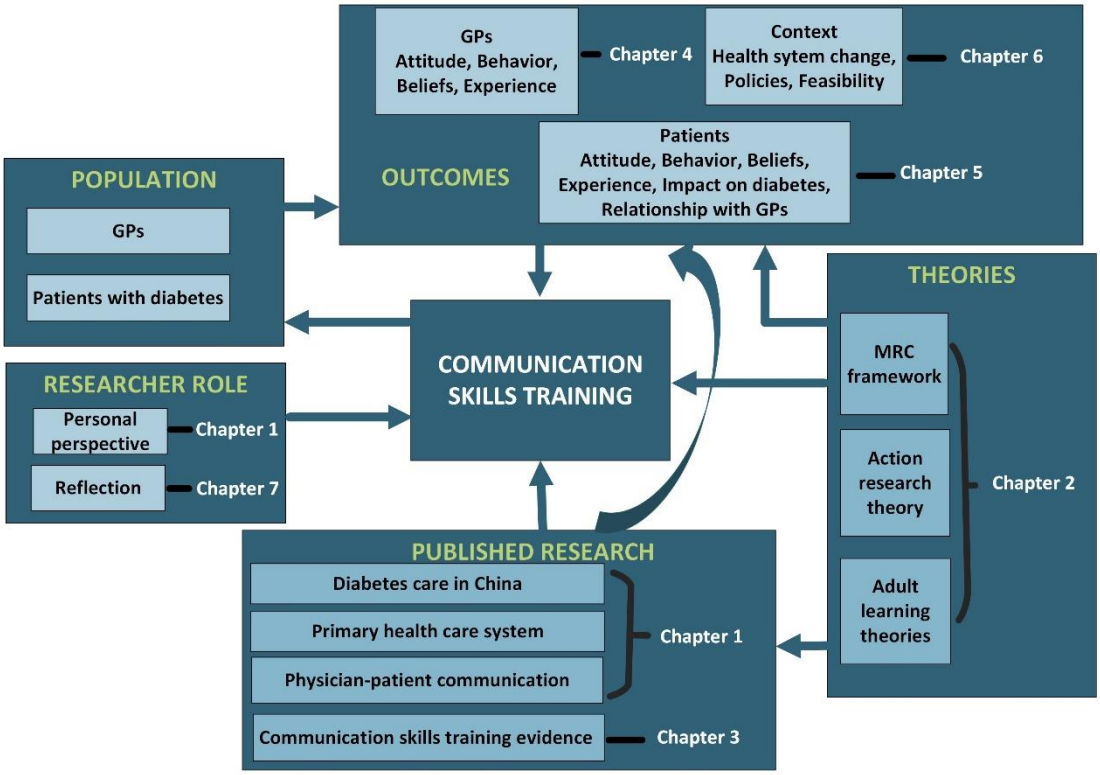
In the context of this research, the changing China primary health care system can also be seen as a social environment that leads GPs to change learning and practice behaviours, which led to a consideration of social learning theory. Due to policy and economical changes, GPs' behaviours have had to change, which may relate to aspects of behaviourist theory. When GPs in China consider their individual development through an education program, cognitive learning may be applied. However, transformative learning theory may provide additional insights, particularly when GPs experience a disorienting dilemma in communication with patients in their daily practice and start to self-examine and reflect. As both a GP in China and a researcher, I have seen examples of these various models in my own daily practice and was aware that some of these theories might apply to this PhD research. At the design stage of the research, it was unclear which of these theories may be most appropriate or whether the application of a multi-theories approach (combining the above) may need to be considered [4] . I came to realise that I might need to consider multiple approaches to adult learning theory, and that it was perhaps

inappropriate to rely exclusively on a single model at the design phase of my research.

2.4 Conceptual framework for this thesis

The considerations above suggested the need for a systematic and iterative approach to the research design, to identify and refine an intervention that considered the local context and environment, emphasised the importance of engaging GPs, and explored factors that influence their behaviours and attitudes in learning and practice. With learning from those theories, a framework was developed for this thesis design (**Figure 2.3.**) and this model shows the links to other chapters. Various components of the development of a communication skills training program for GPs, the dynamic context of China primary health care system and role of the researcher were all considered in this framework.

Figure 2.3. Conceptual framework and linked chapters for this thesis.



2.5 References

1. Liu X, Rohrer W, Luo A, Fang Z, He T, Xie W: **Doctor-patient communication skills training in mainland China: a systematic review of the literature**. *Patient Educ Couns* 2015, **98**(1):3-14.

2. Craig P, Dieppe P, Macintyre S, Michie S, Nazareth I, Petticrew M: **Developing and evaluating complex interventions: the new Medical Research Council guidance**. *BMJ* 2008, **337**:a1655.

3. Willis JW, Edwards CL, Casamassa M: **Action research : models, methods, and examples** Charlotte, North Carolina : Information Age Publishing Incorporated; 2014.

4. Taylor DC, Hamdy H: **Adult learning theories: implications for learning and teaching in medical education: AMEE Guide No. 83**. *Med Teach* 2013, **35**(11):e1561-1572.

5. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, Moore L, O'Cathain A, Tinati T, Wight D *et al*: **Process evaluation of complex interventions: Medical Research Council guidance**. *BMJ* 2015, **350**:h1258.

6. Skivington K, Matthews L, Simpson SA, Craig P, Baird J, Blazeby JM, Boyd KA, Craig N, French DP, McIntosh E *et al*: **A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance**. *BMJ* 2021, **374**:n2061.

7. de Brún T, O'Reilly-de Brún M, O'Donnell CA, MacFarlane A: **Learning from doing: the case for combining normalisation process theory and participatory learning and action research methodology for**

primary healthcare implementation research. *BMC Health Services Research* 2016, **16**(1):346.

8. Ollila S, Yström A: **Action research for innovation management: three benefits, three challenges, and three spaces**. 2020, **50**(3):396-411.

9. Somekh B: **Action research: a methodology for change and development** Maidenhead : Open University Press; 2006.

10. Sendall MC, McCosker LK, Brodie A, Hill M, Crane P: **Participatory action research, mixed methods, and research teams: learning from philosophically juxtaposed methodologies for optimal research outcomes**. *BMC Medical Research Methodology* 2018, **18**(1):167.

11. Malterud K: **Action research--a strategy for evaluation of medical interventions**. *Fam Pract* 1995, **12**(4):476-481.

12. Cordeiro L, Soares CB: **Action research in the healthcare field: a scoping review**. *JBI Database System Rev Implement Rep* 2018, **16**(4):1003-1047.

13. Mukhalalati BA, Taylor A: **Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators**. *J Med Educ Curric Dev* 2019, **6**:1-10.

14. Knowles M: **The adult learner: A neglected species**, 3rd edn. Houston: Gulf Publishin; 1984.

15. Merriam SB: **Adult learning : linking theory and practice.**San Francisco : Jossey-Bass; 2014.

16. Cleland JA, Durning SJ, Artino AR: **Researching medical education** Chichester, England : Wiley Blackwell; 2015.

CHAPTER 3. THE IMPACT OF TRAINING HEALTHCARE PROFESSIONALS' COMMUNICATION SKILLS ON THE CLINICAL CARE OF DIABETES AND HYPERTENSION: A SYSTEMATIC REVIEW AND META-ANALYSIS

Contents of this chapter have been published:

Yao, M., Zhou, Xy., Xu, Zj. et al. The impact of training healthcare professionals' communication skills on the clinical care of diabetes and hypertension: a systematic review and meta-analysis. BMC Fam Pract 22, 152 (2021).

3.1 Abstract

Background

Diabetes and hypertension care require effective communication between healthcare professionals and patients. Training programs may improve the communication skills of healthcare professionals but no systematic review has examined their effectiveness at improving clinical outcomes and patient experience in the context of diabetes and hypertension care.

Methods

We conducted a systematic review of randomized controlled trials to summarize the effectiveness of any type of communication skills training for healthcare professionals to improve diabetes and/or hypertension care compared to no training or usual care. We searched Medline, Embase, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews (CDSR), ClinicalTrials.gov and the World Health Organization International Clinical Trials Registry Platform from inception to August 2020 without language restrictions. Data on the country, type of healthcare setting, type of healthcare professionals, population, intervention, comparison, primary outcomes of glycated hemoglobin (HbA1c) and blood pressure, and secondary outcomes of quality of life, patient experience and understanding, medication adherence and patient-doctor relationship were extracted for each included study. Risk of bias of included

studies was assessed by Cochrane risk of bias tool.

Results

7011 abstracts were identified, and 19 studies met the inclusion criteria. These included a total of 21,762 patients and 785 health professionals. 13 trials investigated the effect of communication skills training in diabetes management and 6 trials in hypertension. 10 trials were at a low risk and 9 trials were at a high risk of bias. Training included motivational interviewing, patient centred care communication, cardiovascular disease risk communication, shared decision making, cultural competency training and psychological skill training. The trials found no significant effects on HbA1c (n = 4501, pooled mean difference -0.02 mmol/mol, 95% CI -0.10 to 0.05), systolic blood pressure (n = 2505, pooled mean difference -2.61 mmHg, 95% CI -9.19 to 3.97), or diastolic blood pressure (n = 2440, pooled mean difference -0.06 mmHg, 95% CI -3.65 to 2.45). There was uncertainty in whether training was effective at improving secondary outcomes.

Conclusion

The communication skills training interventions for healthcare professionals identified in this systematic review did not improve HbA1c, BP or other relevant outcomes in patients with diabetes and hypertension. Further research is needed to methodically co-produce and evaluate communication skills training

for chronic disease management with healthcare professionals and patients.

3.2 Introduction

Diabetes mellitus and hypertension are common chronic conditions and major risk factors for disability and mortality worldwide. It is estimated that 475 million adults were living with diabetes in 2017 and 874 million adults had systolic blood pressure of 140 mm Hg or higher in 2015 globally [1, 2]. The prevalence of diabetes and hypertension continue to increase due to aging populations and an increase in lifestyle risk factors [3, 4]. Hypertension and diabetes carry an increased risk of cardiovascular diseases, including myocardial infarction and stroke, that are among the most important causes of premature death and disability [5]. Importantly, diabetes and hypertension frequently coexist and require long-term self-management to improve outcomes and quality of life [6,7,8]. However, the management of hypertension and diabetes is often poor in terms of low patient awareness, poor medication compliance and incidence of preventable complications [9, 10].

Success in diabetes and hypertension care requires effective communication between health professionals and patients [11, 12]. This can enhance patient engagement and is associated with increased understanding of treatment, adherence to recommendations and patient satisfaction, as well as improved clinical outcomes [13, 14]. One systematic review of randomized trials of

integrated care programs for people with type 2 diabetes found that better communication and information flow enabled timely treatment intensification, improved control of cardiometabolic risk factors and promoted self-care behaviors [15].

Effective communication skills involve active listening, empathy, the use of open questions, forming an understanding of patients' perspectives, knowledge and expectations, and the ability to share information appropriately [16]. Healthcare professionals should be competent at acquiring and explaining relevant health information, counselling patients, providing treatment options, and building long term therapeutic relationships in order to achieve the best possible health outcomes as a core part of their skill set.

Motivational interviewing is one approach to improving communication between physicians and patients that can be used to enhance diabetes and hypertension self-care and management. Motivational interviewing is a person-centered counseling style that enables healthcare professionals to explore patients' motivations and facilitate behaviour change [17]. Several systematic reviews have shown that motivational interviewing is associated with improvement in self-management and glycemic control in the short-term as well as quality of life [18, 19]. A randomized trial of motivational interviewing in hypertension management suggested that it helped to sustain the clinical benefits of

adherence behavior [20].

Shared decision making (SDM) is another key approach to communication that can be appropriately applied in diabetes and hypertension care [21]. SDM is defined as patients and healthcare professionals jointly discussing clinical factors, harms and benefits of treatment options and patient preferences, in order to reach a decision based on mutual agreement [22]. SDM often requires consideration of different management options, such as dietary change, exercise and medication, that may require significant lifestyle changes [23].

Despite the rising interest in improving communication skills for healthcare professionals, it remains unclear to what extent communication skills training improves the clinical management and outcomes for patients with cardiometabolic disease. This systematic review aimed to summarise the findings of randomized controlled trials on the effectiveness of communication skills training for healthcare professionals on the outcomes and experience of patients with diabetes and hypertension.

3.3 Method

We initially conducted a scoping search for reports of any type of studies investigating the effectiveness of communication skills training for healthcare professionals on clinical and patient-reported outcomes for diabetes and

hypertension care. We conducted the scoping search in EMBASE, MEDLINE, the Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews (CDSR), the Epistemonikos database (https://www.epistemonikos.org/), and PROSPERO (https://www.crd.york.ac.uk/PROSPERO/) using the search terms: communication, interview, shared decision making, training, diabetes and hypertension. We were unable to identify any existing or ongoing systematic reviews summarising the effectiveness of communication skills training for healthcare professionals on outcomes for patients with diabetes and hypertension. We registered our systematic review protocol on PROSPERO (registration ID: CRD42019129696) and designed and reported our review in accordance with the Preferred Reporting Items for Systematic Review and Meta-analysis Protocols (PRISMA-P) [24].

3.3.1 Search strategy

The search strategy was designed (supplementary file 1) to find eligible articles reporting randomised controlled trials (RCTs) in the following databases from inception to August 2020: Medline (Ovid SP), Embase(Ovid SP), CINAHL(EBSCO Host), PsycINFO(Ovid SP),Cochrane Central Register of Controlled Trials (CENTRAL, Cochrane Library (Wiley)) and Cochrane Database of Systematic Reviews (CDSR, Cochrane Library (Wiley)). We also searched ClinicalTrials.gov (https://clinicaltrials.gov/) and the World Health

Organization International Clinical Trials Registry Platform (https://www.who.int/clinical-trials-registry-platform). There was no language limitation. References from included articles were also hand searched to identify eligible studies. For ongoing or unpublished RCTs, we contacted the corresponding author by e-mail to request relevant information. Searches were documented in a table contained search term(s), information source, date of coverage and number of articles found.

3.3.2 Eligibility criteria

Study design

All relevant RCTs, including cluster-randomised trials, were eligible for inclusion. There was no limit to the study setting and period or length of follow-up.

Population

Studies were eligible if they recruited healthcare professionals, including physicians, nurses, pharmacists and dietitians within primary and secondary care settings. Studies that assessed training of medical students were not included. Include studies must have assessed outcomes from adult or paediatric patients with a diagnosis of type 1 or 2 diabetes mellitus, or adults with a diagnosis of hypertension or both hypertension and diabetes. Studies that derived outcomes from patients with gestational diabetes mellitus (GDM) were not included.

Interventions

Eligible studies tested communication skills training, where the care of diabetes and/or hypertension was the main focus, against usual or no training as comparators. Communication skills included consultation skills, conversation, interview, and shared decision making. Studies where training was only one component in a complex intervention were not included.

Outcomes

Three categories of outcomes were assessed: clinical outcomes, patient reported outcomes and self-management, and measures of the patient-doctor relationship. Clinical outcomes included changes in systolic and diastolic blood pressure, body mass index (kg/m2), glycated haemoglobin (HbA1c), and lipid concentrations. Patient reported outcomes and self-management included patients' understanding or awareness of diabetes and hypertension, risk perception, adherence to medications, self-care, quality of life, health status and wellbeing (including anxiety). The patient-doctor relationship was assessed using measures of trust, patient satisfaction and communication performance.

3.3.3 Data management

All search results were uploaded into reference management software Mendeley for automatic checking of duplicate entries. Mendeley was also used

to screen titles and abstracts after duplicate studies had been removed. The total number of articles before and after removal of duplicates was documented.

3.3.4 Study selection

Before title and abstract screening, two reviewers (MY and XYZ) agreed on how to apply the eligibility criteria and then independently screened titles and abstracts of retrieved records according to the pre-specified eligibility criteria. Any disagreements were resolved by discussion, or when required, by a third reviewer (RL). The number of titles or abstracts selected and reasons for exclusion were recorded at all stages of the study selection process.

Full-text copies of all potentially relevant articles were retrieved and assessed independently by two reviewers for selection. Disagreements in this phase were resolved by consensus or resolved by a third reviewer. The total number of full-text articles selected and reasons for exclusion were documented.

3.3.5 Data collection process

Data extraction was performed independently by two reviewers (MY and ZJX) any differences in data extraction were discussed until consensus was reached. The third reviewer (RL) helped resolve any discrepancies in the extracted data.

We extracted data onto standard Excel forms after a pilot test. Study

characteristics extracted were: authors, article title, year of publication, country in which the study was performed, study design, care setting, study participants, number of participants in each intervention group, participants' age (mean and range) and gender, eligibility criteria, details of the interventions in each trial arm, intervention duration (including the time spent on different components of training [e.g. training on theory, curriculum and content]), type of training, primary and secondary outcomes, length of follow-up, and source of funding.

For missing or unclear data, we requested further information from the first or corresponding author of the study by e-mail.

3.3.6 Quality (risk of bias) assessment

We assessed the risk of bias using the Cochrane risk-of-bias tool for randomised controlled trials to classify each study as being at low, high or unclear risk of bias in each domain. The tool contains six bias domains: selection bias (random sequence generation and allocation concealment), performance bias, detection bias, attrition bias, reporting bias and other bias [25].

For cluster randomised controlled trials, we also assessed the risk of bias in terms of recruitment bias, baseline imbalance, loss of clusters, incorrect analysis and comparability with individually randomised trials, in accordance

with Chapter 16.3.2 of the Cochrane Handbook for Systematic Reviews [25].

Two authors (MY and ZJX) independently assessed each trial for risk of bias. Disagreements were resolved by consensus, or by discussion with a third reviewer (RL).

3.3.7 Outcomes and data synthesis

For each included study, the population, intervention, control group and outcomes were described. For binary outcomes, we calculated the relative risk (RR) and 95% confidence interval (CI) where outcomes were sufficiently reported. For continuous outcomes (e.g. Likert scales), we reported the mean difference (MD) and 95% CIs for trials that used the same or similar assessment scales. For trials that measured the same outcome with different assessment scales, we used the standardised mean difference (SMD) and 95% CIs.

We initially assessed for methodological heterogeneity by comparing studies in terms of participants, interventions, outcomes and other study characteristics. Where studies were methodologically heterogeneous, we summarized the results narratively.

Where studies were judged to be sufficiently methodologically homogeneous, we pooled their findings by meta-analysis. We investigated statistical

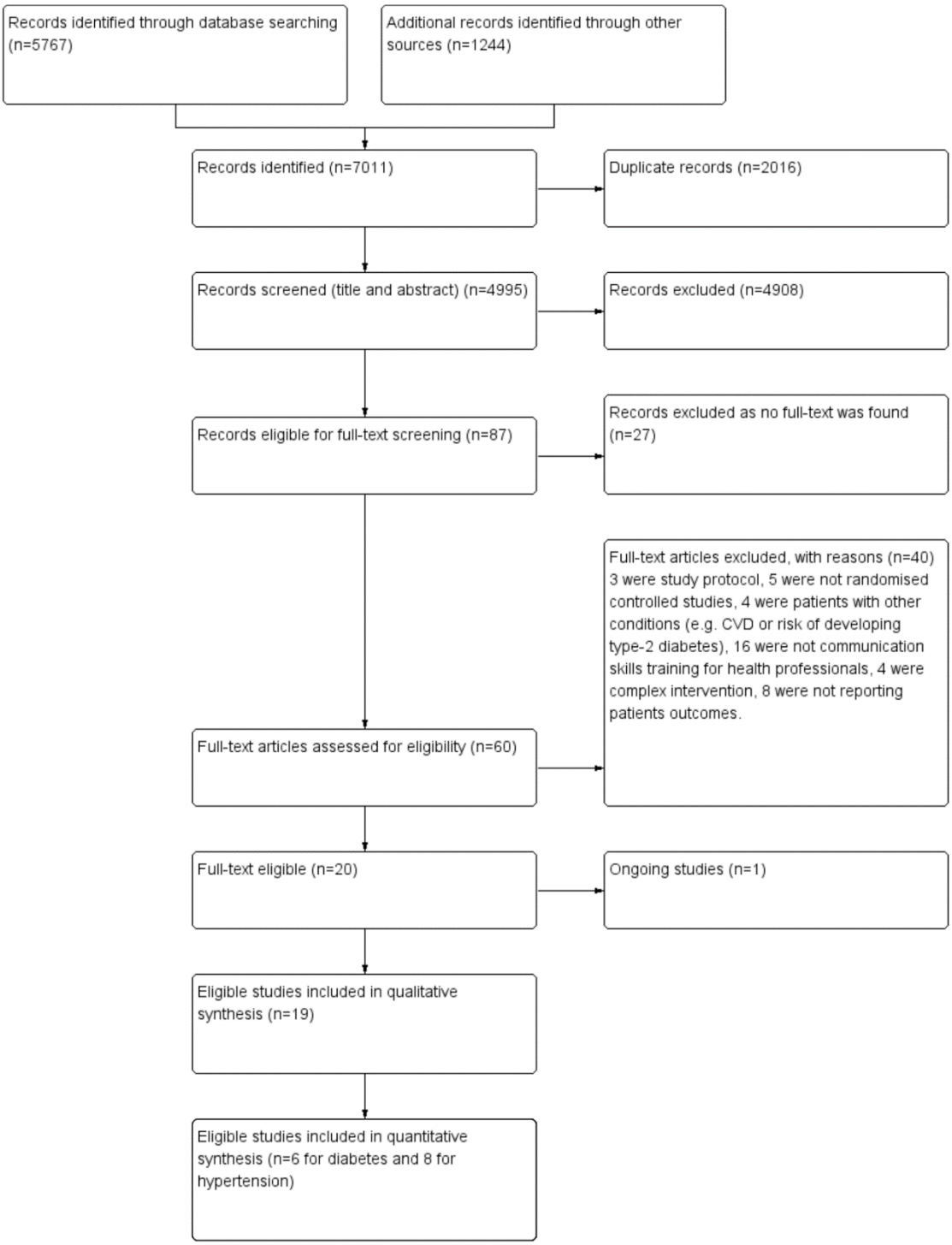
heterogeneity between studies by considering the I2 statistic alongside the Chi2 test. Given the complex nature of training interventions we anticipated that there would be a degree of methodological heterogeneity and therefore combined study results using a random-effects model. For binary outcomes, we presented the summary estimate as a RR with a 95% CI. For continuous outcomes we presented a pooled MD or SMD with a 95%CI. All statistical analysis was conducted using Review Manager 5.3 software.

3.4 Results

3.4.1 Results of search

7011 relevant records were identified and 4995 included in title and abstract screening after removing duplicates (**Figure 3.1.**). 87 records were eligible for full-text screening after the screening of titles and abstracts. We were unable to locate the full text for 27 articles (conference abstracts and posters). From 60 potentially eligible full-text articles, 19 original trial reports were included. 40 studies were excluded because three were study protocols, five were not randomised controlled studies, four were patients with other conditions (e.g., cardiovascular disease or at-risk of developing type-2 diabetes), 16 did not evaluate communication skills training for health professionals, four evaluated complex interventions (training did not form a significant part), and eight did not report patient outcomes.

Figure 3.1. Flow diagram of training healthcare professionals in communication skills in diabetes and hypertension



3.4.2 Characteristics of included trials

19 trials published in full were identified. 13 trials were cluster RCT (512 clusters) and 6 were individual RCT (**Table 3.1.**). 21, 762 patients and 785 health professionals (484 doctors,229 nurses and 37 dietitians) were reported in these trials. 13 trials investigated the communication skills training effect on patients with diabetes: one in Type 1 DM, nine in Type 2 DM, and three in both. 6 trials investigated the training effect on patients with hypertension. 17 trials studied the effect of training on doctors and nurses, one trials for pharmacist and one for dietitians.

3.4.3 Type and duration of intervention

8 trials aimed to train health professionals in motivational interviewing with theory and specific skills (**Table 3.2.**). 4 trials focused on patient centered care communication training. 2 trials aimed at cultural competency training. 1 trial investigated shared decision making training and another one deployed psychological skills training. The remaining 5 trials mainly used general communication training as an intervention (e.g., risk communication, BATH interview (Background, Affect, Troubling, Handling, and Empathy), and constructive consultations). Most trials used the following methods: teaching curriculum, lectures, group discussions, workshops, role played interaction, web-based modules and feedback to implement communication skills training.

The total length of training in 8 trials was more than two days, in 3 trials was less than one day. 9 trials reported training design and evaluation before study.

3.4.4 Measurement of outcomes

Most trials used the following clinical outcome measures: HbA1C (8 trials), blood pressure or blood pressure control (10 trials), BMI (8 trials), lipids (7 trials). Many different validated questionnaires were used to measure patients' quality of life(5 trials), beliefs, understanding, knowledge (6 trials), self-determination, self-care, self-efficacy, empowerment, enablement, confidence (8 trials), medication adherence (7 trials), patient-doctor relationship (6 trials) and psychological well-being (4 trials). These questionnaires were:

- The diabetes specific quality of life (1 trial)
- The EuroQol (1 trial)
- Audit of diabetes dependent quality of life (1 trial)
- The EQ-5D (1 trial)
- The SF-12 (1 trial)
- Determinants of Lifestyle Behavior Questionnaire (1 trial)
- The Problem Areas in Diabetes (PAID) scale (1 trial)

- The Diabetes Empowerment Process Scale (1 trial)
- The chronic disease self-efficacy scales (1 trial)
- The Management Self Efficacy Scale for people with DM2 (1 trial)
- The Summary of Diabetes Self Care Activities (2 trials)
- The Diabetes Illness Representation Questionnaire (1 trial)
- The Brief Illness Perception Questionnaire (1 trial)
- The Perceived Competence for Diabetes Scale (1 trial)
- The Treatment Self-Regulation Questionnaire (2 trials)
- The Clinician & Group Survey – Adult Primary Care Questionnaire (1 trial)
- The Medication Adherence Report Scale (2 trials)
- The Hill-Bone Compliance to High Blood Pressure Therapy Scale (1 trial)
- The Health Care Climates Questionnaire (3 trials)
- The Patients' perceived participation (1 trial)
- The Combined Outcome Measure for Risk communication and treatment Decision making Effectiveness scale (1 trial)

- Diabetes Treatment Satisfaction Questionnaire (1 trial)
- The Health Literacy Assessment Questions (1 trial)
- The Short Form Spielberger State Anxiety Inventory (1 trial)
- The PHQ- 9 (1 trial)
- The Diabetes Distress Scale (1 trial)

Table 3.1. Characteristics of included studies (n=19, ordered by study time)

Study	Condition	Health professionals	Patients	Comparison	Outcome	Longest duration of follow-up	Country	Context	Methods
Kinmonth 1998	Type 2 diabetes	n=107 (43 GPs and 64 nurses) Age: NA	n=360 Mean age: 57.7 Sex: 59.2% male	Int: Patient centred care skills training Con: No training	HbA1C, blood pressure, lipids, BMI Communication performance, patient satisfaction, patient understanding, quality of life (ADDQoL), wellbing	12 months	UK	Primary care	Cluster RCT (n=41)
Brug 2007	Diabetes	n=37 (dietitians) Age: 24 to 45	n=209 Mean age: NA Sex: NA	Int: Motivational interviewing training Con: No training	HbA1C, BMI Self-care management	6 months	Netherlands	Home-care organizations	Individual RCT
Rubak 2009	Type 2 diabetes	n=65 (GPs) Age: NA	n=265 Mean age: NA Sex: NA	Int: Motivational interviewing training Con: No training	Patient-doctor relationship (Health Care Climates Questionnaire), self-care management (Summary of Diabetes Self Care Activities), patient understanding (Diabetes Illness Representation Questionnaire)	12 months	Denmark	Primary care	Cluster RCT (n=48)

Sequist 2010	Diabetes	n=124 (91 GPs and 33 NPs) Age: NA	n=2699 Mean age: 62.4 Sex: 48.7% male	Int: Cultural competency training Con: No training	HbA1C, blood pressure, lipids, BMI Communication performance,	12 months	USA	Primary care	Cluster RCT (n=31)
Heinrich 2010	Type 2 diabetes	n=33 (nurses) Age: NA	n=584 Mean age: 59 Sex: 45.1% male	Int: Motivational interviewing training Con: No training	HbA1C, blood pressure, lipids, BMI Patient-doctor relationship (Health Care Climates Questionnaire), self-care management (Summary of Diabetes Self Care Activities), quality of life (DSQoL)	24 months	Netherlands	Primary care	Cluster RCT (n=33)
Rubak 2011	Type 2 diabetes	n=140 (GPs) Age: NA	n=628 Mean age: 61 Sex: 58% male	Int: Motivational interviewing training Con: No training	HbA1C, blood pressure, lipids, BMI	12 months	Denmark	Primary care	Cluster RCT (n=80)
Robling 2012	Type 1 diabetes	n=79 (Health practitioners) Age: NA	n=693 Mean age: 4 to 15 Sex: 49% male	Int: Talking Diabetes consulting skills Con: No training	HbA1C, BMI Quality of life, self-care management	12 months	UK	Secondary and tertiary care	Cluster RCT (n=26)
Farmer 2012	Type 2 diabetes	n:NA Age: NA	n=211 Mean age: 63.2	Int: Theory of planned	HbA1C Adherence (Medication Adherence Report	3 months	UK	Primary care	Cluster RCT (n=13)

			Sex: 65.4% male	behaviour training Con: No training	Scale), health status (12-item Short Form Medical Outcomes), satisfaction (Diabetes Treatment Satisfaction Questionnaire)				
Welschen 2012	Type 2 diabetes	n:NA Age: NA	n=262 Mean age: 58.6 Sex: 43.1% male	Int: Six-step CVD risk communication training Con: No training	Patient understanding, wellbeing (Short Form Spielberger State Anxiety Inventory), risk perception (Brief Illness Perception Questionnaire), satisfaction (COMRADE scale)	3 months	Netherlands	A managed care system coordinates patients and specialists	Individual RCT
Jansink 2013	Type 2 diabetes	n=53 (nurses) Age: 42.7	n=521 Mean age: 64.0 Sex: 54.9% male	Int: Motivational interviewing training Con: No training	HbA1C, blood pressure, lipids, BMI Quality of life (Euroqol)	14 months	Netherlands	Primary care	Cluster RCT (n=58)
Tinsel 2013	Hypertension	n:NA Age: NA	n=1120 Mean age: 64.4 Sex: 45.7% male	Int: Shared decision making Con: No training	Blood pressure Patient understanding, Adherence (Medication Adherence Report Scale)	20 months	Germany	Primary care	Cluster RCT (n=37)
Juul 2014	Type 1 and 2 diabetes	n=34 (nurses) Age: NA	n=4034 Mean age:	Int: Communication	HbA1C, lipids, BMI Health status (12-item	18 months	Denmark	Primary care	Cluster RCT (n=40)

			60.5 Sex: 56.5% male	skills training Con: No training	Short Form Medical Outcomes), Patient-doctor relationship (Health Care Climates Questionnaire), Patient understanding (Problem Areas in Diabetes scale and Perceived Competence for Diabetes Scale)				
Ma 2014	Hypertension	n=12 (nurses) Age: NA	n=120 Mean age: 58.8 Sex: 49.2% male	Int: Motivational interviewing training Con: No training	Blood pressure, lipids Adherence (Treatment Adherence Questionnaire of Patients with Hypertension), health status (36-item short form)	6 months	China	Primary care	Individual RCT
Manze 2015	Hypertension	n=58 (doctors) Age: NA	n=379 Mean age: 60.6 Sex: 29.6% male	Int: Patient-centered counseling and cultural competency training Con: No training	Blood pressure Communication performance, adherence (Hill-Bone Compliance to High Blood Pressure Therapy Scale)	18 months	USA	Primary care	Individual RCT
Kressin 2016	Hypertension	n:NA Age: NA	n=8866 Mean age: 66.2 Sex:	Int: Patient-centered counseling Con: No training	Blood pressure Communication performance, adherence	14 months	USA	Primary care	Individual RCT

			98.8% male						
Okada 2017	Hypertension	n:NA (pharmacists) Age: NA	n=125 Mean age: 64 Sex: 40% male	Int: Motivational interviewing training Con: No training	Blood pressure Adherence (Medication Adherence Report Scale), health status (WHO-Five wellbeing index and EQ-5D)	4 months	Japan	Pharmacy	Cluster RCT (n=73)
Akturan 2017	Type 2 diabetes	n=8 (doctors) Age: NA	n=112 Mean age: 56.9 Sex: 34.8% male	Int: BATHE (Background, Affect, Troubling, Handling, and Empathy) training Con: No training	Diabetes empowerment score	6 months	Turkey	Primary care	Cluster RCT (n=8)
Belin 2017	Hypertension	n=35 (health providers) Age: NA	n=240 Mean age: 37 Sex: 22.7% male	Int: Communication skills training Con: No training	Blood pressure Communication performance (Health Literacy Assessment Questions), adherence, patients' self-efficacy	NA	Iran	Primary care	Individual RCT
Ismail 2018	Type 2 diabetes	n:NA (nurses) Age: NA	n=334 Mean age: 58.9 Sex: 48.8% male	Int: Diabetes-6 (six psychological skill) training Con: No training	HbA1C, blood pressure, lipids, BMI Health status (PHQ-9 and Diabetes Distress Scale)	18 months	UK	Primary care	Cluster RCT (n=24)

NA: not available; Int: intervention; Con: control.

Table 3.2. Communication skills training of included studies (n=19, ordered by study time)

Study	Conceptual frameworks or theory for interventions	Training content	Training types	Number of sessions	Training evaluation reported before trials
Kinmonth 1998	Action research	Training aimed patient centred care. The first half day was to review the evidence for patient centred consulting and a further full day was to practice skills with a facilitator, including active listening and negotiation of behavioural change.	Lectures, group discussions	1.5 days	Yes
Brug 2007	NA	Training aimed motivational interviewing (MI). The first day was to introduce MI theory and principles and the second day was to practice MI skills. Another one-day follow-up workshop for discussing experiences with experts and refresh knowledge. Training was developed and conducted by authors.	Workshop	3 days	No
Rubak 2009	NA	Training aimed motivational interviewing. A book was used to guide specific skills e.g. empowerment, ambivalence, the decisional balance schedule, the visual analogue scale, stage of change, and reflective listening. The courses consisted of a 1½-day training	NA	2.5 days	No

		sessions with a half-day follow-up twice. Training was conducted by only one trained teacher.			
Sequist 2010	NA	Training aimed cultural competency. Training goals included understanding attitudes of trust and bias, increasing knowledge about health disparities and skills. The curriculum reviewed potential racial and cultural biases in health care, appropriate methods of collecting clinically relevant cultural data, and ways to incorporate such information into effective clinical care plans for diabetes.	Lectures, group discussions, community engagement activities.	2 days	No
Heinrich 2010	NA	Training aimed motivational interviewing. Trainees received a project folder with information about the study, training material (e.g. cases for role-playing), background information about MI. Trainees received instruction charts specifying counselling techniques. Trainees were visited three times after being trained.	Role play, discussions, audio-taped consultations feedback.	21.5 hours	No
Rubak 2011	NA	Training aimed motivational interviewing. Training was conducted by a trained teacher. Training included specific skills, e.g. empowerment, ambivalence, the decisional balance schedule, the visual analogue scale, stage of change, and reflective listening.	NA	2.5 days	No

Robling 2012	Medical Research Council (MRC) framework	Training aimed constructive consultations (Talking Diabetes).Training emphasized shared setting of agendas and a guiding communication style, strategies and skills drawn from motivational interviewing practice.	Role play, web based modules, work shop, case studies	2 days	Yes
Farmer 2012	Theory of Planned Behaviour	Training aimed theory of planned behaviour. These included perceived benefits and harms of taking medicines. Positive beliefs were reinforced verbally and non-verbally through provision of tailored information and problem solving was facilitated around negative beliefs.	Audio-taped consultations feedback	1 day	Yes
Welschen 2012	Leventhal's self-regulation theory,Theory of Planned Behavior	Training aimed cardiovascular disease risk communication. This included communication of the absolute risk, visual communication, message framing, communication with the patient for a reaction.	NA	1 day	No
Jansink 2013	NA	Training aimed motivational interviewing and agenda setting. This included building motivation for change, asking open questions, listening reflectively, affirming, summarizing, eliciting change, expressing empathy, developing discretion, rolling with resistance and supporting self-efficacy. Training were spread equally over 6 months.	Video recording feedback.	2 days	Yes

Tinsel 2013	NA	Training aimed shared decision making (SDM) and motivational interviewing. This included risk communication, the process steps of SDM, introduction of a decision table with options	Role play	NA	Yes
Juul 2014	Self-determination theory	Training aimed self-determination theory. This included patient-health care provider relationships, communication skills, patient worksheets, implementation of the course content in daily practice.	NA	2 days	Yes
Ma 2014	Social cognitive theory	Training aimed motivational interviewing and social cognitive theory. Training was presented by a certified trainer. Training included building rapport with the patients, evaluating the patients' confidence and motivation for behaviour changes, helping change patients behaviours and so on.	Lectures, role play, discussions.	3 days	Yes
Manze 2015	NA	Training aimed patient-centered counseling and cultural competency training. Training was led by experts in medicine and patient-centered counseling. Training includes implementing 5 A's: ask the patient about their BP management, assess their medication adherence, advise the patient about pharmacologic treatment, assist them in overcoming barriers to treatment adherence and arrange for follow-up. The cultural competency training included understanding patients, their social and financial risks for non-adherence, their fears and concerns.	Role play, work shop	2 sessions	No

Kressin 2016	NA	Training aimed patient-centered counseling. Training was led by an experienced trainer. Training includes implementing 4 A's: ask about patients' hypertension beliefs, assess patients' prior experiences in changing behaviors, assist patients in making needed changes, address relapse.	Role play, discussions.	2 hours	Yes
Okada 2017	NA	Training aimed modified motivational interviewing. Training was based on empowerment or coaching-style communication, including : using an open question, setting each goal with patients, and closing with encouragement.	NA	4 hours	No
Akturan 2017	NA	Training aimed BATHE interview (Background, Affect, Troubling, Handling, and Empathy). Training was evaluated by researchers. Trainees were asked to use the BATHE technique on their patients 3 times, with 3-month intervals.	Role play	3 hours	No
Belin 2017	NA	Training aimed patient-centered counseling. Training was led by a doctor specialist. Trainees were used open-ended questions to identify the needs, barriers, patient beliefs, and ideas consistent with the patient centered counseling approach. Trainees identified that poor patient–provider communication and improved communication skills. Training was conducted using a training package and a self-assessment checklist.	Focus-group discussion, workshop.	5 sessions	No

Ismail 2018	NA	Training aimed six psychological skills. The six skills were drawn from MI and CBT, including: active listening; managing resistance; directing change; supporting self-efficacy; addressing health beliefs and shaping behaviours.	NA	NA	Yes

NA: not available.

3.4.5 Assessment of risk of bias in include studies

We considered studies at a low risk of bias if they had at least 4 items (7 in total) assessed as low risk of bias. 10 trials were at a low risk and 9 trials were at a high risk of bias. See **Figure 3.2., Figure 3.3.** for the summary of all studies according to different categories of risk of bias.

3.4.6 Effectiveness of communication skills training for health professionals on clinical outcomes in patients with T2DM and hypertension

For HbA1C, systolic and diastolic blood pressure, BMI, triglyceride, LDL and HDL cholesterol, there is no statistical significance at the meta-analysis level when comparing communication skills training for healthcare professionals with usual care or no training. For total cholesterol, there is a small difference at the meta-analyses level. Subgroup analysis was also conducted. (**Figure3.4.** and **Table 3.3**.).

3.4.7 Effectiveness of communication skills training for health professionals on patients report outcomes

Quality of life

Four studies reported on quality of life. Three studies (Heinrich 2010, Jansink 2013, Okada 2017) found no difference between groups and one study (Robling

2012) found a small improvement in the control group compared with the intervention group.

Beliefs, understanding, knowledge

Six studies reported on patients' understanding and living with conditions. Three studies (Rubak 2009, Heinrich 2010, Welschen 2012) found significantly better understanding and higher knowledge-scores in intervention group compared to the control group. However, one study (Welschen 2012) found that this effect was lost as time went on. Two studies (Tinsel 2013, Okada 2017) found no differences between groups. Another one study (Kinmonth 1998) found that the intervention group's knowledge scores were lower than in the control group.

Self-determined, self-care, self-efficacy, empowerment, enablement and confidence

Eight studies reported on patients' self-care and empowerment. Four studies (Rubak 2009, Robling 2012, Belin 2017, Akturan 2017) found significant evidence in the intervention group. Four studies (Heinrich 2010, Tinsel 2013, Ma 2014, Juul 2014) found no difference between groups.

Medication adherence

Five studies reported on medication adherence. Two studies (Ma 2014, Belin2017) found significant evidence in the intervention group while two

studies (Rubak 2011, Tinsel 2013, Manze 2015) did not find any differences between groups.

Patient-doctor relationship

Six studies reported on patient-doctor relationship. Three studies (Rubak 2009, Heinrich2010, Juul 2014) used Health Care Climates Questionnaire as a measurement and one study (Farmer 2012) showed that there was no difference between groups. Two studies (Welschen 2012, Kinmonth 1998) found significant improvement in the intervention groups.

Figure 3.2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

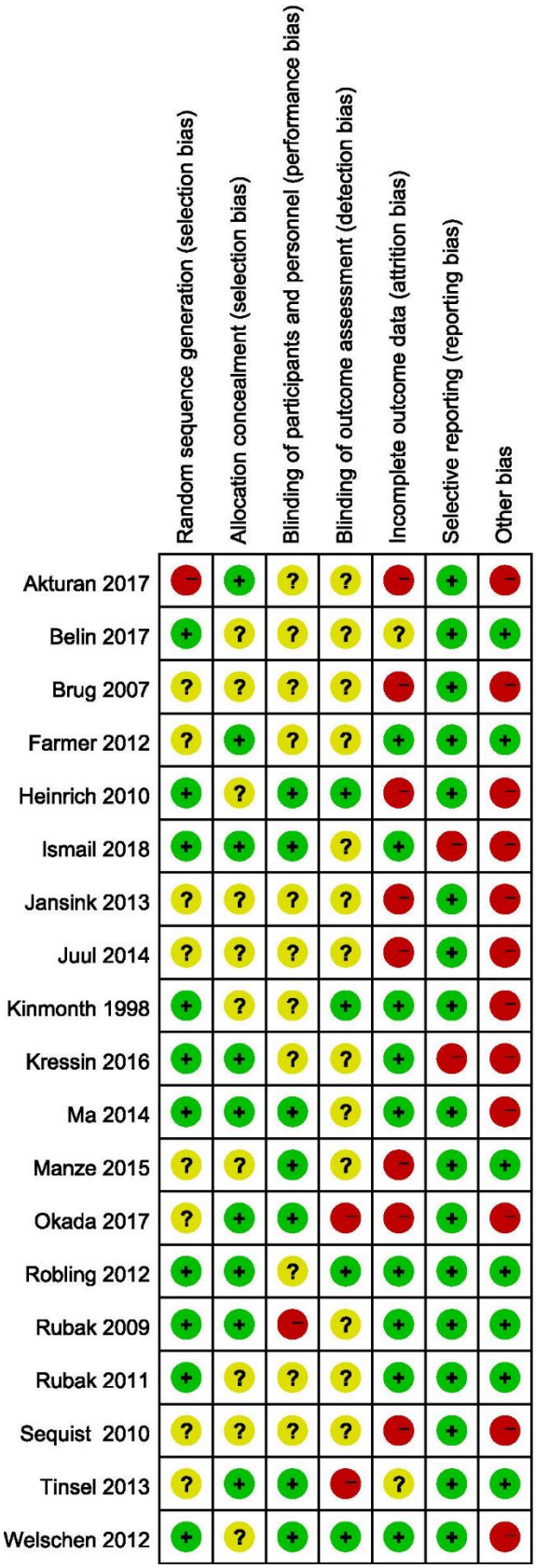


Figure 3.3. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.

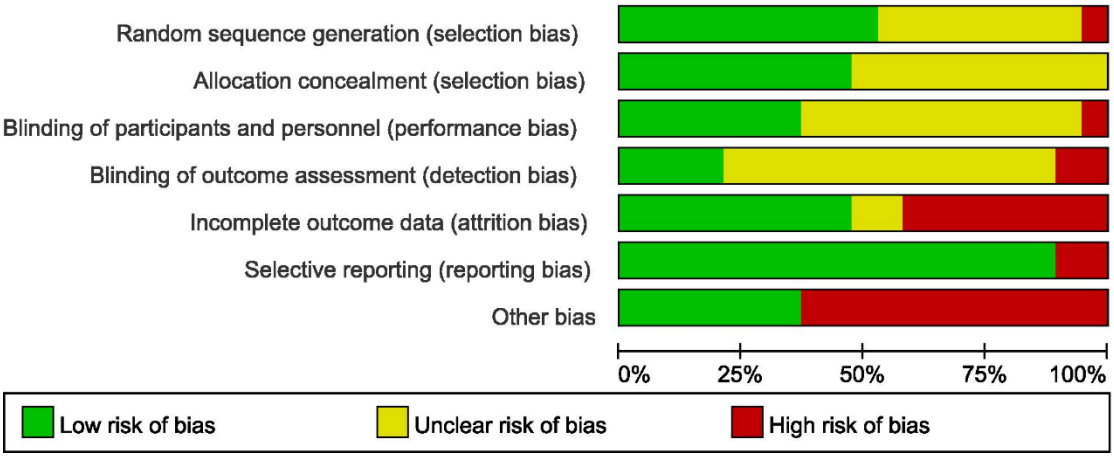
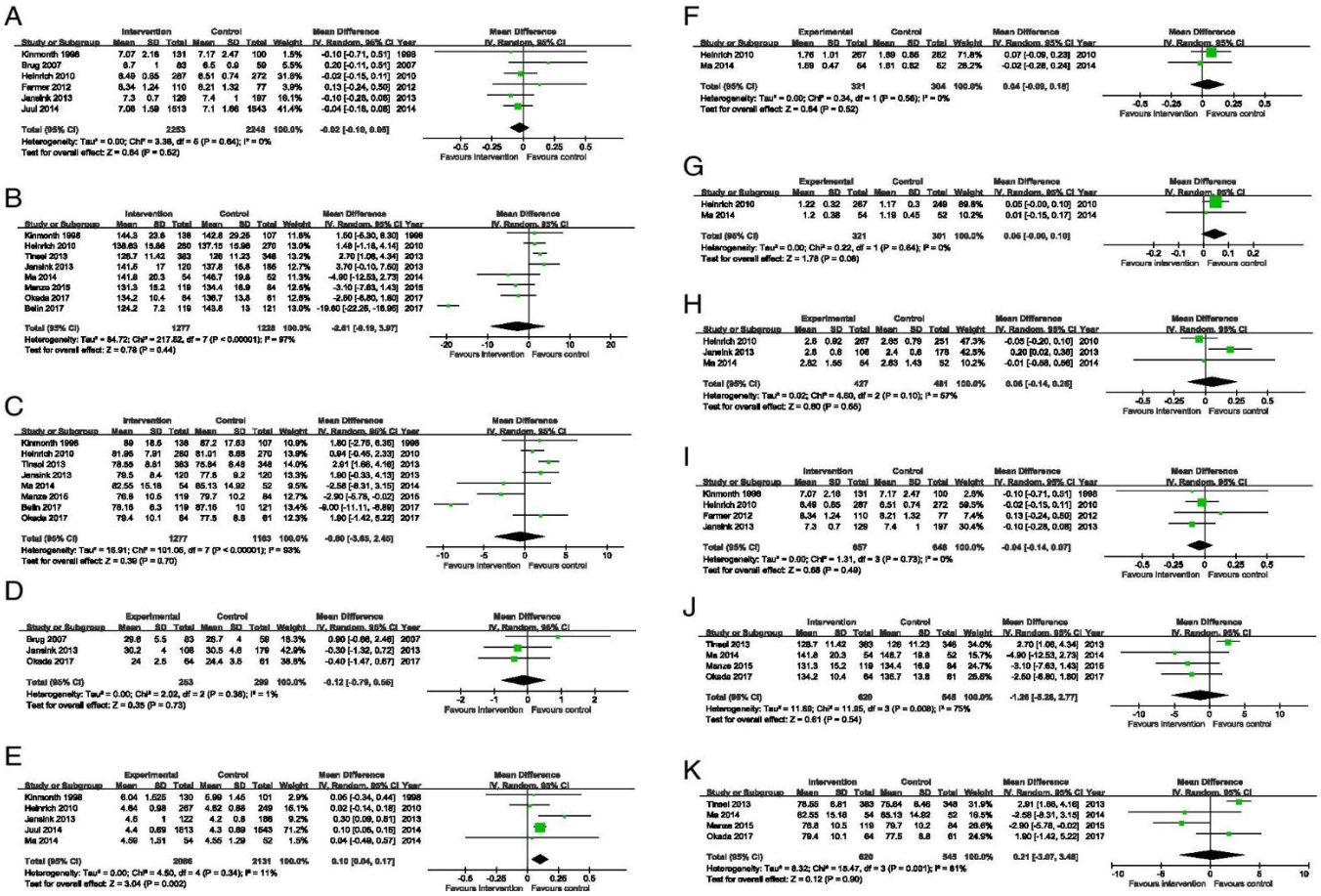


Table 3.3. Meta-analysis results across all outcomes

Outcomes	Studies	Number of patients	I^2 (%)	Pooled effects (95% CI)
HbA_{1c} (%)	6	4501	0	-0.02(-0.01 to 0.05)
Systolic blood pressure (mm Hg)	8	2505	97	-2.61(-9.19 to 3.97)
Diastolic blood pressure (mm Hg)	8	2440	93	-0.60(-3.65 to 2.45)
body mass index (kg/m2)	3	552	1	-0.12(-0.79 to 0.55)
Triglyceride (mmol/L)	2	625	0	0.04(-0.09 to 0.18)
Total cholesterol (mmol/L)	5	4217	11	0.10(0.04 to 0.17)
LDL cholesterol (mmol/L)	3	908	57	0.06(-0.14 to 0.26)
HDL cholesterol (mmol/L)	2	622	0	0.05(-0.00 to 0.10)

Figure 3.4. Forest plot of comparison: HbA1c, SBP and DBP.



A. Forest plot of comparison: HbA1c. B. Forest plot of comparison: SBP. C. Forest plot of comparison: DBP. D. Forest plot of comparison: BMI. E. Forest plot of comparison: TC. F. Forest plot of comparison: TG. G. Forest plot of comparison: HDL. H. Forest plot of comparison: LDL. I. Forest plot of comparison: HbA1c (subgroup for T2DM studies). J. Forest plot of comparison: SBP (subgroup for Hypertension studies). K. Forest plot of comparison: DBP (subgroup for Hypertension studies)

3.5 Discussion

3.5.1 Summary of evidence

19 eligible studies were selected from 7011 potentially relevant records in this systematic review. Within these studies, a total of 21,762 patients and 785 health professionals were recruited. 13 trials investigated the communication skills training effect in diabetes and 6 trials in hypertension. There was a great clinical and methodological heterogeneity of studies in terms of training type and outcomes measurement. For the assessment of risk of bias in included studies, nearly half of trials were at a high risk of bias. The pooled results for primary outcome of HbA1C, blood pressure, BMI, TG, LDL and HDL showed that there was no evidence of differences when comparing training with usual care or no training. It was uncertain whether training for healthcare professionals was effective in secondary outcomes, e.g., quality of life, beliefs, understanding, knowledge, self-care, self-efficacy, empowerment, medication adherence and patient-doctor relationship.

The diversity of interventions and outcome measurements might be the reasons for no obvious effect or a small effect of training healthcare professionals in communication skills in this systematic review. For the training intervention, training theory, types, trainers, training assessment and evaluation, training length (only a few hours for some training) had an impact on effectiveness. It

was not clear what was used to assess trained healthcare professionals in their real-world clinical practice, although three studies (Farmer 2012, Jansink 2013, Heinrich 2010) mentioned evaluations of audiotapes of consultations. In addition, the length of follow-up ranged from 3 to 24 months, so that only short-term effects were measured in the management of these long-term conditions. For clinical indicators as outcome measurements, such as HbA1C, blood pressure control and lipids, our findings suggest that none of the methods used to train healthcare professionals lead to significant improvements in patients with diabetes or high blood pressure. For the secondary outcomes, more than 20 questionnaires were used in studies included in this systematic review, though the same unified questionnaire was occasionally used. This makes it impossible to make direct between-study comparisons for these endpoints.

3.5.2 Strengths and limitation

To our knowledge, this is the first systematic review to evaluate the effectiveness of training programs in healthcare professionals in communicating with patients with common chronic conditions. Patients with diabetes and hypertension typically communicate with health professionals several times a year, over the whole of their lives following diagnosis. The quality of these encounters can be a major determinant of the quality of their long-term outcomes. This systematic review addressed the question of whether

the short-term clinical outcomes of patients and patient's experience can be improved through training health providers in better communication skills.

This review shows serious limitations in the evidence needed to support the development of effective training programs for health professionals caring for patients with diabetes or high blood pressure. The interventions in the included trials are often poorly characterized and are very heterogeneous, both in content and duration. The studies span 9 countries with differing types of diabetes care and major differences of culture and patient expectation. Without clearer understanding of the baseline characteristics of each system and its decision-making professionals, it is difficult to compare or to extrapolate from one setting to another. Because of this great heterogeneity among studies, many patient-related outcomes could not be compared directly.

3.5.3 Relationship to other studies

The results of our study are similar with previous studies in other clinical areas. Although sufficient evidence is lacking, some of the included studies show a small effect on patients' understanding, self-care, and doctor-patient relationships. In a systematic review on communication skills training for healthcare professionals in cancer patients, communication training programs improve some types of healthcare professionals skills related to information gathering and supportive skills. However, the sustained effects of intervention were unable to determine over time. Also, the types of communication skills

training courses evaluated in these trials were diverse. They found no evidence for the beneficial of intervention in patient's mental or physical health, and patient satisfaction [45]. One systematic review on training clinicians on patients in primary care and rehabilitation settings found it has a small effect in improving patients satisfaction [46]. Most of communication training they found emphasized patient participation. Theoretical workshops, written information, and discussion sessions with audiovisual resources were used as communication training methods. The number of intervention sessions given by trained people varied from 1 to 12 within 1 day to 6 months. In another systematic review on communication skills training for mental health professionals in patients with severe mental illness found a modest positive effect on patient-doctor relationship. However, in this systematic review, only one pilot cluster-RCT was recruited [47]. There were relatively few good quality data and the trial is too small to highlight differences in most outcome measures, such as patient satisfaction. Similarly, previous studies show that communication skills training programs employ many different teaching theories, methods and forms of evaluation [48].

3.5.4 Implications for research and practice

Purposeful training is a key element to the improvement of any health system, especially in systems which aim to build new capacity. This applies to the care of diabetes and hypertension in most countries, where a key aim is to maximize

the potential of primary care and to encourage patient understanding and self-management. It is disappointing therefore to find that the evidence to guide such training is poor or absent. There is no generic short-term solution which will work in all contexts.

The successful management of these conditions usually depends on more than one health professional and always involves the patient. Increasingly, patients with diabetes or high blood pressure are being encouraged to self-monitor and self-manage, and to share decisions about their management. We would therefore suggest that any successful training system needs to be based on these goals, and that baseline gaps in provision and understanding need to be assessed for health professionals and patients. The key metrics would therefore be the fulfilment of these prespecified gaps in care, rather than the variety of scalar metrics which were applied across the studies in this review. Future studies should be long-term and adaptive to local need.

3.6 Conclusion

The communication skills training interventions for healthcare professionals did not improve HbA1c, BP or other relevant outcomes in patients with diabetes and hypertension. Although the studies analyzed probably include the key ingredients for successful communication training, the timescale and format of the programs was inadequate to result in measurable change to patient-important outcomes. Better methodology is urgently needed to yield

generalizable evidence for the management of these conditions of lifelong risk which affect a substantial proportion of the human population. The pooled analysis of short-term training interventions is likely to be of less value than a mixed-methods approach to training programs over longer time scales and across a range of health systems. Our study indicates that we are still some ways from identifying the methods by which patients and health professionals can reach shared understanding to achieve the best outcomes for at-risk individuals and populations.

3.7 References

1. GBD 2017 Disease and Injury Incidence and Prevalence Collaborators. **Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017**. *Lancet*. 2018,392(10159):1789-1858.

2. Forouzanfar MH, Liu P, Roth GA, et al. **Global Burden of Hypertension and Systolic Blood Pressure of at Least 110 to 115 mm Hg, 1990-2015Global Burden of Hypertension and Systolic Blood Pressure of at Least 110 to 115 mm Hg, 1990-2015**. *JAMA*. 2017,317(2):165-182.

3. **Worldwide trends in diabetes since 1980: a pooled analysis of 751 population-based studies with 4.4 million participants**. *Lancet*. 2016,387(10027):1513-1530.

4. Zhou B, Bentham J, Di Cesare M, et al. **Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19·1 million participants**. *Lancet*. 2017,389(10064):37-55.

5. Berry JD, Dyer A, Cai X, et al. **Lifetime Risks of Cardiovascular Disease**. *N Engl J Med*. 2012,366(4):321-329.

6. Ferrannini E, Cushman WC. **Diabetes and hypertension: the bad companions**. *Lancet*. 2012,380(9841):601-610.

7. Powers MA, Bardsley J, Cypress M, et al. **Diabetes Self-management Education and Support in Type 2 Diabetes: A Joint Position Statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition**

and Dietetics. *Diabetes Care*. 2015,115(8):1323-1334.

8. Whelton PK, Carey RM, Aronow WS, et al. **2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults**. *J Am Coll Cardiol*. 2018,71(19):e127-e248.

9. Lipska KJ, Yao X, Herrin J, et al. Trends in Drug Utilization, Glycemic Control, and Rates of Severe Hypoglycemia, 2006–2013. *Diabetes Care*. 2017,40(4):468 - 475.

10. Egan BM, Zhao Y, Axon RN. **US Trends in Prevalence, Awareness, Treatment, and Control of Hypertension, 1988-2008**. *JAMA*. 2010,303(20):2043-2050.

11. NICE. **Type 2 diabetes in adults: management | Guidance and guidelines** | NICE. https://www.nice.org.uk/guidance/ng28/chapter/Patient-centred-care#. Accessed February 14, 2020.

12. NICE. Overview | **Hypertension in adults: diagnosis and management** | Guidance | NICE. https://www.nice.org.uk/guidance/cg127#. Accessed February 13, 2020.

13. Naik AD, Kallen MA, Walder A, Street Jr RL. **Improving hypertension control in diabetes mellitus: the effects of collaborative and proactive health communication**. *Circulation*. 2008,117(11):1361-1368.

14. Zolnierek KBH, DiMatteo MR. **Physician Communication and Patient Adherence to Treatment: A Meta-Analysis**. *Med Care*. 2009,47(8):826-834.

15. Lim LL, Lau ESH, Kong APS, et al. **Aspects of Multicomponent Integrated Care Promote Sustained Improvement in Surrogate Clinical Outcomes: A Systematic Review and Meta-analysis**. *Diabetes Care*. 2018,41(6):1312-1320.

16. Lloyd M. ***Clinical Communication Skills for Medicine***. Fourth edi.Amsterdam : Elsevier; 2018.

17. Rollnick S, Miller WR. **What is Motivational Interviewing**? *Behav Cogn Psychother*. 1995,23(4):325-334.

18. Jones A, Gladstone BP, Lübeck M, Lindekilde N, Upton D, Vach W. **Motivational interventions in the management of HbA1c levels: A systematic review and meta-analysis**. *Prim Care Diabetes*. 2014,8(2):91-100.

19. Song D, Xu TZ, Sun QH. **Effect of motivational interviewing on self-management in patients with type 2 diabetes mellitus: A meta-analysis**. *Int J Nurs Sci*. 2014,1(3):291-297.

20. Ma C, Zhou Y, Zhou W, et al. **Evaluation of the effect of motivational interviewing counselling on hypertension care**. *Patient Educ Couns*. 2014,95(2):231-237.

21. Stiggelbout AM, Van Der Weijden T, De Wit MPT, et al. **Shared decision making: Really putting patients at the centre of healthcare**. *BMJ*. 2012,344(7842):1-6.

22. Charles C, Gafni A, Whelan T. **Shared decision-making in the medical encounter: What does it mean? (or it takes at least two to tango)**. *Soc Sci Med*. 1997,44(5):681-692.

23. Montori VM, Gafni A, Charles C. **A shared treatment decision-making approach between patients with chronic conditions and their clinicians: The case of diabetes**. *Heal Expect*. 2006,9(1):25-36.

24. Shamseer L, Moher D, Clarke M, et al. **Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015: Elaboration and explanation**. *BMJ*. 2015,349(5829):1-25.

25. Higgins JPT, Altman DG, Gøtzsche PC, et al. **The Cochrane Collaboration's tool for assessing risk of bias in randomised trials**. *BMJ*. 2011,343(7829):1-9.

26. Kinmonth AL, Woodcock A, Griffin S, et al. **Randomised controlled trial of patient centred care of diabetes in general practice: Impact on current wellbeing and future disease risk**. *Br Med J*. 1998,317(7167):1202-1208.

27. Brug J, Spikmans F, Aartsen C, et al. **Training Dietitians in Basic Motivational Interviewing Skills Results in Changes in Their Counseling Style and in Lower Saturated Fat Intakes in Their Patients**. *J Nutr Educ Behav*. 2007,39(1):8-12.

28. Rubak S, Sandbaek A, Lauritzen T, et al. **General practitioners trained in motivational interviewing can positively affect the attitude to behaviour change in people with type 2 diabetes. One year follow-up of an RCT, ADDITION Denmark**. *Scand J Prim Health Care*. 2009,27(3):172 - 179.

29. Thomas D, Garrett M, Marshall R, et al. **Cultural competency training and performance reports to improve diabetes care for black patients: a cluster randomized, controlled trial**. *Ann Intern Med*.

2010,152(1):40-46.

30. Heinrich E, Candel MJ, Schapte NC, et al. **Effect evaluation of a Motivational Interviewing based counselling strategy in diabetes care**. *Diabetes Res Clin Pract*. 2010,90(3):270-278.

31. Rubak S, Sandbaek A, Lauritzen T, et al. **Effect of "motivational interviewing" on quality of care measures in screen detected type 2 diabetes patients: a one-year follow-up of an RCT, ADDITION Denmark**. *Scand J Prim Health Care*. 2011,29(2):92-98.

32. Robling M, McNamara R, Bennert K, et al. **The effect of the Talking Diabetes consulting skills intervention on glycaemic control and quality of life in children with type 1 diabetes: Cluster randomised controlled trial (DEPICTED study)**. *BMJ*. 2012,344(7860):e2359.

33. Andrew F, Wendy H, Dyfig H, et al. **An explanatory randomised controlled trial of a nurse-led, consultation-based intervention to support patients with adherence to taking glucose lowering medication for type 2 diabetes**. *BMC Fam Pract*. 2012,13:30.

34. Welschen LMC, Bot SDM, Kostense PJ, et al. **Effects of cardiovascular disease risk communication for patients with type 2 diabetes on risk perception in a randomized controlled trial: The @RISK study**. *Diabetes Care*. 2012,35(12):2485-2492.

35. Jansink R, Braspenning J, Keizer E, et al. **No identifiable Hb1Ac or lifestyle change after a comprehensive diabetes programme including motivational interviewing: A cluster randomised trial**. *Scand J Prim Health Care*. 2013,31(2):119-127.

36. Tinsel I, Buchholz A, Vach W, et al. **Shared decision-making in**

antihypertensive therapy: a cluster randomised controlled trial. *BMC Fam Pract*. 2013,14:135.

37. Lise J, Helle T. Vebeke Z, et al. **Effectiveness of a training course for general practice nurses in motivation support in type 2 diabetes care: A cluster-randomised trial**. *PLoS One*. 2014,9(5):e96683.

38. Ma C, Zhou Y, Zhou W, et al. **Evaluation of the effect of motivational interviewing counselling on hypertension care**. *Patient Educ Couns*. 2014,95(2):231-237.

39. Meredith GM, Michelle BO, Mark G, et al. **Brief provider communication skills training fails to impact patient hypertension outcomes**. *Patient Educ Couns*. 2015,98(2):191-198.

40. Kressin NR, Long JA, Glickman ME, et al. **A brief, multifaceted, generic intervention to improve blood pressure control and reduce disparities had little effect**. *Ethn Dis*. 2016,26(1):27-36.

41. Okada H, Onda M, Shoji M, et al. **Effects of lifestyle advice provided by pharmacists on blood pressure: The COMmunity Pharmacists ASSist for Blood Pressure (COMPASS-BP) randomized trial**. *Biosci Trends*. 2017,11(6):632-639.

42. Akturan S, Kaya ÇA, Ünalan PC, et al. **The effect of the BATHE interview technique on the empowerment of diabetic patients in primary care: a cluster randomised controlled study**. *Prim Care Diabetes*. 2017,11(2):154-161.

43. Sany B, Peyman N, Behezhed F, et al. **Health providers' communication skills training affects hypertension outcomes**. *Med Teach*. 2018,40(2):154-163.

44. Ismail K, Winkley K, de Zoysa N, et al. **Nurse-led psychological intervention for type 2 diabetes: a cluster randomised controlled trial (Diabetes-6 study) in primary care**. *Br J Gen Pract*. 2018,68(673):e531-e540.

45. Moore PM, Rivera MS, Grez AM, et al. **Communication skills training for healthcare professionals working with people who have cancer**. *Cochrane database Syst Rev*. 2013,(3):CD003751.

46. Oliveira VC, Ferreira ML, Pinto RZ, et al. **Effectiveness of Training Clinicians' Communication Skills on Patients' Clinical Outcomes: A Systematic Review**. *J Manipulative Physiol Ther*. 2015,38(8):601-616.

47. Papageorgiou A, Loke YK, Fromage M. **Communication skills training for mental health professionals working with people with severe mental illness**. *Cochrane database Syst Rev*. 2017,6:CD010006.

48. Fallowfield L, Jenkins V. **Communicating sad, bad, and difficult news in medicine**. *Lancet (London, England)*. 2004,363(9405):312-319.

CHAPTER 4. THE EXPERIENCES OF CHINESE GENERAL PRACTITIONERS IN COMMUNICATING WITH PEOPLE WITH TYPE 2 DIABETES—A FOCUS GROUP STUDY

Contents of this chapter have been published:

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4.1 Abstract

Background

China has more ascertained cases of diabetes than any other country. Much of the care of people with type 2 diabetes (T2DM) in China is managed by GPs and this will increase with the implementation of health care reforms aimed at strengthening China's primary health care system. Diabetes care requires effective communication between physicians and patients, yet little is known about this area in China. We aimed to explore the experiences of Chinese GPs in communicating with diabetes patients and how this may relate to communication skills training.

Methods

Focus groups with Chinese GPs were undertaken. Purposive sampling was used to recruit 15 GPs from Guangzhou city in China. All data were audio-recorded and transcribed. A thematic analysis using the Framework Method was applied to code the data and identify themes.

Results

Seven males and 8 females from 12 general practices attended 4 focus groups with a mean age of 37.6 years and 7.5 years' work experience. Four major themes were identified: diversity in diabetic patients, communication with patients, patient-doctor relationship, and communication skills training. GPs

reported facing a wide variety of diabetes patients in their daily practice. They believed insufficient knowledge and misunderstanding of diabetes was common among patients. They highlighted several challenges in communicating with diabetes patients, such as insufficient consultation time, poor communication regarding blood glucose monitoring and misunderstanding the risk of complications. They used terms such as “blind spot” or “not on the same channel” to describe gaps in their patients’ understanding of diabetes and its management, and cited this as a cause of ineffective patient-doctor communication. Mutual understanding of diabetes was perceived to be an important factor towards building positive patient-doctor relationships. Although GPs believed communication skills training was necessary, they reported rarely received this.

Conclusions

Chinese GPs reported facing challenges in communicating with diabetes patients. Some of these were perceived as being due to the patients themselves, others were attributed to system constraints, and some were seen as related to a lack of clinician training. The study identified key issues for the development of primary care-based management of diabetes in China, and for developing appropriate communication skills training programs for the primary care workforce.

4.2 Introduction

The detected prevalence of type 2 diabetes mellitus in China has grown rapidly, from 1% in the 1980s to 10.9% in 2013. It is now estimated that 114 million Chinese people have the condition [1]. The cost of diabetes management in China is predicted to exceed RMB 360 billion (almost USD 51 billion) annually by 2030 [2]. It is imposing a huge economic burden for both patients and the wider society in China. Furthermore, the diagnosis, treatment, and control of diabetes are currently not optimal, and very few patients are prescribed drugs to prevent cardiovascular disease, particularly antihypertensive drugs and statins [1, 3]. In addition, the burden of multimorbidity in patients with diabetes is rising with the increasingly ageing population [4]. Multimorbidity has brought on additional challenges for diabetes self-management and has increased pressures on the healthcare system. Against this background, there is an increasing awareness that the current care model for diabetes is unsustainable, with over-reliance on hospital care and relatively weak performance in primary care.

In response to such challenges, the Chinese government has committed to a dramatic increase in the capacity of the primary health care system [5]. This includes designing integrated care pathways between primary and secondary care, alongside training for general practitioners (GPs) [6, 7]. The aim is to train up to 400,000 new GPs by 2030, to produce a total workforce of 700,000,

equivalent to 2–3 per 1,000 population [8]. There are two main training pathways in China: a 5-year undergraduate program with 3 years of residency training (“GP residency training”) and a transfer training pathway for community hospital-based physicians to become GPs within 1–2 years (“GP transfer training”) [9]. Additionally, universal health insurance coverage, a basic public health service program, and a national essential drug system, were developed by the government to improve access and affordability in primary health care. The primary healthcare system was seen as a means of addressing the burden of chronic non-communicable diseases in the government’s Healthy China 2030 plan [10]. As a result, much of the care of patients with T2DM is likely to move into primary care.

Despite increased financial investment and favorable policies in strengthening primary care in China, poor quality of care for chronic non-communicable diseases (such as diabetes) still exists, with fragmentation insufficient continuity of clinical care. Primary care in China usually does not provide the first point of care and infrequently coordinates with specialty care. Both hospitals and general practices are paid by a fee-for-service related to the care they complete for patients [10]. Within the social health insurance program (a 70% government subsidy and 30% individual premium) patients are reimbursed wherever they seek care without referral [11]. This is in contrast to other healthcare systems in which primary care acts as the gatekeepers to secondary care services.

Diabetes care requires effective communication between physicians and patients. This can enhance their cooperation, and is associated with increased understanding of treatment, adherence to recommendations, patient satisfaction, and improved clinical outcomes [12, 13]. Diabetes patients who are more engaged with their doctors and more involved in decision making are shown to comply better with medical recommendations and self-care activities [14]. However, in China, recent studies have found that poor communication and relationships between doctors and patients has led to a low level of trust [15,16,17]. Communication skills training could help to improve this. However, communication skills training is currently rarely provided in medical schools, or in continuing medical education for residents and practicing physicians in China [18].

To our knowledge, no studies have explored the experiences of Chinese GPs in communicating with diabetes patients. We therefore undertook a qualitative study to address the following: (a) To explore the perceptions of GPs, particularly in relation to their experiences of communicating with diabetes patients, doctor-patient relationships, and the socio-cultural context impacting on diabetes care and self-management; (b) To explore GPs perceptions on communication skills training in this area. We identify elements of communication which might be improved by a training program, and also look

at doctors' experience of trying to communicate with their diabetes patients from a wider systems perspective. This consideration of the socio-cultural context will help explore the contribution of the current health systems and state of primary care in China to diabetes care, and to the experience of doctors delivering that care.

4.3 Method

4.3.1 Study design

We conducted a qualitative study using focus groups. Focus groups were chosen to reduce the impact of any social distance between the facilitator and participants on the discussions, and to explore complex problems and shared experiences with group interaction [19, 20]. GPs working in general practices in Guangzhou, China were eligible to participate. Guangzhou is a modern industrial city located in the South of China. It is the capital city of Guangdong province with close to fifteen million urban residents at the end of 2019 [21]. There were 188 community healthcare service centers (general practices) with about 5000 GPs, 303 secondary hospitals and 70 tertiary hospitals in 2021 [22]. The study was advertised (through paper and electronic invitations) at various GP seminars and conferences in Guangzhou, outlining the research background, aims and methods. GPs were invited to express interest in the study by contacting the focus group facilitator (MY) by email or WeChat, and providing basic demographic information. Participants were purposively

sampled based on their working area (rural or urban), age and years of experience working in primary care [23].

4.3.2 Topic guide

Recruitment was balanced between having an adequate number of participants to be able to draw conclusions and stopping recruitment when data saturation had been reached. Data saturation was defined as no new codes and no new significant themes being identified from subsequent data. A flexible topic guide was used to stimulate open discussion, while ensuring key issues were covered in investigating the experience of GPs in communicating with patients with diabetes. The focus group guide was developed using the findings of a systematic review together with discussions with the multidisciplinary and multi-national team involved in this research [24]. (see **Table 4.1.**).

Table 4.1. Focus group discussion guide for GPs

1. Issues of confidentiality and anonymity
Reinforce written participant information, emphasizing that no participant would be identifiable in any dissemination or publication of the study by the investigators. Establish ground rules for participants. Advise participants to draw the group's attention to any information that they do not wish to be repeated outside the group by other participants in any further discussions. Confirm consent to audio-recording
2. Prompts for facilitators
What do you think are the most important things for diabetes patients? (HbA1c, blood pressure, quality of life, etc.)
What is your experience in communicating with diabetes patients?
Are there any barriers (gaps) or facilitators in communication with diabetes patients?

How do you feel when your diabetes patients present with emotional difficulties?
How do you see your attitudes and behaviors (words, emotion and expression styles) affecting your diabetes patients' self-care?
What do you think make diabetes patients trust doctors?
Are there any good communication skills in daily practice with diabetes patients?
Have you received any communication skills training before? If yes, what is your experience in communication skills training, e.g., training content and methods?
Do you think training will help improve GPs communication skills? If yes, why?
Is there anything else about the physician/patient relationship that you want to share?

4.3.3 Participants recruitment

The recruitment process and focus groups took place from November 2019 to April 2020. All GP participants provided written informed consent and completed a questionnaire to collect demographic information including age, gender, years in practice, education background and location of practice. One researcher (MY) conducted all the focus groups as a facilitator, and another researcher (DZ) acted as a co-facilitator. Both researchers were trained in qualitative research methods and had no prior relationship with any of the participants. The facilitators reflected that participants were engaged, generous and authentic. Field notes were made by one researcher after each focus group (MY or DZ). All focus groups were held at the First Affiliated Hospital of Sun Yat-sen University, a central point in Guangzhou that is easily accessible by public

transport as well as by car. A compensation of a RMB 200 (equivalent to 28 US dollars) shopping voucher was offered to participants to reimburse travel costs.

4.3.4 Ethical approval

Ethical approval was provided by the Medical Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University (Reference number [2019]369).

4.3.5 Analysis

Audio-recorded data were transcribed verbatim and reviewed for accuracy by two researchers (MY & JF). One focus group transcript was randomly selected by researchers and returned to participants for comments to validate the transcription process. No correction were required for this transcript. Anonymized transcripts were imported into NVivo12 software and coded independently by two researchers (MY & DZ). Thematic analysis was undertaken using the Framework Method [25]. Analysis was ongoing and iterative, informing further data collection. For the first stage of the thematic analysis, two researchers independently read two random focus group transcripts and field notes and open-coded the data. Key words and phrases were used as the units of analysis to generate initial codes. Meaning units from the transcripts were discussed and condensed to a description close to the context. Discrepancies and disagreements were resolved through discussion and consensus to develop the initial thematic framework, which was then

applied to all remaining transcripts. Once all data had been coded using this framework, we summarized the data in a matrix based on similarities and differences of codes. Sub-themes were generated from the data set by reviewing the matrix and making connections within codes. Themes and sub-themes were identified until data saturation had been reached. The analysis and interpretation of the data were discussed by authors and disagreements resolved by consensus. Relevant quotations were identified and selected from the transcripts to highlight the themes. Findings were provided to four participants in one focus group for review, and they all agreed that this accurately reflected their discussions. This study was reported according to the 32-item checklist of Consolidated Criteria for Reporting Qualitative Research (COREQ) [26]. (see appendix).

The first author (MY, male) is a practicing general practitioner in China and undertaking a PhD in medicine in the UK. DZ (female) is an academic researcher with relevant expertise in primary health care in China.

4.4 Results

Four focus group discussions with 15 GPs from 12 general practices in Guangzhou (mean duration 58 min, range 50 to 86) were held and no participants dropped out. See **Table 4.2.** for GP characteristics and focus group information.

Table 4.2. Focus group characteristics: gender, age, education background, previous GP training experience, and location of practices in Guangzhou[a] (n = 15)

	Focus group 1 (N = 4; M1, F3)	**Focus group 2 (N = 3; M2, F1)**	**Focus group 3 (N = 4; M1, F3)**	**Focus group 4 (N = 4; M3, F1)**
Participant 1	29, 3, E1, T1, D1	35, 6, E1, T1, D2	43, 10, E1, T2, D1	39, 8, E1, T2, D1
Participant 2	31, 4, E2, T1, D1	40, 10, E1, T2, D2	50, 12, E3, T2, D1	41, 10, E1, T2, D1
Participant 3	37, 8, E1, T2, D1	36, 7, E1, T1, D2	42, 9, E1, T2, D1	32, 5, E2, T1, D1
Participant 4	30, 4, E1, T1, D1		33, 5, E1, T1, D2	46, 11, E1, T2, D1

[a]Gender (M/F), Age (years), GP experience (years worked as GPs), Education background (E1-E3, E1 Bachelor's degree, E2 Master's degree, E3 College degree), Previous GP training experience (T1-T2, T1 GP residency training, T2 GP transfer training), District in Guangzhou (D1-D2, D1 city center, D2 rural or suburb)

Four main themes were identified from the focus groups: diversity in diabetic patients, communication with patients, patient-doctor relationship and

communication skills training. The themes and subthemes are presented in **Table 4.3.**.

Table 4.3. Themes and subthemes

Themes	Subthemes
1. Diversity in diabetic patients	a. Diabetes patients' attitudes, knowledge, and behavior
	b. Medication adherence
	c. Patients' emotional problems
2. Communication with patients	a. Consultation management
	b. Blood glucose monitoring and control
	c. Communication difficulties and facilitators
3. Patient-doctor relationship	a. Mutual understanding
	b. Blaming doctors
	c. Blurring of the boundaries
4. Communication skills training	a. Insufficient training
	b. Training needs
	c. Practice and feedback

4.4.1 Theme 1: Diversity in diabetic patients

Diabetes patients' attitudes, knowledge, and behavior

Patients with diabetes were described by GPs as often being in denial of their diagnosis, expressing fear or anxiety, losing patience and even giving up. A number of factors were perceived to affect how patients view their condition. The GPs described that some asymptomatic patients did not take their

diagnosis of diabetes seriously while those with obvious or severe symptoms (e.g., itchy skin), or complications (e.g., diabetic retinopathy), were often worried and concerned. Patients with longstanding diabetes worried about their bodily function such as their liver and renal function. Some patients worried about the dietary and life-style changes required to self-manage their condition, although participants acknowledged that some young patients were more willing to engage in dietary and lifestyle changes, rather than taking medication. Some patients also worried about diabetes being inherited in their families. However, some well-controlled patients with long term diabetes were described by GPs as having an optimistic attitude and confidence in living with diabetes.

> ‘The patient cannot accept that he has diabetes, and he cannot accept it psychologically, and he denied that he had the disease.’ (FG [focus group]2 P2).

> ‘Some patients had concerns about complications that might affect them, for example, some patients had diabetic feet, and then they worried about whether they might have to have an amputation or other problems because of the infection. In some cases, because of the long-term effects of diabetes on vision, there was a serious concern about becoming blind.’ (FG1 P1).

‘Not all of them are worried about their diabetes. Some well-controlled patients often told me about their diabetes experiences, such as regular exercise and a healthy diet. I think they are very optimistic.’ (FG1 P2).

GPs described that the majority of patients’ knowledge about diabetes was insufficient and that misunderstanding was common. However, most patients wanted to know how diabetes might progress and the associated risks, especially those with other long term conditions. Participants reported several factors that may affect patients’ understanding of diabetes and their health literacy, such as being in contact with other diabetes patients, family members, access to health information, and socioeconomic factors. Some physicians felt that doctors themselves carried some responsibility for patients’ poor knowledge of diabetes as a result of ineffective communication with patients. However, some participants mentioned that patients with longstanding diabetes had a considerable amount of diabetes related knowledge, that sometimes exceeded that of young doctors.

'Patients are very short of knowledge about diabetes, such as how to monitor blood glucose, how to take drugs, whether to take drugs before or after a meal, the harm of diabetes, and matters needing attention in exercise and diet control. All of which are lacking.' (FG1 P2).

‘Many patients who come to see me really want to know the prognosis of the disease, how serious the disease is, and what is the risk for the implications.’ (FG1 P1).

‘Some patients thought that the doctor's words are not as useful as the neighbor's words. What medicine the neighbor told him to take, he immediately went to the pharmacy to buy it. The neighbor said that a certain medicine can lower blood sugar, he bought it immediately.’ (FG1 P4).

‘Some patients, especially in the ‘villages’ in the city, they are very young and unable to read and write, even those in their 30 s or 40 s who were not able to write their own names. In the face of such a patient, I think it is impossible to simply expect him to understand the complications of diabetes.’ (FG3 P3).

‘Patients who have been treated at hospitals or community centers for more than five years are well aware of the symptoms, harms, and complications of diabetes. They know more about diabetes than younger doctors.’ (FG4 P3).

GPs described some patients as “lazy” and unwilling to make lifestyle change even when knowing the risk of diabetes, and that this applied especially to young patients. However, some patients looked up information for themselves and compared different information sources through the internet. Some physicians also described two kind of diabetes patients: “pseudo experts” and the “deceived person”. The “pseudo expert” patients consulted the internet, placed significant authority on what they discovered, and perceived themselves to be sufficiently informed on the management of their condition. They frequently asked their doctors to make prescriptions for treatment during the consultation (“like ordering food at a restaurant or supermarket”). Patients described as the “deceived person” were perceived to be unable to independently analyze and assess incorrect health information and were sometimes tricked into buying health supplements that had no therapeutic benefit.

> ‘Even if they face the risk of diabetes, sometimes they are really reluctant to make some lifestyle changes.’ (FG2 P1).

> ‘He (patient) found some health products information from the WeChat Moments (online social platform) or found some home remedies and diets in other places, and then wrote them on paper. And he brought this paper to me and asked me to follow his mixed treatment plan on

diabetes. But in fact, when I told him something more authoritative, he did not understand' (FG4 P4).

Medication adherence

GPs recognized that most patients were taking multiple medications. Medication frequency, duration and price were thought to greatly affect patients' medication adherence. Patients were perceived to be concerned about both the effectiveness and the side-effects (e.g., liver and kidney impairment, hypoglycemia, etc.) of diabetes medication, especially among older patients. Many GPs had found that patients refused to take insulin due to a fear of needles and a feeling that using insulin means they had "failed" at managing their diabetes. They gave accounts of patients who were being treated with insulin, yet had asked their doctors to switch them to oral medication or to simply discontinue insulin. Some young patients refused to take medication and preferred exercise and dietary changes to control their condition. GPs also recounted complaints from patients who wished their prescriptions could be issued for longer than monthly as a lot of time was spent travelling to practices and waiting for consultations.

'Especially if you want to persuade patients to take insulin, they are even more afraid. They feel that once they use insulin, they cannot stop it and have to use it all the time' (FG1 P2).

‘For example, the drug Sitagliptin, because it can be taken one tablet a day, many patients like to use it. But for Acarbose, which is taken three times a day, seems to be too much trouble, and it is not acceptable. Patients like the simple way of taking medicine.’ (FG3 P1).

Patients’ emotional problems

GPs described that some patients had emotional problems, or problems such as anxiety, depression, or other mental health disoders. Most of these problems were considered associated with economic and family issues which,in turn, affected patients’ attitudes and behaviors to self-manage their diabetes. GPs felt that some patients saw doctors mainly as a source of comfort for their emotional problems. Although GPs recognized that some emotional issues could be resolved by finding solutions together with patients, they found it was very difficult to manage their mental health. In turn, it was also recognized that patients’ mood could also affect doctors. Most physicians mentioned that there were no tools to evaluate diabetes patients’ psychological or mental health problems in clinical encounters. However, some physicians mentioned that they would refer patients to psychologists or diabetes specialists, and this could relieve patients’ emotional problems to some extent during the consultation.

‘Of course, if the patient is uncomfortable, I can feel it directly. Many diabetes patients cried in my consultation room.’ (FG4 P3).

‘Because we do not have our own diagnosis and treatment system, and do not have the matching evaluation tools, I can only say that I can evaluate the emotional state of diabetes patients based on my own feelings.’ (FG1 P2).

4.4.2 Theme 2: Communication with patients

Consultation management

GPs described that their consultations with diabetes patients were not by prior appointment, which often caused patients to wait for a long time and doctors to be hurried when communicating with them. Normally, consultation times are very short, ranging from three to five minutes. Patients were perceived to be afraid to ask their doctors too many questions as they knew doctors had no time to answer them. However, some GPs mentioned that providing patient information leaflets on diabetes was helpful and could improve time management during consultations.

Online communication (e.g., Wechat, a mobile phone application) was used by most of physicians to answer questions without the need for direct face-to-face consultations. Physicians typically built an online WeChat group of about 100 to 500 patients. When patients had any questions, they could ask questions in these online forums. Other patients in these groups were thought to benefit from

these online conversations, providing an opportunity for them to find useful information. However, some physicians did not agree with this method and believed that face-to-face communication was better than online, especially in long term management and follow-up.

The most difficult thing for GPs was to acquire patients' health records from other hospitals or clinics. Patients often could not remember their own health information and (for those in possession of a health record) did not bring it with them.

> 'Frankly speaking, sometimes I'm really scared that I don't have enough time. I personally feel that if I have time to talk to patients with diabetes under current circumstances, I can do my best. But in fact, there is no more time for me, and it is really difficult to do more for patients. It really takes extra time to comfort the patient.' (FG3 P4).

> 'I designed a blood glucose book by myself and made a grid for patients. I provided this piece of paper to them. I told them which monitoring points and saying that I hope you(patients) can do next time. I gave them this form to make it like homework. If the patient does what I want, I think this paper can serve as a supervision. I think this is a method for patients self-management and for me to know their control.' (FG2 P2).

Blood glucose monitoring and control

Most GPs described that blood glucose monitoring and control was very important and they often set goals for patients. Guidelines and clinical pathways require doctors to monitor patients' glucose as an indicator to evaluate the quality of diabetes care and to screen for diabetes. However, the GPs' felt that many patients were unwilling to have blood glucose tests because they found tests painful. By contrast, other patients checked their blood glucose frequently as they were worried about their glucose variability. Participants reported spending a lot of time explaining glucose control.

> 'Many patients are used to checking their fingertip blood glucose several times a month. Frankly speaking, the figures changed all the time. Patients are very nervous. They will say why it is high, whether it is the problem of taking drugs, and then this caused the patients to have some bad emotions, and then doctors have to deal with. Fluctuations in blood glucose do cause some unnecessary troubles and increase the amount of time we need to explain to patients each time.' (FG4 P1).

Communication difficulties and facilitators

GPs described several difficulties in communicating with diabetes patients, including lifestyle change, dietary change, discussing risk of complications,

medication change, referring to specialists and giving bad news. Some physicians used the expressions “blind spots” or “not being on the same channel” with their patients. These terms referred to situations where doctors and patients had conflicts of understanding, and these sometimes caused disputes between doctors and patients. A common phenomenon was that patients often had different treatment plans (some with traditional Chinese medicine) from the different doctors they visited, especially diabetes specialists, which made it difficult for GPs to decide which plan should be followed when communicating with patients. Patients often placed more trust in treatment plans from specialists than from GPs. Some GPs mentioned that patients were unwilling to talk with young or new doctors.

> ‘We often have some blind spots in communication with patients. Sometimes we may be clearly for the sake of their good, but we may not speak and express well, so that they do not understand, and may even cause us to dispute’ (FG3 P1).

> ‘Sometimes words from specialists in hospitals were more useful than we said. If specialists give some treatment plans, the patient may say that the plan should be implemented all the time. When we communicate with the patient afterwards, patients always listen to the specialists and feel that our plan is wrong.’ (FG1 P3).

‘When sharing bad news, such as telling the patient when he will die, or amputation, or his vision will be permanently blind, or his energy will not recover in the future. In these cases, it is difficult to tell him and let him accept such bad information.’ (FG4 P2).

The GPs did describe some methods to promote communication in clinical encounters. Respecting patients’ choices, agreeing and encouraging patients, providing patients’ opportunities to express and ask questions, aiming to understand what patients were thinking, learning patients’ characters, using examples, and making decisions together, were described as facilitating communication. Empathy, maintaining eye contact, listening, using a polite tone and plain language were described as effective communication skills. Some physicians expressed that offering patients small gifts or free services, such as free blood glucose tests or insulin needles (as patients usually have to pay for these), were helpful in promoting communication. Some physicians thought that panicking patients was useful, such as showing patients pictures of diabetes foot ulceration, while some physicians believed that this way would unduly worry patients.

‘Sometimes I will praise them (patients) in front of their families, they will feel a sense of honor and pride. In short, in some situations like this,

with timely encouragement and prompt praise, they will more easily accept my suggestions' (FG2 P3).

'Sometimes when I try to get to know my patients, to allow them to express their feelings, to respect their choices and to make decisions together, it makes our communication process more harmonious. I think that's how you get both sides on the same channel.' (FG2 P4).

'Tell them (patient) what is the danger of diabetes, but maybe because my way of expressing is not very good, they don't take it seriously. On the contrary, showing them some horrible pictures or video materials will impress them. I think this is an important communication skill.' (FG3 P2).

Some GPs expressed the feelings they experienced when communicating with diabetes patients. When they saw the condition of their patients was poorly managed, they felt sad or experienced a sense of failure. In contrast, if patients' diabetes was controlled well, they felt happy and had a sense of accomplishment. They also felt a sense of loss and lack of respect when patients compared them negatively with diabetes specialists.

'Our GPs have a sense of frustration and failure. If he (patient) went to tertiary hospitals, he might be very obedient. Subconsciously, he may

feel that the doctors in the tertiary hospitals are better than the doctors in our general practice.' (FG4 P2).

4.4.3 Theme 3: Patient-doctor relationship

Some GPs described that first impressions and mutual understanding were important factors to build patient-doctor relationships. They also expressed that several factors could affect patients' trust in their doctor. The better their professional qualifications, professionalism, self-confidence and communication skills, the more they felt patients tended to trust them. However, GPs also reported negative patient-doctor relationships. They felt that patients may complain or blame doctors if the consultation time was short or their conditions were not managed well. GPs were very unclear whether the responsibility for the latter fell on the clinician or the patient. Some GPs mentioned that patients believed doctors were making money from them from prescriptions and by offering tests, and even by deliberately over-prescribing and over-testing. However, some GPs mentioned that they had a good relationship with patients, as multiple consultations built trust. They even worried whether a close patient-doctor relationship could potentially be harmful, as it could cause blurring of the boundaries of the patient-doctor relationship, seeing patients almost as their relatives and stepping too far into their patients' lives.

‘Trust is built in two ways, one is effective communication, and another is effective treatment. If you said well, but his blood glucose does not fall, he will not believe you. Therefore, I think we should convince him with professional knowledge, from the aspects of weight management of his diet to medication. And if he can cooperate with my suggestions, I think it is possible to achieve mutual trust.’ (FG1 P1).

‘In fact, I think that if one patient follows you for a long time, sometimes it will give you an illusion that he is already your loved one or family member. Then when you are on holiday or some time you will think that he might eat too much, and his blood glucose is not good. It is really an illusion to have a long relationship with people with diabetes. It’s hard to say whether this feeling is good or not.’ (FG3 P4).

4.4.4 Theme 4: Communication skills training

Almost all the GPs stated that they had seldom received any communication skills training in medical school, or later in their continuing medical education. They acknowledged that communication skills were not a natural ability and needed training. They hoped communication skills training programs for them would be framed in the everyday reality of clinical practice rather than on theories alone. Being able to participate and receive feedback was perceived to be helpful. Some physicians suggested role-play as a form of training, while

other physicians did not agree as they could not transfer role-play into real practice since they were not “actors in a TV show.”

> ‘Basically, there is very little relevant training in this area. There are many details about how to establish some such relationship, communication skills with the patients, how to gain the trust of patients, how to communicate with the patient, such trainings for us are rare.’ (FG3 P3).

> ‘That's something I need to learn. It's not like I can do it by taking a few classes or lectures. I may understand everything in class, but I am not able to do it in practice. It needs to be practiced repeatedly to achieve the best.’ (FG1 P3).

4.5 Discussion

4.5.1 Summary of evidence

To better understand the experiences of Chinese GPs in communication with diabetes patients, we undertook a focus group study. Our questions encouraged the participants to talk openly about the issues that they felt affected communication with this patient group. They responded by commenting about the context as well as the content of consultations for diabetes in the current state of primary care in China. We did not wish to limit

their input to aspects which might be remediable by communication skills training alone. Instead we sought to explore all the barriers and facilitators which these doctors encountered as part of their whole experience of delivering care. A major theme was uncertainty about their role and status, and the impossibility of achieving adequate communication in the consultation time available. These are systems challenges for the whole of Chinese primary care at present. Another major theme was the great diversity of patient understanding and responsiveness. It is clear that primary care doctors cannot address this by themselves, and that this is therefore also a systems challenge for better patient education, self-management and team care.

It is surprising that some physicians in focus groups called their diabetes patients “pseudo experts”. This term was not found in previous literature. The physicians in the study believed that patients had too much faith in their own knowledge while the authority of physicians was not respected. These patients may want to have more autonomy, but the participants found this difficult to cope with. Once an antagonistic approach was established, it would be a great barrier to doctor-patient communication and relationship. An alternative view was that patients seeking information from the internet should not be labelled “pseudo-experts” but as collaborators with their GPs in finding evidence-based sources of diabetes information to help them manage their condition. We also found that most GPs in focus group described “blind spots” or “not being on the same channel” with their patients. In fact, patients and doctors are two kind of

experts [27]. Patient experts know themselves well and have their own attitudes, values, and preferences in diabetes care. Doctor experts know the evidence base and can advise on the potential pros and cons of different treatment regimens [28]. Current diabetes care in primary care in China might benefit from a change of attitude towards patients, away from a paternalistic model of obedience to standard advice, towards a model of partnership towards finding individual solutions.

Almost all the GPs described that their patients saw blood glucose control as very important, and management of this was often set as the goal of diabetes care for patients and their GP. However, our study showed that using numerical targets made both patients and doctors worried in communication. Patients worried about their condition fluctuating or worsening, and doctors worried about how to explain the figure changing. The problem arises because figures can be easily measured in a very short clinical encounter and too much reliance is placed on them in clinical guidelines and pathways in the Chinese primary care health system. It would be helpful if there were some specific patient tools to promote better discussions between patients and doctors. Doctors also need better guidance and permission to move away from this predominantly glucocentric view. There is increasing global consensus that diabetes care should be centred on the individual needs of patients according to their personal risk profile and their informed preference for management options [29].

4.5.2 Relationship to other studies

In our focus group study, most GPs rarely received communication skills training. This finding was consistent with previous studies [18]. Our report on barriers and facilitators experienced by GPs in communicating with diabetes patients could help to inform future training, especially in a transition from a predominantly secondary to primary care-led service, where large numbers of diabetes patients will receive care. Training could focus on combining traditional communication skills teaching with addressing the practical clinical issues GPs encounter to achieve better patient experience and health outcomes. We also found that referring patients to specialists, negotiating treatment plans between primary and secondary care and patient's mental health issues are difficult communication areas for GPs. Those issues have been neglected and are not covered in current Chinese diabetes guidelines and clinical pathways [29].

The themes from our study have some similarities with previous studies [30,31,32]. One systematic review of qualitative studies from developed countries on patients' and healthcare providers' perspectives on diabetes management found several themes relating to differences and diverse perceptions between patients and their healthcare providers. Similarly, this showed that providers experience barriers in communication and sometimes lack adequate communications skills, as reported in our study. Both this review and our study found that patients preferred specialists above GPs [24]. These

themes present a broader picture of challenges and complexity in communication between GPs and diabetes patients.

4.5.3 Strengths and limitation

To our knowledge, this is the first study to describe the experiences of Chinese GPs in communicating with diabetes patients. A limitation of the study is that the sample was drawn from a single city in China, so it is possible that the views and experiences of physicians from other geographic regions would differ. However, our focus groups encompassed a range of GPs in different general practices, both in urban and rural areas. Another limitation is our focus group numbers are smaller than usually recommended and may have led to idea restriction [33]. However, there are some strengths of smaller groups, including ease of recruitment of GPs, organization and facilitation, and less fragmentation of discussion compared with larger groups. The successful management of diabetes usually depends on more than one clinician and should always involve patients. Future research should therefore explore patients' experience of communicating with GPs.

4.6 Conclusion

Chinese GPs face a wide variety of diabetes patients in their daily practice and encounter many challenges in communicating with them. Some of these are driven by system issues such as short consultation times, lack of patient

information resources, inadequate team support, and the perceived low status of primary care in China. While communications skills alone cannot provide a solution to these, better training in dialogue with patients will be needed if primary care is to take on the leading role in caring for China's 140 million or more patients with diabetes.

4.7 References

1. Wang L, Gao P, Zhang M, Huang Z, Zhang D, Deng Q, Li Y, Zhao Z, Qin X, Jin D *et al*: **Prevalence and Ethnic Pattern of Diabetes and Prediabetes in China in 2013**. *JAMA* 2017, **317**(24):2515-2523.

2. Wang W, McGreevey WP, Fu C, Zhan S, Luan R, Chen W, Xu B: **Type 2 diabetes mellitus in China: a preventable economic burden**. *Am J Manag Care* 2009, **15**(9):593-601.

3. Ji L, Hu D, Pan C, Weng J, Huo Y, Ma C, Mu Y, Hao C, Ji Q, Ran X *et al*: **Primacy of the 3B approach to control risk factors for cardiovascular disease in type 2 diabetes patients**. *Am J Med* 2013, **126**(10):925 e911-922.

4. Wang HH, Wang JJ, Wong SY, Wong MC, Li FJ, Wang PX, Zhou ZH, Zhu CY, Griffiths SM, Mercer SW: **Epidemiology of multimorbidity in China and implications for the healthcare system: cross-sectional survey among 162,464 community household residents in southern China**. *BMC Med* 2014, **12**:188.

5. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H *et al*: **The primary health-care system in China**. *Lancet (London, England)* 2017, **390**(10112):2584-2594.

6. **General Office of the State Council of the People's Republic of China: Opinions of the General Office of the State Council on Reforming and Improving General Practitioner Training and Incentive Mechanisms. 2018. Date accessed: March 31 2021.** [http://www.gov.cn/zhengce/content/2018-01/24/content_5260073.html]

7. **General Office of the State Council of the People's Republic of China: Guidance on setting up hierarchical medical system. 2015. Date accessed: March 31 2021.** [http://www.gov.cn/zhengce/content/2015-09/11/content_10158.html]

8. Murphy F: **China's plan for 500 000 new GPs**. *BMJ* 2018, **363**:k4015.

9. Lian S, Chen Q, Yao M, Chi C, Fetters MD: **Training Pathways to Working as a General Practitioner in China**. *Fam Med* 2019, **51**(3):262-270.

10. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Li C, Lu J, Su M *et al*: **Quality of primary health care in China: challenges and recommendations**. *The Lancet* 2020, **395**(10239):1802-1812.

11. Meng Q, Fang H, Liu X, Yuan B, Xu J: **Consolidating the social health insurance schemes in China: towards an equitable and efficient health system**. *The Lancet* 2015, **386**(10002):1484-1492.

12. Zolnierek KB, Dimatteo MR: **Physician communication and patient adherence to treatment: a meta-analysis**. *Med Care* 2009, **47**(8):826-834.

13. Naik AD, Kallen MA, Walder A, Street RL, Jr.: **Improving hypertension control in diabetes mellitus: the effects of collaborative and proactive health communication**. *Circulation* 2008, **117**(11):1361-1368.

14. Schoenthaler AM, Schwartz BS, Wood C, Stewart WF: **Patient and physician factors associated with adherence to diabetes medications**. *Diabetes Educ* 2012, **38**(3):397-408.

15. Pun JKH, Chan EA, Wang S, Slade D: **Health professional-patient communication practices in East Asia: An integrative review of an emerging field of research and practice in Hong Kong, South Korea, Japan, Taiwan, and Mainland China**. *Patient Educ Couns* 2018, **101**(7):1193-1206.

16. Ting X, Yong B, Yin L, Mi T: **Patient perception and the barriers to practicing patient-centered communication: A survey and in-depth interview of Chinese patients and physicians**. *Patient Educ Couns* 2016, **99**(3):364-369.

17. Zhang X, Sleeboom-Faulkner M: **Tensions between medical professionals and patients in mainland China**. *Camb Q Healthc Ethics* 2011, **20**(3):458-465.

18. Liu X, Rohrer W, Luo A, Fang Z, He T, Xie W: **Doctor-patient communication skills training in mainland China: a systematic review of the literature**. *Patient Educ Couns* 2015, **98**(1):3-14.

19. Leavy P: **The Oxford handbook of qualitative research**. Cambridge: Oxford University Press; 2014.

20. Kitzinger J: **Qualitative research. Introducing focus groups**. *BMJ* 1995, **311**(7000):299-302.

21. **Guangzhou statistics bureau: Population size and distribution in Guangzhou in 2019. 2020. Date accessed: March 31 2021.** [http://tjj.gz.gov.cn/tjdt/content/post_5727607.html]

22. **Guangzhou Municipal Health Commission: List of hospital institutions and community health care service centres in**

Guangzhou. 2021. Date accessed: June 10 2021. [http://wjw.gz.gov.cn/fwcx/yljgcx/content/post_7153475.html]

23. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K: **Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research**. *Adm Policy Ment Health* 2015, **42**(5):533-544.

24. Peimani M, Nasli-Esfahani E, Sadeghi R: **Patients' perceptions of patient-provider communication and diabetes care: A systematic review of quantitative and qualitative studies**. *Chronic Illn* 2020, **16**(1):3-22.

25. Gale NK, Heath G, Cameron E, Rashid S, Redwood S: **Using the framework method for the analysis of qualitative data in multi-disciplinary health research**. *BMC Med Res Methodol* 2013, **13**:117.

26. Tong A, Sainsbury P, Craig J: **Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups**. *Int J Qual Health Care* 2007, **19**(6):349-357.

27. Kennedy I: **Patients are experts in their own field**. *BMJ* 2003, **326**(7402):1276-1277.

28. Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, Cording E, Tomson D, Dodd C, Rollnick S *et al*: **Shared decision making: a model for clinical practice**. *J Gen Intern Med* 2012, **27**(10):1361-1367.

29. Jia W, Weng J, Zhu D, Ji L, Lu J, Zhou Z, Zou D, Guo L, Ji Q, Chen L *et al*: **Standards of medical care for type 2 diabetes in China 2019**. *Diabetes Metab Res Rev* 2019, **35**(6):e3158.

30. Beverly EA, Ritholz MD, Brooks KM, Hultgren BA, Lee Y, Abrahamson MJ, Weinger K: **A qualitative study of perceived responsibility and self-blame in type 2 diabetes: reflections of physicians and patients**. *J Gen Intern Med* 2012, **27**(9):1180-1187.

31. Brez S, Rowan M, Malcolm J, Izzi S, Maranger J, Liddy C, Keely E, Ooi TC: **Transition from specialist to primary diabetes care: a qualitative study of perspectives of primary care physicians**. *BMC Fam Pract* 2009, **10**:39.

32. Kokanovic R, Manderson L: **Exploring doctor-patient communication in immigrant Australians with type 2 diabetes: a qualitative study**. *J Gen Intern Med* 2007, **22**(4):459-463.

33. Richard A. Krueger MAC: **Focus Groups: A Practical Guide for Applied Research**, 4th edn: SAGE Publications; 2008.

CHAPTER 5. THE EXPERIENCES OF PEOPLE WITH TYPE 2 DIABETES IN COMMUNICATING WITH GENERAL PRACTITIONERS IN CHINA – A PRIMARY CARE FOCUS GROUP STUDY

Contents of this chapter have been published:

Yao, M., Zhang, Dy., Fan, Jt. et al. The experiences of people with type 2 diabetes in communicating with general practitioners in China – a primary care focus group study. BMC Prim. Care 23, 24 (2022).

5.1 Abstract

Background

With the implementation of health care reforms in China, primary care is on a journey to provide care for most patients with type 2 diabetes. While Chinese general practitioners (GPs) have described challenges in communication with diabetes patients in their daily practice, little is known about patients' experiences in communicating with their GPs.

Methods

Five focus groups (of 4-5 participants each) were used to explore views from patients with type 2 diabetes. Purposive sampling was used to recruit a spread of participants from general practices in Guangzhou city, China. Focus groups were audio-recorded, transcribed, and thematically analyzed using the Framework Method.

Results

10 males and 12 female patients from five general practices participated in focus group discussions, with a mean age of 57.3 years and 7.3 years of diabetes duration. Five main themes emerged: patients' understanding about diabetes, diabetes medication, communication with GPs, physician-patient relationships, and healthcare systems and context. Patients generally searched for information on the internet, but they weren't always sure if it was trustworthy.

Several communication needs were described by diabetes patients, such as explanation of blood glucose monitoring, medication information support, communication in the risk of diabetes complications and cardiovascular disease, and language barriers. Communication was frequently brief and not tailored to their concerns, and some described being scolded or panicked by GPs. Participants acknowledged the pressures within the health system, such as short consultation times, an incoherent GP-hospital interface and high demand.

Conclusions

Key issues from the patients' perspective for the development of primary care based management of diabetes in China were identified. People with type 2 diabetes require more access to trustworthy diabetes information and wish for better channels of communication with their GPs. Strategies may be required to improve GPs' communication skills with their patients that also consider the context of the wider health system environment in China.

5.2 Introduction

Diabetes has become a major public health problem and economic burden and is the sixth leading cause of death in China [1, 2]. It is now estimated that diabetes affects more than 140 million Chinese people, and the number is

dramatically increasing [3, 4]. Diabetes patients are at increased risk of long-term microvascular and macrovascular complications including heart disease, stroke, blindness, kidney failure and extremity amputations [5, 6]. However, diagnosis, treatment, and control of diabetes are not optimal in China [7, 8]. Effective diabetes management is an urgent need in China to reduce the burden of diabetes and improve the quality of diabetes care.

The current weakness of the primary care system in China is a major barrier to optimal diabetes care [9, 10]. Primary health care in China usually does not provide the point of first contact care, and typically coordinates care under the direction of specialty care. However, care delivery systems are often fragmented between primary and secondary care [10]. There is an increasing awareness that the current diabetes care model is unsustainable. To address such issues, the Chinese government has committed to a dramatic increase in the capacity of the primary health care system, including training 400,000 new GPs in the next 10 years, and the introduction of a national essential drug system alongside a social health insurance program, introduced to improve access and affordability in primary health care [11-14]. Patients with chronic non-communicable diseases, including diabetes, will gradually transition from hospitals into primary care settings and receive care by GPs.

This qualitative focus group study is part of a programme of research, aimed to understand the communication experiences in type 2 diabetes care in China, and related training needs. A review of the literature highlighted the importance of effective communication between healthcare providers and diabetes patients to ensuring optimal diabetes care [15-17]. Also, the patient–provider relationship has a strong bearing on patients' adherence to treatment [18, 19]. These cornerstones of care can enhance cooperation, understanding of treatment, adherence to recommendations and patient satisfaction, as well as resulting in improved clinical outcomes. Our previous focus group study suggested that Chinese GPs face challenges in communication with diabetes patients in their daily practice. They believed patients' knowledge was insufficient and that misunderstanding was common [20]. At the same time, GPs rarely received communication skills training, which may impede effective communication with diabetes patients [20, 21].

Individualized approaches to diabetes care, taking patients' views into account, are necessary for optimal outcomes [22, 23]. The patient perspective is critical to understanding the experience of receiving care in the current state of primary care in China. We therefore conducted our focus group study with diabetes patients to explore their experiences of communicating with their GPs and to identify elements of communication which might be improved by a GP training program.

5.3 Method

5.3.1 Study design

A qualitative study was undertaken with facilitated focus groups. The methods used were based on our previous linked study on healthcare professionals [20]. One researcher (MY) conducted all the focus groups as facilitator, and another researcher (DZ) was co-facilitator. The first author (MY, male) is a practicing general practitioner in China and undertaking a PhD in medicine in the UK, and DZ (female) is an academic researcher with relevant expertise in primary health care in China. Both researchers were trained in qualitative research and had no prior relationship with any of the participants. Each focus group was audio recorded and transcribed verbatim.

5.3.2 Topic guide

A semi-structured topic guide was used to stimulate an open conversation and to ensure key issues were covered in investigating the experience of diabetes patients in communicating with GPs during consultations. Design of the topic guide was informed by the study aim, a systematic review of literature on the impact of training healthcare professional's communication skills on diabetes care, discussion amongst the multidisciplinary team involved in this research, and the tested before use [20, 24]. (see **Table 5.1.**).

Table 5.1. Focus group discussion guide for participants with diabetes

1. Prompts for facilitators. ● How did you feel when you were first diagnosed with type 2 diabetes? ● What is important for you to be able to live as good a life as possible with diabetes? ● Do you get the opportunity to ask questions relevant to diabetes with your GPs? ● What is your experience and feeling when communicating with doctors both in hospitals and general practices? ● Are there any difficulties in communicating with your GPs? ● Do you like your GPs? Explain. ● Do you trust your GPs? Explain. ● Among the different doctors you visit, which one did you think gave you a better experience? ● What do you think doctors can do to enhance communication or relationship with you during consultations? ● Is there anything else about the physician/patient relationship that you want to share?

5.3.3 Participants recruitment

The recruitment process and focus groups took place from April to November 2020. Type 2 diabetes patients from five community health service centers (general practices) were recruited from different geographical settings (two rural and three urban districts) in Guangzhou, China. Using GP practice data, we aimed to purposively sample patients aged over 18 years, diagnosed with type 2 diabetes for at least one year. These inclusion criteria were chosen to enable recruitment of adult participants, who had some experience of communication interactions with GP's about managing their diabetes. Eligible patients from 5 GP practices were recruited by an electronic letter, disseminated through each practice's online information platform (WeChat), which introduced the research

and criteria. 38 individuals expressed interest through the WeChat platform and were followed up by telephone from the research team. Of these, 22 consented and participated in focus groups. All focus groups were held in the general practices where participants were registered for their convenience. All provided written informed consent and completed a questionnaire to collect demographic information including age, gender, years of diabetes, education background, status of employment, hypertension, and diabetes pharmacotherapy. None of the participants were known to the interviewers. No repeat interviews were carried out. We stopped patient recruitment when data saturation was reached. Subsequent analysis did not identify significant new codes, views, or experiences, so it was concluded that data saturation had been achieved. A compensation of a RMB 200 (equivalent to 30 US dollars) shopping voucher was offered to participants for the costs of travel.

5.3.4 Ethical approval

Approval was obtained from the Medical Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University (Reference number [2019]369).

5.3.5 Analysis

Audio-recorded data were professionally transcribed and reviewed for accuracy by two researchers (MY & JF). One focus group transcript was randomly selected by researchers and returned to participants for comments within two

days of the group discussion to check the accuracy of the transcription. Following participant checking, no corrections were required for this transcript. Anonymized transcripts and field notes were imported into NVivo12 software and coded independently by two researchers (MY & DZ).

The Framework Method was used for thematic analysis, aligning to our analytic approach elsewhere in our programme of research [20, 25]. Analysis was ongoing and iterative, informing further data collection. For the first stage of the thematic analysis, two researchers (MY and DZ) independently read two random focus group discussion transcripts (and associated field notes) and open-coded the data by marking and categorizing key words and phrases to generate initial codes. These were discussed, and discrepancies resolved through consensus to develop the initial thematic framework, which was then applied to the remaining transcripts.

Once all the data had been coded using this framework, we summarized the data in a matrix based on similarities and differences of codes. Sub-themes were generated from the data set by reviewing the matrix and making connections within codes. Themes and sub-themes were identified until data saturation was confirmed in the analysis. The analysis and interpretations of the data were discussed by researchers (MY and DZ) until they reached a consensus. The findings were provided to four participants (from two focus

groups) for review, and the participants were in agreement with the interpretation of the research team.

The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist was used when writing this report [26]. (see additional file)

5.4 Results

In total, we ran five focus group discussions with 22 diabetes patients, with a mean age of 57.3 years, having lived with diabetes for an average of 7.3 years. The mean duration of focus groups was 65minutes (range 55 to 80 minutes), no participant dropped out. Details of participant and focus group characteristics are provided in **Table 5.2.**

Five main themes were conceptualised from the group discussions: patients' understanding about diabetes, diabetes medication, communication with GPs, physician-patient relationships, and healthcare systems and context. The themes and subthemes are presented in **Table 5.3.**

Table 5.2. Focus group characteristics for participants with diabetes, *N* = 22

Characteristic	n
Age	
Mean (SD), years	57.3 (10.8)
Sex ratio	
Male: female	10:12
Duration of diabetes	
Mean (SD), years	7.3 (5.1)
Education background	
Junior high school or below	12
High school	7
College or above	3
Status of employment	
Working	10
Retired	12
Hypertension	
Yes	8
No	14
Diabetes pharmacotherapy	
Diet alone only	1
Oral medication only	16
Oral medication and insulin injections	5
Location	
City center	14
Rural or suburb	8

Table 5.3. Themes and subthemes for participants with diabetes

Themes	Subthemes
1. Patients' understanding of diabetes	a. Impact of diabetes b. Sources of knowledge
2. Diabetes medication	a. Medication information support b. Adherence to oral hypoglycemic agents c. Traditional Chinese medicine & herbal medicines
3. Communication with GPs	a. Blood glucose measurement and monitoring b. Risk of diabetic complications and cardiovascular disease (CVD) c. Poor and good communication experiences d. Language barriers
4. Physician-patient relationships	a. What constitutes a good physician b. Sympathy to GPs' busy clinical work c. Building relationships with physicians d. Personal responsibility
5. Healthcare systems and context	a. Diagnosis and hospitalization b. Convenience of community health service centers c. Environment of the consultation room

5.4.1 Theme 1: Patients' understanding of diabetes

1a. Impact of diabetes

Patients described a significant impact of diabetes from the time of initial diagnosis to living with the condition in the long term. Some described that they were unexpectedly diagnosed with diabetes through screening and health check-ups as they did not have any symptoms. They expressed initially experiencing denial of the diagnosis, fear, depression, anxiety and worry. As time went on, various symptoms and complications troubled most of them, such as fatigue, weight loss, hypoglycemia, and itchy skin. A few patients described challenges in living with a diabetes label, especially in their work and social activities. Patients also worried about their diet and life-style changes, organ impairment and comorbidities. They had doubts and questions about the best treatments for diabetes, and whether diabetes was inherited in their families.

> 'When I was first diagnosed with diabetes, I felt as if I was sentenced to death. How can a person suddenly become like this? I can't accept it.' (FG [focus group] 2 P1)

> 'Words jump out of my head that I am a chronic disease patient who cannot eat more. I always think of myself as a diabetes person.' (FG4 P2)

1b. Sources of knowledge

Patients described several ways of acquiring knowledge about diabetes and other health-related issues. They believed that information from friends, family members and other diabetes patients was useful, and trustworthy. They also searched for information from the Internet and social media, such as WeChat (a popular mobile phone social application in China) and Tik Tok (a popular mobile phone short video application). However, they found it difficult to judge whether the information presented on these platforms was trustworthy, whilst some information made them more worried about their condition. They reported rarely receiving health information from GPs in clinical encounters. However, they mentioned that they did get information through health education classes in community health care settings. This typically consists of a group lecture or class for 50-100 patients, usually administered by a doctor or nurse.

> ‘It's usually my relatives and friends with diabetes who talk too much about diabetes information. Doctors rarely tell me this.’ (FG1 P4)

> ‘Sometimes I look for information online, but it is just made up. I am afraid that the information is false. I neither believe nor know how to judge.’ (FG3 P3)

5.4.2 Theme 2: Diabetes medication

2a. Medication information support

Patients felt that they needed medication information support and more communication with their GPs. Several patients expressed particular concerns about the comparison of effectiveness between drugs, differences between generic and branded drugs, adverse drug reactions (such as hypoglycemia), information about new drugs (such as sodium-glucose cotransporter-2 (SGLT2) inhibitors) as well as the price of different drugs. Patients wanted their GPs to advise them on medication therapies with more detail, such as the indications for medicines and rationale for changing or stopping medications. However, they frequently felt that almost no GPs, nurses or pharmacists in clinics gave such information. Patients also hoped that GPs would explain more about the complexities of diabetes therapies in combination with other treatments, such as statins or antiplatelet drugs. Again, they felt this information from GPs was lacking.

> ‘I asked my doctor if there were many side effects. What is bad for the stomach and intestines? My stomach is very upset, so whether I can take the medicine less once a day?’ (FG4 P1)

> ‘The doctor said that this medicine was rather expensive. A box of medicine costs more than 60 RMB. Health insurance does not cover it.

The price of my other drugs adds up to nearly 200 RMB, which can be reimbursed. If this cannot be reimbursed, I may not accept it.' (FG2 P3)

'The doctor didn't give me a good explanation of what they were and why I was taking them.' (FG5 P4)

2b. Adherence to oral hypoglycemic agents

Patients described fears, concerns, and distress regarding oral hypoglycemic agents. They did not wish to take medication when first diagnosed with diabetes. They believed that once started, they would need to take these lifelong. Some patients said taking medication before or after meals made them feel embarrassed when eating with friends or family members, and described instances when they would find an excuse to leave and take their medication. Some patients recognized the importance of medication concordance. However, others (frequently older participants, or those with diabetes for a longer duration) described difficulties in taking multiple medications, and found they often got these mixed up or forgot to take them

'After all, I'm not yet 40. I am still young. I'll try to put off taking the medicine.' (FG3 P1)

'I probably don't take my medicines on time, and sometimes I forget to take.' (FG1 P2)

‘I'm embarrassed to tell people why I take medicines when having lunch with them.’ (FG4 P3)

‘I take 7 or 8 different medications and sometimes I can't tell them apart. I feel like I become stupid if I take too many.’ (FG2 P4)

2c. Traditional Chinese medicine & herbal medicines

A few patients described trying traditional Chinese medicine (TCM) and herbal medicines when first diagnosed with diabetes. Most information on TCM therapies came from other diabetes patients, rather than GPs. One patient believed his diabetes could be reversed by TCM. Some patients would take TCM while concurrently taking western medications. Compared with western medication, patients saw TCM as supplements without any side effects. A few patients believed that TCM could make narrow blood vessels more open. However, others felt that they took TCM but saw no effect in the control of their condition.

‘When I was first diagnosed, I heard from friends with diabetes that there would be a lot of sequelae and trouble after taking the western medicine. So, I tried traditional Chinese medicine and I felt my body function start to recover a little bit.’ (FG3 P1)

‘After all, traditional Chinese medicine has no side effects and does less

harm to the body. Besides, some traditional Chinese medicine can open blood vessels.’ (FG5 P1)

'I went to see a traditional Chinese doctor. But after taking traditional Chinese medicine, I didn't see any real effect.' (FG5 P3)

5.4.3 Theme 3: Communication with GPs

3a. Blood glucose measurement and monitoring

Most participants, across every focus group, described the importance of blood glucose figures and monitoring, such as fasting and postprandial blood glucose, and HbA1c. Higher figures or transient fluctuations figures made them worry about their condition and eager to discuss their results with doctors. They saw normal blood glucose figures as an indicator of stable status in diabetes management. Some patients even described experiences of their self-confidence coming back when higher figures returned to normal. A number of patients described instances when their GPs had set goals for self-monitoring of their blood glucose, though they usually did this less frequently than recommended.

‘Get those blood glucose levels down to normal, and you'll be fine. Or you're really upset.’ (FG2 P4)

'As long as the blood glucose comes down, I will be confident.' (FG2

P1)

‘My blood glucose fluctuates a lot, then I go to see my doctor for help.’ (FG5 P3)

‘The doctor told me the goal and self-monitoring at home, but I rarely did it.’ (FG1 P3)

3b. Risk of diabetes complications and cardiovascular disease

Most patients were concerned about diabetes complications, especially eye problems, kidney problems, and amputation. They had heard about diabetes complications from their doctors, family members with diabetes or other diabetes patients. They mentioned that their doctors simply required them to control their blood glucose within normal range alongside self-observation for symptoms. However, they expressed that further information was needed from GPs on how diabetes could progress to complications. Almost no patients in focus groups mentioned cardiovascular disease (CVD) in their discussions. When CVD was suggested by the group facilitators, almost no patients recognized that diabetes could increase the risk of CVD, and reflected that they had not been informed of this information, even by GPs.

‘I have a relative who has diabetes. He has lost his eyesight, problems with his kidneys and liver. He almost has problems with his whole body.

Although he had been hospitalized, but nothing worked. He was miserable. He could not sleep one night because of the pain. He was not very old, and just in his 50s.When I thought about him, and then realized that I had diabetes myself, I was particularly afraid of these complications. I wish I had a doctor to talk to me about these things.' (FG3 P3)

'When I first came to see my doctor, he said something about the complications of diabetes, but then he didn't say anything more in following visits. I was told to watch my blood glucose and pay more attention.' (FG5 P2)

'Doctors neither told me about heart disease or stroke, nor the information that diabetes can increases the risk of such disease.' (FG4 P2)

3c. Poor and good communication experiences

Some participants believed that GPs attempted to persuade patients, for example by leading them to panic about severe complications of diabetes by using dramatic illustrations, such as pictures of amputation. Communication with GPs was frequently described as very brief, sometimes without any words, and with no explanation of recommended therapies. One patient mentioned that her doctor used clinical guidelines to persuade her to follow advice. Another

participant reflected that he was scolded by his GP for asking more questions. He felt his doctor was unhappy and the interaction resulted in the provision of a prescription without explanation. Most patients hoped that their GPs would give them more guidance about diet, exercise, medication, and ways to access resources for support and diabetes education. They also wanted to have more options to access channels of patient-doctor communication, rather than just clinical encounters in their GP appointments.

Not all experiences were poor, and there were some good communication experiences described by patients, including those who felt their views were respected by their GP, through prompt provision of feedback, the use of clear and frank words and positive body language (such as touch or delivering paper towels to wipe tears). Many patients also mentioned good communication experiences in telephone calls and online communication with their GP. Patients had the ability to add their GPs to their contacts through Wechat and joined in diabetes patient online groups through this option, which typically consisted of an online chat within around 300-500 patients. Some patients felt they could easily and quickly ask questions on this online forum (Wechat), and their GPs would respond.

> ‘He (the GP) said this was what the treatment guideline shows and how it should be followed.’ (FG2 P3)

‘He (the GP) showed me a picture with a diabetes patient lose one leg. And he said if you did not control diabetes and you might be like that patient.’ (FG2 P4)

‘Sometimes the doctor scolds me for asking too much.’ (FG4 P4)

‘Once he took my hands and said you did not be afraid. That was really touching. I think he is a good doctor- better than my son.' (FG4 P3)

‘Call him (the GP) when you don't feel well in the evening and he's always there to answer you’ (FG1 P1)

‘I always added GPs to my WeChat contacts and asked them questions. I also read diabetes information that GPs sent out to other patients in the WeChat group.’ (FG1 P2)

3d. Language barriers

Some patients described language barriers in their communication with GPs. Some were not fluent in speaking or understanding Mandarin (the official language in China, and typically used in professional communication) and their GPs also had difficulties in understanding patients’ local dialects. Patients wished to visit doctors who spoke the same language as them. Some found it difficult to have relatives to accompany them to provide translation support. In

addition to these concerns, some patients wanted their GPs to use common or plain language, rather than medical terminology.

> ‘Sometimes I have questions, but I can't express them in Mandarin.’ (FG2 P4)

> ‘Cantonese is easy for me to understand and express. If the doctor speaking Mandarin, I can't understand what he says.' (FG2 P1)

> ‘Doctors should be wise. They should say something common, then everyone will understand.’ (FG5 P3)

5.4.4 Theme 4: Physician-patient relationships

Almost all the focus groups participants mentioned desirable traits of an ‘ideal’ or ‘good’ physician, which included a caring attitude, patience, responsibility, listening to patients, alongside active feedback, and the ability to solve patients’ problems. However, when asked how they chose their GPs, they frequently made this judgement based on the doctor’s educational background and recommendations from family and friends. They frequently liked to build a relationship with one ‘good’ GP for a long time, though a few patients liked to randomly visit doctors (both specialists and GPs) rather than to build a long-term relationship with them.

‘The one who is very careful, very kind, and caring for me, and who can make me feel comfortable is a good doctor’ (FG1 P2)

‘A good doctor can solve the patient's problems professionally, listen to the patient carefully, and make the patient feel comfortable.’ (FG5 P2)

Many of the participants expressed a sympathy and appreciation of GPs’ busyness and hard work. They were aware that doctors saw large numbers of patients every day and consultation time with them was very short. Some felt that they should not take up too much of their doctor’s time during clinical encounters and felt they should cooperate with doctors as much as possible to decrease their burden.

‘GPs see a lot of patients. I do not talk to him for long. I do not want to burden them by taking up too much of their time. They already work very hard.’ (FG4 P3)

Some participants hoped that their GPs would take over control of their condition and remind them what to do and not do. They felt the responsibility of diabetes management should sit with their GPs. However, others disagreed with this opinion and believed that it was the patient’s own responsibility.

‘I will take my GP's advice. It would be better if he kept pushing me. I wish he could fully manage my diabetes.’ (FG5 P1)

5.4.5 Theme 5: Health care systems and context

Many of the participants had experienced diabetes care in both hospital and GP settings. Some had been admitted to hospital to facilitate their diabetes diagnosis, especially when glucose figures were detected to be abnormal through screening or health check-ups by GPs or specialists. They were also hospitalized by specialists to control their blood glucose, dramatically change their medication or for a full ‘check’ for diabetes complications, frequently comprising a range of imaging and blood tests.

‘When I was first diagnosed with diabetes, I was admitted directly to a hospital for diagnosis and treatment.’ (FG1 P3)

‘I was hospitalized routinely once every two years for CT, B-ultrasound, neurological test, as well as examination of all organs of the body, such as heart, lung and liver. It costed more than 10,000 RMB each time, and then stayed in hospitals for five to seven days without any treatment effect.’ (FG4 P3)

Patients described that they were free to visit different specialists or GPs as

they chose, and they subsequently compared the advice from these different sources. Official referral routes between hospital and primary care were rarely described, and navigation between services was frequently initiated by the patients themselves. Experiences in seeking care from hospitals was generally thought to be worse, including long travel, crowded clinics, difficulties in obtaining appointments, short consultations, financial costs, and the recommendation of complex or costly procedures and tests felt to be irrelevant to their condition.

Participants described the convenience of GP care, such as the ability to walk-in without an appointment, less crowding, less reliance on complex procedures, and being cheaper and easier for multiple prescriptions. They also felt that GPs could solve other health issues in addition to diabetes problems. Participants in both rural and suburban discussion groups hoped that the environment of GP consultation rooms could improve to include one patient with one doctor in one consultation room rather than crowded patients with more than two doctors in one room. Participants found that primary care medication lists often did not match those from the hospital, and they wanted a system where these could be aligned to avoid unnecessary changes or confusion.

‘It's very convenient to visit a general practice, and you can come at any time. It is quick to get my prescription. Also, other health problems

can be solved at the same time' (FG3 P2)

'Of course, we want the environment of general practices to be better. Instead of having a room full of doctors and patients, either each patient or doctor has a separate room.' (FG1 P4)

'There is not a wide range of medicines available in general practices. Sometimes drugs that are given in hospitals are not available in general practices. I don't want to change my current medication.' (FG3 P2)

5.5 Discussion

5.5.1 Summary of evidence

In this study, we explored diabetes patients' experience in communicating with their GPs in China. The rich information from focus group discussions has illuminated several important areas for consideration. Several of the needs described by diabetes patients in communication with GPs, such as medication information support, communication of risk, complications and CVD.

Compared with our previous focus group study with GPs, we found that the patient participants shared the same health system concerns as the GP participants, including short consultation times and difficulties in accessing trustworthy diabetes information [20]. Such challenges can impede effective communication between GPs and diabetes patients and indicate that good

doctor-patient communication requires a sufficiently resourced healthcare environment to support it. Improving communication with patients in China is therefore likely to also require contextual changes to lead to meaningful change. Our results suggest this may require consideration of appointment duration, consultation environments, communication channels between specialists and GPs, the way in which funding and cost are administered and access to trustworthy information.

To our surprise, and in contrast to our previous study with GPs, the patient groups frequently expressed sympathy and appreciation of GPs' busy clinical work rather than "blaming doctors" [20]. Instead, they appeared to attribute communication difficulties to the pressures of short consultation times and frequently made concessions for this in their communication expectations. Despite the reality of many of the described experiences, patients hoped their GP would be kind, caring and problem-solving. Although patients acknowledged that communication between each side was inadequate, experiences of remote or online communication encounters was typically felt to be good. Online platforms were considered to provide more time and space for patients to ask questions and acquire tailored information and offer novel approaches for doctor-patient communication beyond the typical in-person clinical interaction.

Stories of scolding and panicking patients were unexpected and pose a

significant risk to patient-doctor communication and to diabetes care. These experiences signify the need for attitudinal change, highlighting the importance of the patient perspective, the creation of space for patient questions and their active involvement in plans about their care[15]. These also suggest a need for clinical skills training. These negative experiences may reflect the previously described pressures of the busy clinical environment, and training programmes will need to consider the socio-cultural context in their design.

Blood glucose control was a specific focus for many of the patients in our study. This frequently appeared to be the goal of diabetes care, and an obvious and easy indicator for patients. However, transient fluctuations in blood glucose caused patients uneasiness, worry and often drove additional consultation with GPs. We found that communication of diabetes complications and risks was frequently sparse, and particularly rare when considering CVD risks. These long-term goals in diabetes care represent important areas for clinical care, and should not be neglected[5]. Communication skills training for GPs in China should ensure that such areas are addressed, and patient tools and communication aids may further facilitate these conversations. Communication of this type must also offer a tailored discussion, adapting to the particular risk profile of the patient and providing relevant management advice that takes the patient perspective into account [17, 27].

5.5.2 Relationship to other studies

Compared with previous studies in developed countries, similar themes emerged from our study. Those themes were impact of illness [28], knowledge and information needs [29], medication adherence [30], seeking alternative therapies [28], and access to healthcare settings [31]. Several of the experiences in poor communication skills and barriers in communication reported in our study were also consistent with one systematic review [24]. However, there are some differences in themes which could be explained by the context of primary care in China. For example, diabetes was frequently diagnosed and treated initially through hospitalization. We also would suggest that the access that patients have to GPs on online discussion forums may not be available in other countries. Such differences further emphasize the need for experiences in China to be studied, so that training programme design and support for communication reflect local needs and healthcare context.

5.5.3 Strengths and limitation

To our knowledge, this is the first study to describe experiences of type 2 diabetes patients in their communication with GPs in China. One limitation of the study is that the sample was drawn from a single city in China, and it is possible that the views and experiences of patients from other geographic regions would differ. However, purposive sampling was used in our focus groups to encompass a range of patients, across both urban and rural general

practices, ages, and duration of diabetes. Our focus groups were small groups. We used smaller groups due to the complexity of the topic and a desire for more in-depth insights from participants. However, these smaller groups also provided the advantage of being easier to recruit and host, providing more opportunity to share ideas, being more comfortable for participants and having less fragmentation of discussion compared with larger groups [32]. Combined with our previous focus group study with GPs, this study presents a picture of communication between diabetes patients and GPs in China, which will benefit future research and policymaking for improving this area.

5.6 Conclusion

Key issues from the patients' perspective for the development of primary care based management of diabetes in China were identified. These provide a starting point for planning a viable transition from secondary to primary care and also a baseline from which to assess progress. The challenges are considerable. Success in the long term management of diabetes depends on patient understanding and self-management, and the picture that emerges from our study is that these needs are currently very poorly addressed. China has a fast-developing knowledge-based economy, and the information needs of patients should be relatively easy to meet, provided that this is done in a structured way that meets all levels of literacy and is tailored to each locality's health system and languages. Our study reveals that many patients have little

confidence in their ability to get timely advice from health professionals, and sometimes receive conflicting advice. Even with a massive expansion of the primary care medical workforce, general practitioners alone cannot address all the support needs of the 150 million Chinese patients with diabetes but will need to be augmented by multi-professional teams working at grass roots level. Such basic changes in the quality of communication and the structure of care offer the prospect of greatly improved outcomes over the lifetime of this population.

5.7 References

1. National Health Commission of People's Republic of China: **China health statistical yearbook 2019**. Beijing: Peking union medical college publishing house; 2019.

2. Wang W, McGreevey WP, Fu C, Zhan S, Luan R, Chen W, Xu B: **Type 2 diabetes mellitus in China: a preventable economic burden**. *Am J Manag Care* 2009, **15**(9):593-601.

3. Wang L, Gao P, Zhang M, Huang Z, Zhang D, Deng Q, Li Y, Zhao Z, Qin X, Jin D *et al*: **Prevalence and Ethnic Pattern of Diabetes and Prediabetes in China in 2013**. *JAMA* 2017, **317**(24):2515-2523.

4. Li Y, Teng D, Shi X, Qin G, Qin Y, Quan H, Shi B, Sun H, Ba J, Chen B *et al*: **Prevalence of diabetes recorded in mainland China using 2018 diagnostic criteria from the American Diabetes Association: national cross sectional study**. *BMJ* 2020, **369**:m997.

5. Buse JB, Ginsberg HN, Bakris GL, Clark NG, Costa F, Eckel R, Fonseca V, Gerstein HC, Grundy S, Nesto RW *et al*: **Primary Prevention of Cardiovascular Diseases in People With Diabetes Mellitus**. *Diabetes Care* 2007, **30**(1):162.

6. Tuttle KR, Bakris GL, Bilous RW, Chiang JL, de Boer IH, Goldstein-Fuchs J, Hirsch IB, Kalantar-Zadeh K, Narva AS, Navaneethan SD *et al*: **Diabetic Kidney Disease: A Report From an ADA Consensus Conference**. *Diabetes Care* 2014, **37**(10):2864.

7. Ji L, Hu D, Pan C, Weng J, Huo Y, Ma C, Mu Y, Hao C, Ji Q, Ran X *et al*: **Primacy of the 3B approach to control risk factors for**

cardiovascular disease in type 2 diabetes patients. *Am J Med* 2013, **126**(10):925 e911-922.

8. Jia W, Weng J, Zhu D, Ji L, Lu J, Zhou Z, Zou D, Guo L, Ji Q, Chen L *et al*: **Standards of medical care for type 2 diabetes in China 2019**. *Diabetes Metab Res Rev* 2019, **35**(6):e3158.

9. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H *et al*: **The primary health-care system in China**. *Lancet (London, England)* 2017, **390**(10112):2584-2594.

10. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Li C, Lu J, Su M *et al*: **Quality of primary health care in China: challenges and recommendations**. *The Lancet* 2020, **395**(10239):1802-1812.

11. **General Office of the State Council of the People's Republic of China: Guidance on setting up hierarchical medical system. 2015. Date accessed: June 30 2021.** [http://www.gov.cn/zhengce/content/2015-09/11/content_10158.html]

12. Lian S, Chen Q, Yao M, Chi C, Fetters MD: **Training Pathways to Working as a General Practitioner in China**. *Fam Med* 2019, **51**(3):262-270.

13. **General Office of the State Council of the People's Republic of China: Opinions of the General Office of the State Council on Reforming and Improving General Practitioner Training and Incentive Mechanisms. 2018. Date accessed: June 30 2021.** [http://www.gov.cn/zhengce/content/2018-01/24/content_5260073.html]

14. Meng Q, Fang H, Liu X, Yuan B, Xu J: **Consolidating the social health insurance schemes in China: towards an equitable and efficient health system**. *The Lancet* 2015, **386**(10002):1484-1492.

15. Naik AD, Kallen MA, Walder A, Street RL, Jr.: **Improving hypertension control in diabetes mellitus: the effects of collaborative and proactive health communication**. *Circulation* 2008, **117**(11):1361-1368.

16. Schoenthaler AM, Schwartz BS, Wood C, Stewart WF: **Patient and physician factors associated with adherence to diabetes medications**. *Diabetes Educ* 2012, **38**(3):397-408.

17. Yao M, Zhou X-y, Xu Z-j, Lehman R, Haroon S, Jackson D, Cheng KK: **The impact of training healthcare professionals' communication skills on the clinical care of diabetes and hypertension: a systematic review and meta-analysis**. *BMC Family Practice* 2021, **22**(1):152.

18. Zolnierek KB, Dimatteo MR: **Physician communication and patient adherence to treatment: a meta-analysis**. *Med Care* 2009, **47**(8):826-834.

19. Ciechanowski PS, Katon WJ, Russo JE, Walker EA: **The Patient-Provider Relationship: Attachment Theory and Adherence to Treatment in Diabetes**. *American Journal of Psychiatry* 2001, **158**(1):29-35.

20. Yao M, Zhang D-y, Fan J-t, Lin K, Haroon S, Jackson D, Li H, Chen W, Lehman R, Cheng KK: **The experiences of Chinese general**

practitioners in communicating with people with type 2 diabetes—a focus group study. *BMC Family Practice* 2021, **22**(1):156.

21. Liu X, Rohrer W, Luo A, Fang Z, He T, Xie W: **Doctor-patient communication skills training in mainland China: a systematic review of the literature**. *Patient Educ Couns* 2015, **98**(1):3-14.

22. **Type 2 diabetes in adults: management. 2020. Date accessed: 13th Oct 2021.** [https://www.nice.org.uk/guidance/ng28/chapter/Recommendations]

23. Inzucchi SE, Bergenstal RM, Buse JB, Diamant M, Ferrannini E, Nauck M, Peters AL, Tsapas A, Wender R, Matthews DR: **Management of hyperglycemia in type 2 diabetes: a patient-centered approach: position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)**. *Diabetes Care* 2012, **35**(6):1364-1379.

24. Peimani M, Nasli-Esfahani E, Sadeghi R: **Patients' perceptions of patient-provider communication and diabetes care: A systematic review of quantitative and qualitative studies**. *Chronic Illn* 2020, **16**(1):3-22.

25. Gale NK, Heath G, Cameron E, Rashid S, Redwood S: **Using the framework method for the analysis of qualitative data in multi-disciplinary health research**. *BMC Med Res Methodol* 2013, **13**:117.

26. Tong A, Sainsbury P, Craig J: **Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups**. *Int J Qual Health Care* 2007, **19**(6):349-357.

27. Nano J, Carinci F, Okunade O, Whittaker S, Walbaum M, Barnard-Kelly K, Barthelmes D, Benson T, Calderon-Margalit R, Dennaoui J *et al*: **A standard set of person-centred outcomes for diabetes mellitus: results of an international and unified approach**. *Diabetic Medicine* 2020, **37**(12):2009-2018.

28. Lin CC, Anderson RM, Hagerty BM, Lee BO: **Diabetes self-management experience: a focus group study of Taiwanese patients with type 2 diabetes**. *J Clin Nurs* 2008, **17**(5A):34-42.

29. Matthews SM, Peden AR, Rowles GD: **Patient-provider communication: understanding diabetes management among adult females**. *Patient Educ Couns* 2009, **76**(1):31-37.

30. Brundisini F, Vanstone M, Hulan D, DeJean D, Giacomini M: **Type 2 diabetes patients' and providers' differing perspectives on medication nonadherence: a qualitative meta-synthesis**. *BMC Health Serv Res* 2015, **15**:516.

31. Carolan M, Holman J, Ferrari M: **Experiences of diabetes self-management: a focus group study among Australians with type 2 diabetes**. *J Clin Nurs* 2015, **24**(7-8):1011-1023.

32. Richard A. Krueger MAC: **Focus Groups: A Practical Guide for Applied Research**, 5th edn. London: SAGE Publications Ltd; 2015.

CHAPTER 6. CORE THEMES FOR COMMUNICATION SKILLS TRAINING IN DIABETES CARE: A NOMINAL GROUP TECHNIQUE STUDY WITH GENERAL PRACTITIONERS IN CHINA

6.1 Abstract

Background

In China as in many parts of the world, the care of people with type 2 diabetes (T2DM) is increasingly managed by community teams under the direction of General Practitioners (GPs). However, GPs in China rarely receive communication skills training, which may impede effective communication with diabetes patients in primary care. In this study we seek to identify training priorities and unresolved communication issues for Chinese GPs in diabetes care.

Methods

Through systematic review of the literature and qualitative research with GP's and patients with diabetes, 19 potential training priorities were identified. A modified nominal group technique (NGT) was used to evaluate these priorities. Purposive sampling was used to recruit a spread of participants from general practices in Guangzhou city, China. 8 structured focus groups were facilitated to elicit the views of group members, and participants rated the importance and feasibility of the training items independently, before and after focus groups. Video recordings of four NGT group discussions were analyzed.

Results

29 males and 29 female GPs from 28 general practices participated in NGT group discussions, with a mean age of 38.5 years and mean 12.3 years of practice experience. Based on the correlation of importance and feasibility rating scores, the top 3 ranked priorities for communication training were ‘health education’, ‘discussing and explaining blood glucose monitoring ’, and ‘diabetes complications and cardiovascular disease risk communication’. Five main themes were identified from focus group discussions: ‘impact on diabetes patients’, ‘GP attitudes towards communication skills’, ‘patient-related factors influencing the application of communication skills by GPs, ‘local contextual factors’, and ‘training implementation’.

Conclusions

Priorities for communication skills training for Chinese GPs in diabetes Care were identified. In addition, we describe the current unsatisfactory experience of primary care doctors when trying to communicate with their diabetes patients from a wider systems perspective. This study provides a foundation for the understanding of the current level of communication between doctors and patients with diabetes in China and identifies major gaps which must be addressed as diabetes management moves increasingly into primary care.

6.2 Introduction

Diabetes is a common and costly long-term condition globally. It is estimated that 463 million people were living with diabetes in 2019 and this number is expected to increase to 578 million (10.2%) in 2030 [1]. Uncontrolled diabetes can lead to microvascular and macrovascular complications, disability, premature death, and impaired quality of life [2, 3]. Diabetes affects more than 140 million Chinese people and is the sixth leading cause of death in China [4, 5]. However, diagnosis, treatment, and control of diabetes in China are not optimal [6, 7]. Adequate diabetes care is an urgent need in China to reduce the burden of diabetes and improve the quality of diabetes management.

Optimal diabetes care requires effective communication between health professionals and patients to achieve shared understanding of chronic illness and its management [8, 9]. Healthcare professionals should be competent in communication skills relevant to chronic disease management, and training is necessary to improve their skills [10]. Communication skills include active listening, showing empathy, shared decision making, and motivational interviewing, in order to understand patients, provide treatment opinions and facilitate the doctor-patient relationship and achieve better health outcomes [11].

In China, a significant proportion of the care of people with type 2 diabetes (T2DM) is currently managed by GPs, and this proportion will increase with the implementation of health care reforms aimed at strengthening China's primary health care system [12]. 400,000 new GPs will be trained by 2030, to produce a total workforce of 700,000, equivalent to 2–3 per 1,000 population [13]. However, GPs rarely receive communication skills training, which may impede effective communication with diabetes patients in primary care [14].

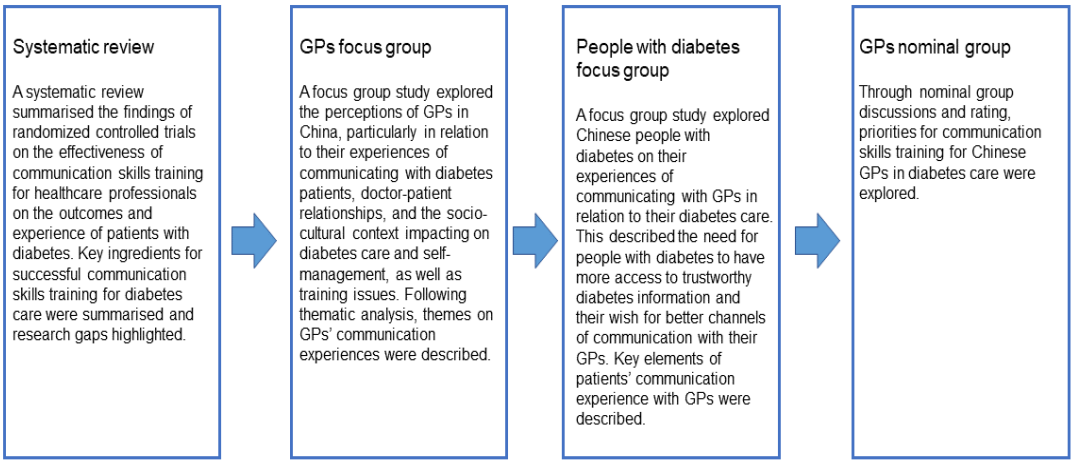
To our knowledge, there are currently no effective training programs on communications skills for GPs in China. Educating Chinese GPs in this area may represent a colossal task, and our early qualitative research with GPs and patients suggested many different areas for development in communication [15, 16]. Attempts to cover this breath within a training curriculum risks a superficial approach to a complex phenomenon, where knowing 'where to start' may be difficult. Our systematic review suggested that such that 'one size fits all' approaches to communication skills training should be exercised with caution [17]. Furthermore, the training of communication skills for Chinese GPs may represent a paradigm shift in learning and patient care, which could be overwhelming for many learners, risking disinterest or disengagement. This research focuses on identifying important 'next steps' for GP education in China on communication skills for patients with diabetes; aiming to foster engagement amongst GPs amidst significant resource constraints.

6.3 Method

6.3.1 Study design

A mixed method was used to achieve the study objectives. A systematic review was conducted to find existing evidence in communication skills training in diabetes care worldwide [17]. Two focus group studies were then conducted with GPs and people with diabetes in China [15, 16]. Data from the above studies were combined to inform potential communication skills components for training. In this article, we specifically reported the details of using nominal group technique (NGT) to evaluate, refine and rate these components. The NGT is a method of eliciting and aggregating judgments in a transparent and structured way. It can provide important information on levels of agreement between participants [18]. At the outset of designing a training programme for a complex phenomenon (which may be largely unfamiliar to learners, or where there is a suggestion of learner disengagement), this method offered a means to begin to identify areas of priority for those who will subsequently embed these skills in their practice. The NGT is widely used in health care service research and health education [19]. It can also provide a range of opportunities to better understand the reasons for the opinions and judgements of others, providing scope for the identification of new or unconsidered themes [20]. The different stages of the study are shown in Figure 6.1.

Figure 6.1. Flow diagram of different stages of the study



6.3.1 Identifying a list of potential communication skills training components

A list of communication skills training components was developed for discussion and review before the NGT focus group. Based on a systematic review of the literature, and qualitative research with patients and GPs, a provisional list of communication skills training priorities was developed by researchers (MY & GY). The systematic review identified several communication skills training contents used from 13 previous trials and showed impact on diabetes care [12]. The qualitative studies illuminated the importance of context in implementing communications skills training, especially the socioeconomic and health care system background in China [15]. These items, along with their descriptions, are outlined below in **Table 6.1**. We critically reviewed and analysed the evidence from the academic literature and provided refinement on terminology and descriptions for each of the identified training components. As outlined previously, our previous research with GPs and patients had highlighted both 'importance' and 'feasibility' as key areas to consider, and these were chosen as particular areas of focus within the Nominal Group ranking approach.

However, through the creation of conditions for participants to discuss and reflect upon their ranking of training components, we also aimed to leave sufficient flexibility for new themes, ideas and priorities to develop. This was captured through facilitated group discussion.

Table 6.1. Potential components for communication skills improvement

Item	Potential components for communication skills improvement (for training)	Sources of evidence		Description
		Findings from systematic review	Findings from qualitative studies	
1	Active listening	√	√	Listen attentively to the patient's opening statement, without interrupting or directing the patient's account. When asking questions, leave space for patient to think before answering, or to pause for thought before going on.
2	Express empathy	√	√	Deliberately show your understanding and appreciation of the patient's feelings or predicament; overtly acknowledge patient's views and feelings.
3	Share bad news		√	Become skilled at breaking bad news to patients who have started or already developed complications, such as a diagnosis of diabetic nephropathy, retinopathy, or associated foot problems. Giving bad news is a complex challenge in communication that involves a series of preparations and steps.

4	Use examples		√	Use examples to share relevant information with patients with diabetes and help their understanding by using materials such as stories or pictures (such as pictures of diabetic foot problems).
5	Idea, concerns, and expectations		√	In people with diabetes, explore their beliefs, their concerns about current problems and how these problems affect them. Ask about their expectations for solutions, and their willingness to take personal action to achieve them.
6	Nonverbal skills: body language, facial expressions, eye contact, speed, tone, and silence		√	Convey and receive information and understanding in ways outside direct verbal communication.
7	Negotiation of behavioral change	√	√	Use negotiation as a method to help patients make lifestyle changes (such as addressing obesity, adherence to treatment, smoking cessation, and physical activity) to improve their health.
8	Evaluate the patients' confidence, support patients' self-efficacy and optimism	√		Assess the individual's confidence in his or her own ability to perform specific tasks required to reach a desired goal. To cope effectively with the complex demands of the diabetes treatment regimen, a sufficient sense of self-efficacy is required. Self-efficacy is a dynamic, changeable belief, which may be enhanced by behavioral interventions, resulting in an increased motivation for behavioral efforts.

9	Motivational interviewing	√	√	Use motivational interviewing (MI) as a person-centered strategy to guide patients towards changing a specific negative behavior. There are four processes: 1) engaging, which requires an understanding of the patient's point of view to develop a working alliance with them; 2) focusing, the process of developing one or more clear goals for change; 3) evoking, calling forth the patient's own motivation for, and ideas about, change; 4) planning, which involves the collaborative development of the next steps that the individual is willing to take.
10	Shared decision making	√		Shared decision making is a key component of patient centered health care. It is a process in which clinicians and patients work together to make decisions and select tests, treatments and care plans based on clinical evidence that balances risks and expected outcomes with patient preferences and values. There are four major processes: 1) clinician informs patient that decision is to be made and patient's opinion is important; 2) clinician explains the options and the pros and cons of each (relevant) option; 3) clinician and patient discuss patient preferences and clinician supports deliberation; 4) clinician and patient discuss the patient's wish to make the decision and discuss follow-up.

11	Discuss blood glucose monitoring and explanation		√	Carefully communicate blood sugar figures with patients, and guide patients to consider the significance of different indicators based on evidence. Be aware of tension, anxiety, depression, and other emotions caused by fluctuations in blood sugar or glycosylated hemoglobin and seek to reduce these.
12	Diabetes complications and cardiovascular disease risk communication	√	√	Discuss the risk of complications such as problems with the heart, kidneys, and eyes and how these can be reduced by an adequate treatment with medication and by adopting a healthy lifestyle. Learn how to help patients understand the risks of developing severe diabetes related complications to enable them to make informed choices. It is important to provide a clear and very simple message, tailoring the explanation of risk and frequency statistics in a way that the patient can understand, such as using visual aids or discussion of absolute risk across a 10-year period. Messages about risk should consist of information on what causes the risk, the consequences of the risk, and what can be done to prevent or treat the problem. Positive framing, by highlighting the benefits of behaviour change (rather than focusing on the effects of not changing), appears more likely to increase patients' motivation.

13	Medication adherences	√	√	Look out for poor medication adherence, by checking on whether prescriptions have been requested and dispensed, and by asking patients directly. Poor adherence can be linked to key nonpatient factors (e.g., lack of integrated care in many health care systems and clinical inertia among health care professionals), patient demographic factors (e.g., young age, low education level, and low-income level), critical patient beliefs about their medications (e.g., perceived treatment inefficacy), and perceived patient burden regarding obtaining and taking their medications (e.g., treatment complexity, out-of-pocket costs, and hypoglycemia). There are several communication skills: 1) elicit patients` beliefs (e.g. perceived benefits and harms of taking medicines); 2) assess patients' medication adherence; 3) assist patients' in overcoming barriers to treatment adherence (include discussing healthcare system issues); 4) ask patients to generate and write down the exact circumstances in which they would take their medication. Be aware that poor adherence to treatment may be a signal for other psychosocial problems (see section 16).
14	Follow up or referring	√	√	Know when to refer patients with diabetes to endocrinologists and how to make appropriate communication, in line with local guidelines and in accordance with

				patient wishes. Ensure that you coordinate different doctors' diabetes treatment plans and arrange regular follow-up of patients with diabetes with specific time.
15	Cultural biases and patients background awareness	√	√	Be aware that patients from different regions (such as urban and rural areas) may have different perceptions of diabetes and treatment options, and it is necessary to consider the patient's background, family or economic factors and other problems that bring difficulties to diabetes patients. The dialect used by patients is also a cultural difference, and some patients prefer their doctors to communicate in dialect.
16	Explore the patient's emotional and psychosocial (mental health) problems		√	Specifically ask about psychosocial problems in diabetes patients, which often result in serious negative impact on patient's well-being and social life, if left un-addressed. Patients can feel overwhelmed with the demands of self-management. Feelings of frustration, fatigue, anger, burn out, and low mood can be experienced due to complexities in the routine of self-management of the control of blood sugar. Family members may not understand the feelings of the patient, and food differentiation and restriction of food by family members may lead to further distress. Avoid the over-simplification of a label of ‘noncompliance to treatment’. It is important to incorporate psychological screening and management at every level

				of diabetes care.
17	Use online or telephone communication technic		√	Make use of online communication, or text communication, in line with what suits each patient best in each situation. Online communication is becoming more and more common, making it easier and faster for patients to find and call doctors, reduces unnecessary travel time, and costs, and also increases the frequency of contact with doctors. Online communication, or texting communication, is very different from face-to-face communication, particularly as non-verbal communication between doctor and patient can be restricted. When interacting online, active listening, multiple acknowledgements, and positive responses are essential for online communication.

18	Health education		√	Develop skill in sharing diabetes-related health knowledge with patients in various forms, e.g., written material, online resources etc. Be aware of different knowledge sources and ensure that those used by your patients are reliable, safe, and up to date. When discussing topics, check on your patient’s knowledge and sources of advice.
19	Patient held health record management		√	Each time the patient visits, primary care physicians acquire the patient's personal health record book, consult the previous medical information, and record the information of this visit, so that the patient can use one patient's personal health record book to record the condition of diabetes in different hospitals as far as possible.

6.3.3 Participant recruitment

We recruited GPs from a Guangzhou GP training program which began 2019 and is supported by the Guangzhou Municipal Health Commission [22]. This training program mainly focuses on the improvement of GPs' clinical skills, with the help of specialists from hospitals in Guangzhou. Purposeful sampling was used to selected 60 GPs in this program from 30 community health service centers in 11 districts (both urban and suburban) throughout Guangzhou city [22]. Guangzhou is a modern industrial city located in the South of China. It is the capital city of Guangdong province with close to fifteen million urban residents at the end of 2019 [23]. There were 188 community healthcare service centers (general practices) with about 5000 GPs at the time of the study [24]. All GPs were qualified in general practice and had more than 3 years of work experience as required by the program [22]. On average, participants in this program received one full day of training per month.

We aimed to invite all 60 GPs to take part in our 2-hour NGT focus group. We telephoned and emailed them with information about the study and the NGT process with the support of Guangzhou GP training program organizers. 58 GPs agreed to take part in the NGT group and provided electronic informed consent. Eight parallel groups were hosted, with the group size ranging from six to eight members. There was no compensation offered to participants. All

participants provided electronic written informed consent before participation in the study.

6.3.4 Ethical approval

Ethical approval was given by the Medical Ethics Committee of the First Affiliated Hospital of Sun Yat-sen University (Reference number [2019]369).

6.3.5 NGT focus group and data collection

Eight facilitators, two for each NGT group, were trained in NGT and were familiar with all the study aims and methods. A facilitator protocol was developed. A pilot NGT group with facilitators was conducted and minor adjustments were also made to the descriptions of training components based on their feedback.

Eight structured focus groups were subsequently held virtually with GP participants between January and February 2021. Each NGT group met virtually via a web videoconferencing platform (Classin, https://www.classin.com/en/) which participants were proficient in.

Prior to each focus group, we sent out an information pack describing the NGT process. Participants were asked to independently review the list of communications skills training components one week prior to the online NGT

focus group, rating each component on Likert scales. Two questions were posed: 1) importance: how important would this communication skill be to train GPs in? (Rating of 1-9, not at all important = 1; very important = 9); 2) feasibility: how difficult or easy would this strategy be to implement into GP training? (Rating of 1-9, very difficult = 1; very easy = 9). Every participant submitted their ratings by email before attending focus groups. Participants were also invited to share free text comments and were required to complete an anonymized questionnaire capturing demographic characteristics.

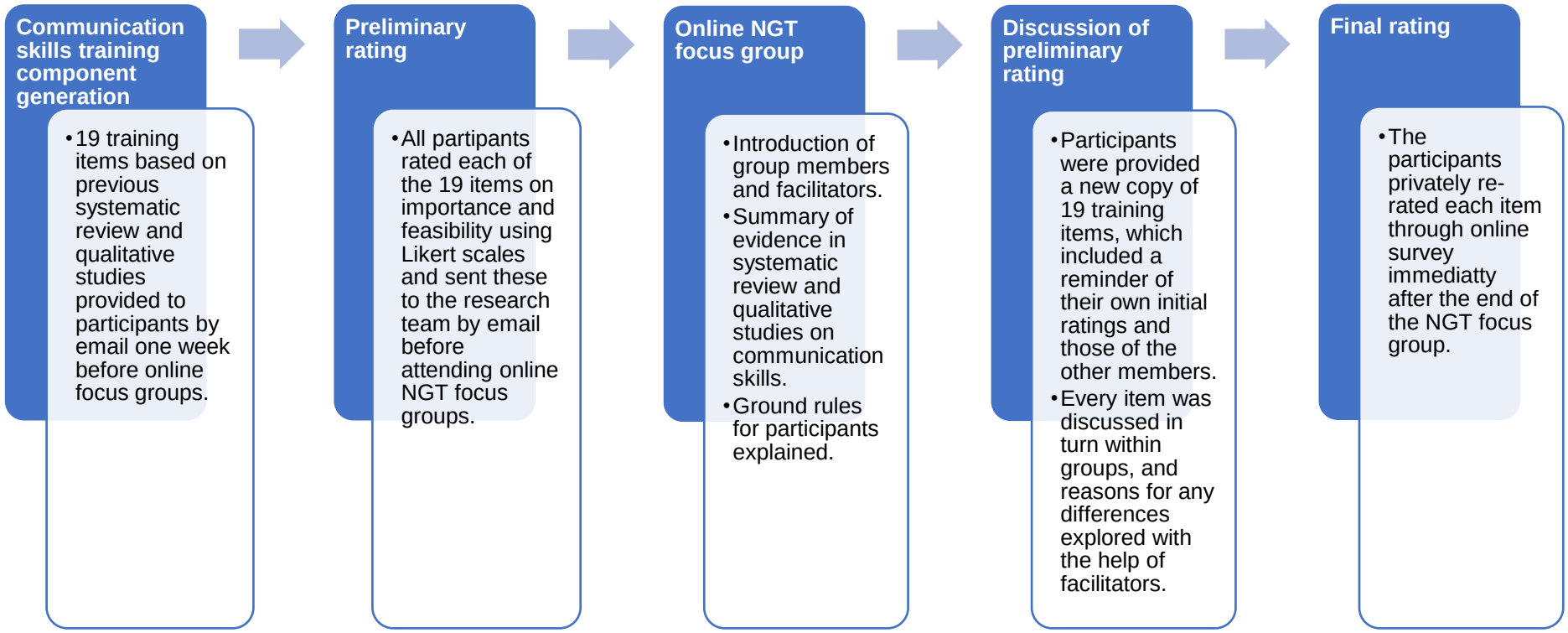
The structure for each group discussion is outlined in **Figure 6.2.**, and each group took 2 hours. At the beginning of the focus group session, facilitators provided a brief summary of our systematic review and qualitative studies. The facilitator briefly described the listed communication skills training components, giving each component equal time and emphasis to avoiding favoring towards any particular one. The facilitator aimed to encourage discussion among quiet members of the group and made sure the group discussion was focused on evaluating each of the training components.

At the online focus group, preliminary voting results were presented on a Microsoft Excel spreadsheet, which outlined a reminder for each participant of their own initial ratings, and also contained those of the other members. Every item (rated for both importance and feasibility) was discussed in turn, and

reasons for any differences explored. Participants were asked two questions to explore differences in the rating of items: 1. What do you think of this item? 2. Please take a look at the scores given by others in your group and your own scores (importance and feasibility). Is there a big difference and if so, why?

The participants then independently re-rated each item immediately at the end of the group discussion, using an online survey. The qualitative data of group discussions was collected by video recording of the focus groups and field notes were made by facilitators.

Figure 6.2. Nominal Group Technique process for the study



6.3.6 Data analysis

All quantitative data were analyzed using STATA 16, including participants' demographic characteristics and the Likert ratings of importance and feasibility of the training components. We calculated the total Likert score ratings for all participants for each of the 19 communication skills training items. The correlation of the feasibility and importance ratings for each item were plotted on a scatter plot to visually identify the key items to prioritize. A ranking of each item was subsequently calculated, based on the total ratings.

For qualitative data, two of the researchers (MY and XJ) initially reviewed the entire transcripts of the 8 NGT group discussions. Transcripts were imported into NVivo12 software and coded independently by two researchers (MY and GY). Data were analyzed inductively by thematic analysis based on the principles of grounded theory [25, 26]. Researchers independently read transcripts and open-coded the data by marking and categorizing key words and phrases to generate the initial codes. This process was continued until no new codes emerged (data saturation), which happened after the analysis of four transcripts. Similar codes were grouped to form broader themes by constant comparison until themes and subthemes were developed. The themes that emerged from analysis of the first four transcripts analysis were checked against the transcript of a remaining, randomly selected group. The themes

were presented to other team members for further discussion to reach a consensus.

6.4 Results

Eight NGT groups with 58 GPs from 28 general practices in Guangzhou (mean duration 95 min, range 85 to 100) were held and no participants dropped out. See **Table 6.3.** for GP characteristics and NGT group information. Details of GP participants and facilitators in 8 NGT workshops were shown in Supplementary Table 6.1.

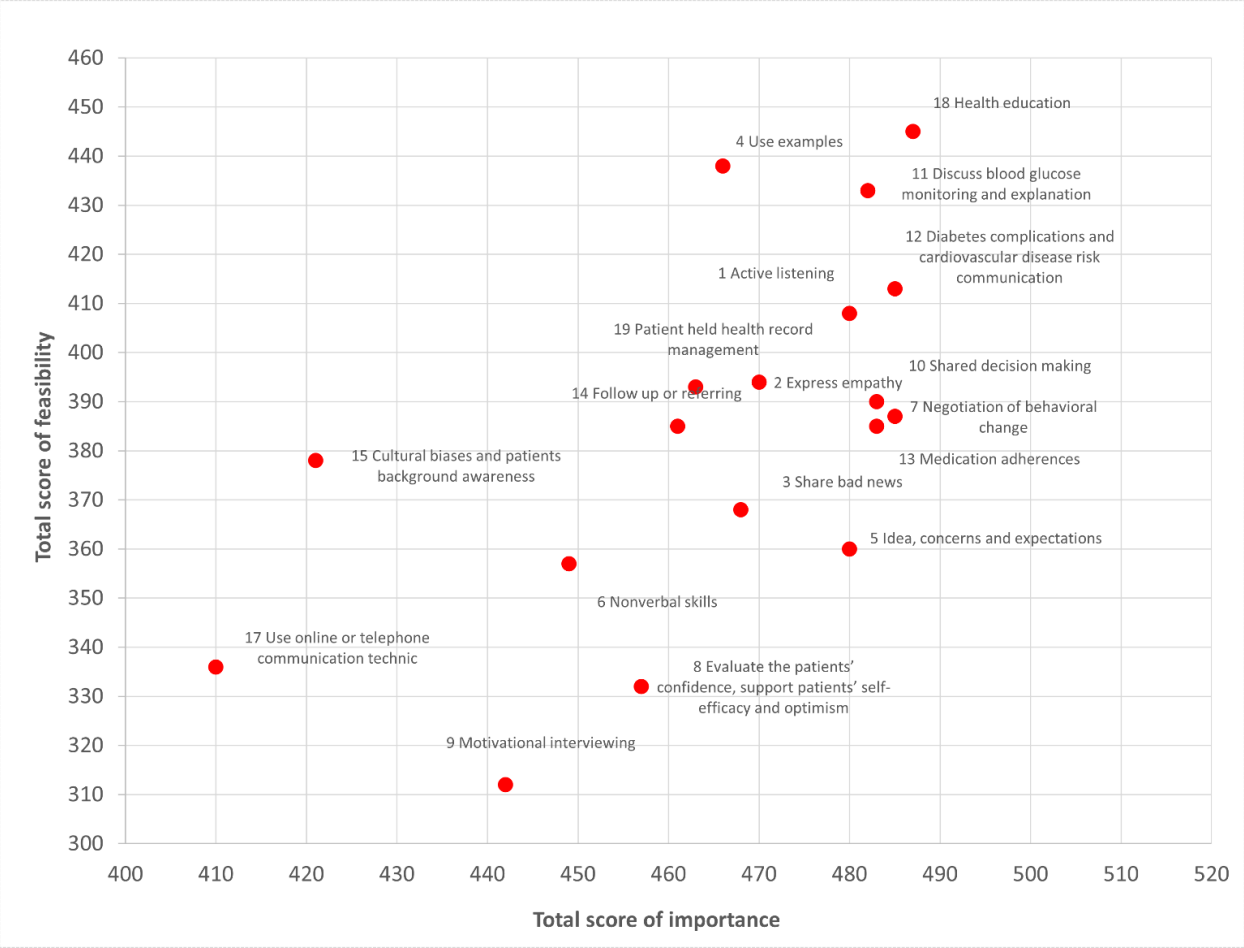
Table 6.2. Characteristic of GP participants (n=58)

Characteristic	**No. (%)**
Sex	
Male	29 (50%)
Female	29 (50%)
Age	
30-40 y	37 (64%)
41-50 y	20 (34%)
>50 y	1 (2%)
Practice location	
City center	37 (64%)
Rural or suburb	21 (36%)
Practice years	
<10 y	21 (36%)
11-20 y	28 (48%)
>20 y	9 (14%)
Education background	
College degree	2 (3%)
Bachelor’s degree	49 (84%)
Master’s degree	7 (13%)
Professional title	
Physician	4 (7%)
Attending physician	34 (58%)
Associate chief physician	17 (30%)
Chief physician	3 (5)

6.4.1 Nominal group ranking

Figure 6.3. outlines the importance and feasibility scores for the various training components and the scatter plot indicates the correlation between the total importance and total feasibility ratings. Overall, the top 10 training components, based on importance ratings were ‘health education’, ‘negotiation of behavioral change’, ‘diabetes complications and CVD risk communication’, ‘shared decision making’, ‘medication adherence’, ‘discussing and explaining blood glucose monitoring’, ‘active listening’, ‘idea, concerns and expectations’, ‘expressing empathy’ and ‘sharing bad news’. Based on feasibility ratings, the top 10 were ‘health education’, ‘using examples’, ‘discussing and explaining blood glucose monitoring’, ‘active listening’, ‘expressing empathy’, ‘patient held health record management’, ‘shared decision making’, ‘negotiation of behavioral change’, ‘medication adherence’, and ‘follow up or referring’. The top 3, based on the correlation of importance and feasibility, were ‘health education’, ‘discussing and explaining blood glucose monitoring’, and ‘diabetes complications and CVD risk communication’. Details of score and ranking of score and ranking of 19 items were provided in Supplementary Table 6.2. and 6.3.

Figure 6.3. Correlation between total rating scores for importance and feasibility



6.4.2 Qualitative data analysis

Five main themes emerged out of the group discussions: impact on diabetes patients, GP attitudes towards communication skills, patient-related factors influencing GP communication skills, local contextual factors influencing GP communication skills, and factors related to communication skills training program implementation. Illustrative quotes are presented for each theme in **Table 6.3.** and help to explain the quantitative ranking results.

6.4.3 Theme 1: Impact on diabetes patients

Most GPs tended to believe that using a variety of communication skills in medical encounters can promote better understanding of diabetes among patients as well as long-term cooperation in treatment. Participants thought that communication skills had an impact on the healthcare experience of diabetes patients and their confidence in self-management, as well as better addressing their information and psychological needs. They felt that these needs, in turn, impacted patients' choices about their lifestyle and their family's ability to support the management of their condition. Enhancing the healthcare provider-patient relationship and trust were also mentioned by most GPs.

6.4.4 Theme 2: GPs attitudes towards communication skills

Most GPs reported that they tended to ignore the importance of, and were reluctant to focus on, the use of communication skills in their day-to-day clinical

practice. They generally lacked training opportunities to learn and acquire knowledge on communication skills. They were also unaware of a number of communication skills relevant to chronic disease management, such as motivational interviewing and shared decision making. However, some believed that some communication skills were essential competencies and were integrated into their daily work. The patience of GPs, their experience, mood, interest, and clinical workload were all factors that were deemed to influence the use of communication skills.

Perspectives on the 19 items for communication skills training differed. Some skills were regarded as too complex to handle with, too many evaluation scales or tools to adopt, or too many steps to process, such as exploring diabetes patients' emotional and psychosocial problems, evaluating patients' confidence, and risk communication. However, other skills were believed to be easy to follow, such as discussing and explaining blood glucose monitoring. Many GPs mentioned that using communication skills, such as breaking bad news or risk communication with diabetes patients, was especially tricky to strike a balance between not panicking the patients and not making them overconfident. Some GPs emphasized that patients' participation and mutual understanding were necessary.

6.4.5 Theme 3: Patients' factors influence on application of communication skills

Most GPs described several patient-related factors that impacted on the use of communication skills during clinical encounters. Participants noted differences among their patients, including age, personality, psychosocial and family background, health literacy and economic income. Some GPs believed that diabetes patients' knowledge was often insufficient, with frequent misunderstanding of the condition and its management. Patients were perceived to be reluctant to express their feelings and inner thoughts regarding their condition. They were also reluctant to change their lifestyle behaviours (such as exercise and diet) and routine medication even if it was recommended by their healthcare professional.

Some participants believed that older patients had a strong desire to express their complaints, concerns, and expectations, but that this was often communicated in a disorganized and unfocused fashion. Participants felt that the discussion of blood glucose figures often opened opportunities for discussion, as patients put great importance on whether their figures achieved goals or not. GPs believed that developing skills to support patients' optimism and confidence were difficult.

6.4.6 Theme 4: Local context factors influence on application of communication skills

Participants thought that the 19 items of communication skills applied to clinical encounters with diabetes patients were hard to operationalize due to local context. Most GPs mentioned that they had insufficient time to engage in communication with patients. In their practices, it was always crowded with patients in almost all service delivery points. Administrative workload (e.g., electronic healthcare records) occupied large amount of doctors' time. GPs discussed that it was hardly realistic to adopt time consuming or implementing multistep communication skills, especially motivational interviewing, shared decision making and exploring patients' emotional problems. Regional differences (e.g., urban and rural areas, migrant population), local policies (e.g., guidance or clinical guidelines), healthcare resource (e.g., access to medication and information system) and coordination with hospitals were also factors influencing communication skills using.

6.4.7 Theme 5: Factors involved in communication skills training program implementation

Many GPs described that several factors influenced training programs communication skills improvement. Almost no participants had previous training experience on certain communication skills, such as motivational interviewing,

shared decision making, exploration of patients' emotional problems, evaluation of patients' confidence and support for optimism, although some GPs were interested in these areas. GPs felt that training periods should be for sufficient duration (over a longer term), incorporating continuous learning cycles, with opportunities to embed learning in practice. Various methods of training were proposed by GPs, including interactive teaching, role play and sharing clinical cases, and there was general consensus that a detailed training method could be appropriately found.

Participants felt that some skills, such as discussing blood glucose monitoring and explanation, diabetes complications and cardiovascular disease risk were flexible to learn, easy to embed and they felt able to acquire relevant skills. For nonverbal skills and expressing empathy, some male GPs felt that they might be less proficient than their female colleagues because they were less willing to acknowledge and express their own feelings and emotions.

Table 6.3. Select GPs Quotations for each theme explaining the reasons for the ranking results

Subthemes	Quotations
	Impact on diabetes patients
Patients understanding of condition	*"It is best for patients to understand their condition, such as the severity. When they do not understand, we will give a simple example, so that they can understand the disease, the treatment and progress. They also can better cooperate with our treatment."* (GP 12, Group 2, item 4)
	"Sharing bad news can affect how they feel about their condition, how they respond to treatment and follow-up, and even their entire family, which is very important." (GP 10, Group 2, item 3)
Long-term cooperation with doctors	*"There was a patient who came in with breast cancer and diabetes. She was very secretive. She did not want to people know she had breast cancer. But when I started talking to her, she told me that she did. And then her tears came out. She said no one cared about her. She had seen diabetes for so many years that no one cared about her comorbidities and complications. Then I saw how sad she was, and I held her hand. And then there was a silence, she said a lot of her worries. I just listened and did not give a lot of guidance, because after all, I was not very good at breast cancer treatment. From then on, this patient only came to see me once a month. She did not go to clinics when I'm resting or when I'm out of the clinic. Therefore, I think this skill is very important, because the patient will understand your caring, patient will be in close contact with you, and will be more compliant to your opinions."* (GP 20, Group 3, item 4)
Patients' experience improvement	*"I tell my patients a lot of things to encourage them. Life is a state of mind. Even the same disease, same symptoms, maybe this person thinks it's okay and he's going to have a very fulfilling life. But for some people, it is like the sky is falling in. So, I think communication is very important, it can explore patient's attitude towards life, as well as improve his experience with diabetes. I want my patients to be*

	optimistic. No matter what kind of diseases or difficulties they face, I will teach them such a positive thought by using communication skills." (GP 11, Group 2, item 8)
	GPs attitudes towards communication skills
Seldom using communication skills	*"In practice, we really ignored them. We did not do enough."* (GP 1, Group 1, item 5 and 16) *"Motivational interviewing is a relatively new concept, and I suspect a lot of people are hearing it for the first time."* (GP 14, Group 2, item 9) *"The mental health issues with diabetes really involves a variety of professional rating scales, and I think I really don't have much confidence to operate and use them well."* (GP 23, Group 4, item 16)
Essential competencies	*"Active listening, expressing empathy, sharing bad news, using examples, are skills that went on almost every day in our daily work, and I think it should be basic competencies for every doctor."* (GP 20, Group 3, item 1, 2, 3 and 4)
Mutual understanding	*"If good communication skills used during consultation, it will be easy to build a common understanding with diabetes patients. They can feel that you are caring. " (GP 18, Group 3, item 8)*
	Patients' factors influence on application of communication skills
Personality	*"Different levels of patients have different ideas, concerns, and expectations. We need to observe and understand the patient's background to know how to communicate with them."* (GP 26, Group 4, item 5) *"It may have something to do with Chinese culture. Foreigners may find it easier to express their feelings. For Chinese, when you invite them to speak out, they may be shy and unwilling to express their feelings to you."* (GP 11, Group 2, item 2)

Health literacy	*"Many patients have different levels of awareness of diabetes, especially in the urban and rural areas, and most of them are not well educated. Sometimes, when explaining his condition to him, such as medication, the patient thought that his blood sugar was well controlled, he would stop the medication on his own, and would not follow the doctor's advice. It will take a long time for doctors to work in and communicate with him before things get better."* (GP 5, Group 1, item 13)
Aging population	*"Most of the patients I care for are the elderly, and their desire to talk is very strong. Even some old people come to me, they neither want to prescribe medicine or cope with symptoms. They just want to talk to me. So, I think it's important to listen to patients."* (GP 28, Group 4, item 1)
	"Our general practice is in a rural-urban junction area. To be honest, those patients are not well-educated, especially the middle-aged and elderly. They can't describe the key points, and they talk very far." (GP 20, Group 3, item 1)
	Local context factors influence on application of communication skills
Insufficient time	*"I feel it is quite difficult. In our general practice, one doctor sees dozens of patients in the morning. And if each patient wants to say everything, there is definitely not enough time."* (GP 16, Group 2, item 9)
	"In terms of medical records, I think the workload is very heavy, which is really a burden for our doctors. A lot of time spending on the computer...If we could make it easy, we would have more time with our patients." (GP 3, Group 1, item 19)
Regional differences	*"The electronic medical record system is far from perfect. Only in our own clinic patients' records can be traced. But here we have a higher population floating (migrant population), for example, patients who do not always live in this area, they may have gone to another village or community. It would take a long time to retrieve the patient's records from other medical institutions. Sometimes even more than half an hour spent, there is no guarantee of a result. Even if we could retrieve the patient's records, things in our hands were not what we doctors wanted."* (GP 16, Group 2, item 19)

Healthcare resource, policy and guidelines	*"Even if we are trained to recognize anxiety, depression, and other mental health issues, we don't have the capacity to help them. At best, we just comfort him with words, right? To talk to him about life matters, only to this level. When it comes to medication, there are not enough medicines in our community health care service. Doctors have no experience in using drugs and are afraid to give them to patients. If I find that the patient has mental problems that need to be referred, I find that I don't know how to answer this question, and I don't have a good way to help him. That is to say, how do I help patients to refer patients to which hospital, which department, which doctor? Basically, there is no system of referral."* (GP 27, Group 4, item 14, 15) *"Now our policy pays much attention to doctors' service attitude towards patients. In the past, complaints from patients were about doctors' bad attitude and impatience. Doctors can be penalized if one patient complained him. I think this is very important."* (GP 23, Group 3, item 6) *"Compared with other items, I think explanations to diabetes patients that may be related to data or have guidelines for reference are actually relatively objective, clear and explicit."* (GP 20, Group 3, item 11,12)
	Factors involved in communication skills training program implementation
Previous training experience	*"It is difficult to master this skill aimed at improving patient adherence, and there is no previous training in this aspect."* (GP 5, Group 1, item 9,13) *"Psychosocial training is hard to do. Even in so many GP practices in Guangzhou, I have not heard of a few GPs who have been trained in this field."* (GP 13, Group 2, item 16) *"Sometimes when a patient comes in smiling, it doesn't mean he is happy, and when he comes in crying, it doesn't mean he is unhappy. So, I think it needs a certain accumulation of experience to judge, but also need a higher skill to perform."* (GP 26, Group 4, item 16)

Training period and strategy	*"Even if there is such a training course, we may not be able to master it well. It may need a long time, after many times of training, with frequently using these skills, to achieve good effectiveness."* (GP 12, Group 2, item 6) *"In general, most doctors have knowledge of diabetes and cardiovascular disease, and most of them have studied clinical guidelines. Training to communicate risks, explain blood sugar with patients, etc., is not complex and operationally easy to implement."* (GP 14, Group 2, item 11,12) *"I think the communication skills to train doctors how to explore the true inner thoughts of patients are related to the experience of every doctor, which is not easy to do through simple training. It needs practice."* (GP 1, Group 1, item 5)
Trainees' gender difference	*"In my opinion, it may be better for female doctors to show empathy. Sometimes, male doctors may not easily show their feelings or emotions as well as speak out. Female GPs trained have advantages in using those skills."* (GP 4, Group 1, item 2,6)

6.5 Discussion

6.5.1 Summary of evidence

Our study described the methods for adapting a priority technique using NGT combined with focus groups for development a communication skills training program in diabetes care for GPs in China.

Through the early stages of our qualitative research with patients and GPs, it became apparent that GPs faced considerable time and resource constraints, which risked disengagement with implementing elements of quality communication in their interactions with patients. Building on these findings, the NGT arm of our study enabled us to identify areas of communication that were deemed both important and feasible to GPs. We have identified core themes of high priority to GPs in China. These include health education, discussing and explaining blood glucose monitoring and explanation, and diabetes complications and CVD risk communication.

Previous clinical trials in training physicians in communication skills to improve health care outcomes failed to show definite benefit [17], and we would suggest that the NGT approach offers a means to identify what might be improved if educators identified the specific needs and ideas from the trainees themselves.

Several reasons affected the prioritization from the qualitative analysis of NGT groups. Although most GPs tended to believe that using various a variety of communication skills in medical encounters can promote diabetes patients' better understanding of diabetes and improve diabetes management, several factors arising from doctors themselves, their patients and the external environment impede their potential needs from being met in training. They acknowledged that different aspects of communications skills were too burdensome or complex to implement. For some skills, such as motivational interviewing and shared decision making, most of GPs had no conception and had not even heard of them until they participated in this study. They also had no previous training experience in terms of a lot of communication skills, which may have made them choose more familiar items when rating. The reasons why GPs prioritize the top 3 of communication skills as health education, discuss blood glucose monitoring and explanation, and diabetes complications and CVD risk communication might be that they were able to acquire relevant knowledge with relative ease. And when learning or using such skills, they had guidelines for reference which were relatively objective, clear, and explicit. But although GPs discussed that it was hardly realistic to adopt time consuming or multistep communication skills, such as exploring diabetes patients' emotional and psychosocial problems, and evaluating patients' confidence, those skills still had a relative high ratings and rankings.

6.5.2 Relationship to other studies

Results from our study have some similarities with previous studies. Low health literacy is common among diabetes patients and has been associated with lacking diabetes knowledge and possible worse health outcomes [27]. Being capable of good health education skills in clinical encounters can be seen as a means for improving patients health literacy [28]. In our studies, we define the following core health education skills: sharing diabetes-related health knowledge with patients in various forms, e.g., written material, online resources etc.; being aware of different knowledge sources and ensure that those used by your patients are reliable, safe, and up to date; when discussing particular topics, checking on the patient's knowledge and sources of advice.

Our findings also can be explained by the low health literacy of diabetes patients, as well as the low health education ability of general practitioners in China. Numeracy skills are also important for diabetes patients, which means the ability to understand numbers in the measurement, estimation, and risk [29]. Evidence from other studies suggests that there is an important association between patients' numeracy skills and glycemic control [30]. There is no doubt that discussing blood glucose monitoring and explanation, and diabetes complications and CVD risk communication is closely related to patients' understanding of numbers. It is important for GPs to provide a clear and very simple message, tailoring the explanation of risk and frequency statistics in a

way that is suitable for current patients' numeracy in China.

6.5.3 Strengths and limitation

To our knowledge, this is the first study using NGT to identify communication skills training priorities and relevant issues not only for Chinese GPs but other countries health providers in diabetes care. This may inform a high-quality evidence-based training programs to support diabetes care improvement in primary care. We suggested that communication skills training in diabetes is important and how this can be implemented in the absence of statement in current Chinese diabetes guidelines [7]. We looked how GPs thought and what really matters to people with diabetes in their communication in the context of transforming primary healthcare system in China [31]. The methodology used in our study can also be seen as a paradigm of evidence-based GP training program formation for chronic conditions in China where 400,000 new GPs will be trained in the next 10 years [32].

A limitation of the study is that the sample was drawn from a single city in China. Although Guangzhou is a modern industrial city with close to fifteen million urban residents and about 5000 GPs, there still might be some difference in prioritization of outcomes in other geographic regions with different cultures in China. However, similar methodology could be adopted to find their local training priorities. Another limitation is that we used online focus group rather

than in-field discussion which may lead to less face-to-face discussion. However, our participants were familiar with such online methods and facilitators were trained, and protocol was followed to ensure the NGT group discussion quality. Although we identified the core themes in communication skills training for Chinese general practitioners in diabetes care, we still need to test it in a training program in future research. Our study prioritised 'importance' and 'feasibility'; factors that had been highlighted through previous research with GP's and patients with diabetes. However, we recognise that different areas of focus may be required in different geographical areas, or at different stages of training curriculum development. It may be necessary to revisit an NGT approach in the implementation stage of training, embedding an ongoing consideration of learner and patient perspective. Feedback from GPs, as well as patients, will be also important for modifying training content. We believe this could be a way to improve future diabetes management in primary care in China.

6.5 Conclusion

Designing a training programme for communication skills in China may represent a paradigm shift for learners, and the literature has indicated that a 'one size fits all' approach to programme design across different environments should be undertaken with caution. Our programme of research aimed to understand the perspectives of patients and GP's and built on these findings to

identify priorities for communication skills training for Chinese GPs in diabetes care. A particular area of concern in our context was the constraints faced by GPs to implement quality communication in their care of diabetes patients. By designing a training programme based on elements of communication that are both important and feasible to learners, we would suggest that there is scope for enhanced engagement of GPs, which offers the potential for improved patient outcomes for patients with diabetes.

6.5 References

1. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, Colagiuri S, Guariguata L, Motala AA, Ogurtsova K et al: **Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition**. Diabetes Research and Clinical Practice 2019, 157:107843.

2. Buse JB, Ginsberg HN, Bakris GL, Clark NG, Costa F, Eckel R, Fonseca V, Gerstein HC, Grundy S, Nesto RW et al: **Primary Prevention of Cardiovascular Diseases in People With Diabetes Mellitus**. Diabetes Care 2007, 30(1):162.

3. Tuttle KR, Bakris GL, Bilous RW, Chiang JL, de Boer IH, Goldstein-Fuchs J, Hirsch IB, Kalantar-Zadeh K, Narva AS, Navaneethan SD et al: **Diabetic Kidney Disease: A Report From an ADA Consensus Conference**. Diabetes Care 2014, 37(10):2864.

4. Wang L, Gao P, Zhang M, Huang Z, Zhang D, Deng Q, Li Y, Zhao Z, Qin X, Jin D et al: **Prevalence and Ethnic Pattern of Diabetes and Prediabetes in China in 2013**. JAMA 2017, 317(24):2515-2523.

5. National Health Commission of People's Republic of China: **China health statistical yearbook 2019**. Beijing: Peking union medical college publishing house; 2019.

6. Ji L, Hu D, Pan C, Weng J, Huo Y, Ma C, Mu Y, Hao C, Ji Q, Ran X et al: **Primacy of the 3B approach to control risk factors for cardiovascular disease in type 2 diabetes patients**. Am J Med 2013, 126(10):925 e911-922.

7. Jia W, Weng J, Zhu D, Ji L, Lu J, Zhou Z, Zou D, Guo L, Ji Q, Chen L et al: **Standards of medical care for type 2 diabetes in China 2019**. Diabetes Metab Res Rev 2019, 35(6):e3158.

8. Zolnierek KB, Dimatteo MR: **Physician communication and patient adherence to treatment: a meta-analysis**. Med Care 2009, 47(8):826-834.

9. Naik AD, Kallen MA, Walder A, Street RL, Jr.: **Improving hypertension control in diabetes mellitus: the effects of collaborative and proactive health communication**. Circulation 2008, 117(11):1361-1368.

10. Levinson W, Pizzo PA: **Patient-physician communication: it's about time**. JAMA 2011(305(17)):1802-1803.

11. Margaret Lloyd RB, Lorraine Noble: **Clinical Communication Skills for Medicine, 4th edn**. London: Elsevier; 2018.

12. Li X, Lu J, Hu S, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Xu DR, Yip W, Zhang H et al: **The primary health-care system in China**. Lancet (London, England) 2017, 390(10112):2584-2594.

13. Murphy F: **China's plan for 500 000 new GPs**. BMJ 2018, 363:k4015.

14. Liu X, Rohrer W, Luo A, Fang Z, He TH, Xie W: **Doctor-patient communication skills training in mainland China: A systematic review of the literature**. Patient Education and Counseling 2015, 98(1):3-14.

15. Yao M, Zhang D-y, Fan J-t, Lin K, Haroon S, Jackson D, Li H, Chen W, Cheng KK, Lehman R: **The experiences of people with type 2**

diabetes in communicating with general practitioners in China – a primary care focus group study. BMC Primary Care 2022, 23(1):24.

16. Yao M, Zhang D-y, Fan J-t, Lin K, Haroon S, Jackson D, Li H, Chen W, Lehman R, Cheng KK: **The experiences of Chinese general practitioners in communicating with people with type 2 diabetes—a focus group study**. BMC Family Practice 2021, 22(1):156.

17. Yao M, Zhou X-y, Xu Z-j, Lehman R, Haroon S, Jackson D, Cheng KK: **The impact of training healthcare professionals' communication skills on the clinical care of diabetes and hypertension: a systematic review and meta-analysis**. BMC Family Practice 2021, 22(1):152.

18. Raine R, Sanderson C, Hutchings A, Carter S, Larkin K, Black N: **An experimental study of determinants of group judgments in clinical guideline development**. Lancet (London, England) 2004, 364(9432):429-437.

19. Cantrill JA, Sibbald B, Buetow S: **The Delphi and nominal group techniques in health services research**. International Journal of Pharmacy Practice 1996, 4(2):67-74.

20. McMillan SS, King M, Tully MP: **How to use the nominal group and Delphi techniques**. International Journal of Clinical Pharmacy 2016, 38(3):655-662.

21. Tong A, Sainsbury P, Craig J: **Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups**. Int J Qual Health Care 2007, 19(6):349-357.

22. **Notice on the issuance of Guangzhou General Practitioners (Family Doctors) Training Program (2019-2021)** [http://www.gz.gov.cn/zwgk/zdgzlsqk/2019nzdgz/qjqmsbzhshzlcx/content/post_2868427.html]

23. **Population size and distribution in Guangzhou in 2019** [http://tjj.gz.gov.cn/tjdt/content/post_5727607.html]

24. **List of hospital institutions and community health care service centres in Guangzhou** [http://wjw.gz.gov.cn/fwcx/yljgcx/content/post_7153475.html]

25. Braun V, Clarke V: **Using thematic analysis in psychology**. Qualitative Research in Psychology 2006, 3(2):77-101.

26. Melanie Birks JM: **Grounded Theory: A Pratical Guide Second edn**. London: SAGE; 2015.

27. Gazmararian JA, Williams MV, Peel J, Baker DW: **Health literacy and knowledge of chronic disease**. Patient Educ Couns 2003, 51(3):267-275.

28. Schillinger D, Grumbach K, Piette J, Wang F, Osmond D, Daher C, Palacios J, Sullivan GD, Bindman AB: **Association of health literacy with diabetes outcomes**. JAMA 2002, 288(4):475-482.

29. Golbeck AL, Ahlers-Schmidt CR, Paschal AM, Dismuke SE: **A definition and operational framework for health numeracy**. Am J Prev Med 2005, 29(4):375-376.

30. Cavanaugh K, Huizinga MM, Wallston KA, Gebretsadik T, Shintani A, Davis D, Gregory RP, Fuchs L, Malone R, Cherrington A et al:

Association of numeracy and diabetes control. Ann Intern Med 2008, 148(10):737-746.

31. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Li C, Lu J, Su M et al: **Quality of primary health care in China: challenges and recommendations**. The Lancet 2020, 395(10239):1802-1812.

32. **Opinions of the General Office of the State Council on Reforming and Improving General Practitioner Training and Incentive Mechanisms** [http://www.gov.cn/zhengce/content/2018-01/24/content_5260073.html]

CHAPTER 7. DISCUSSION

China has the largest population of people with known diabetes in the world and is facing a great challenge in developing an effective system for their management. Diabetes care is gradually shifting from secondary to primary care in China with great infrastructure investment and GP training over the past decades and in future as well [1-5]. It is hoped that a well-developed primary healthcare system in China can provide a good foundation for better outcomes in diabetes management [6-8]. Success in the long-term management of diabetes requires patient understanding of the condition, self-management, and partnership and trust between patients and health professionals [9-13]. All of these are related to the quality of communication between GPs and people with diabetes patients. However, most GPs in China lack communication skills training, which is a huge obstacle in communication with their patients [14]. Communication skills training is needed that is evidence-based, appropriate for the context of primary care in China, and that meets the real needs of both GPs and people with diabetes.

7.1 Summary of principal findings

This thesis aims to develop an evidence-based communication skills training program in diabetes care for general practitioners in China. A conceptual framework was designed based on the MRC framework, action research and adult learning theories (Chapter 2). A systematic review was conducted to find existing evidence in communication skills training in diabetes care worldwide

(Chapter 3). Two focus group studies were then conducted with GPs and diabetes patients in Guangzhou city of China (Chapter 4 and 5). Data from the above studies were combined to inform potential communication skills components for training. Finally, a nominal group technique (NGT) with GPs was used to identify the most important and feasible communication skills training components for Chinese GPs in diabetes care (Chapter 6). Communication skills training priorities for Chinese GPs in diabetes care were identified.

7.1.1 Chapter 2

As communication skills training is a complex intervention with multiple components, the MRC conceptual framework was considered to encourage good quality. Developing training programs for GPs is an educational activity that involves interaction between designers, educators, and learners. For researcher involvement in the process, we used the methods of action research. GPs had their medicine degrees from universities or colleges, qualifications in general practice and clinical practice experience in their workplace. We applied adult learning theories to understand their learning and practice behaviours, especially in a changing and reforming primary health care system context. With learning from those theories, a theoretical framework was developed to guide this PhD research by a systematic and iterative approach to identify and refine communication skills training programs for GPs in managing diabetes

patients.

7.1.2 Chapter 3

A systematic review was needed to summarize existing research studies that evaluated the effectiveness of communications skills training in diabetes care. In this chapter, a systematic review was conducted on randomized controlled trials on the effectiveness of communication skills training for healthcare professionals on the outcomes and experience of patients with diabetes. 19 relevant studies were identified from 7011 records searched in several bibliographic databases. Training interventions for healthcare professionals were not demonstrated to improve clinical outcomes in patients with diabetes, likely due to the large heterogeneity in studies and the use of inappropriate outcome measures in the included trials. However, key elements for successful communication training were identified including teaching theories, appropriate training content, training methods, and use of evaluation forms. Research gaps in communication skills training for diabetes care were identified in this systematic review: training needs to understand what health professionals and patients' thoughts and goals should be based on encouraging patients to self-manage and shared understanding of diabetes management with appropriate patient-important outcomes.

7.1.3 Chapter 4 and 5

Qualitative studies were used to explore and provide deeper insights into the

problems of communication between GPs and people with diabetes and relevant training issues for GPs. Insights of their experiences, perceptions, behaviour, and views on the barriers and facilitators to delivering diabetes care were gathered from two focus group studies from a wider primary health care system perspective. The findings could inform the design of a communication skills training program for GPs in China. Rich themes emerged from both GPs and patients' perspectives. GPs described several difficulties in communication with their diverse patients. They believed most of their patients had insufficient knowledge and misunderstanding of diabetes. Both GPs and patients had common needs in communicating about diabetes, such as regarding blood glucose monitoring and control, risk of diabetes complications and cardiovascular disease. Patients expressed that they needed more information and better communication channels with their GPs. Participants acknowledged that aspects of the health system were obstacles to good communication, such as insufficient consultation time and a consultation environment.

Poor communication behaviours (e.g., scolding and panicking patients) by GPs were described by participants. This highlighted a need for communication skills training, especially since GPs reported that there was a lack of relevant training. The patient-doctor relationship was another important theme as both patients and clinicians expressed the necessity for building long-term relationships that spanned patients' long journeys with diabetes. The focus group studies showed

a broader picture of challenges and complexity in communication between GPs and diabetes patients.

7.1.4 Chapter 6

Based on findings from the systematic review and focus groups with diabetes patients and GPs, a nominal group technique was used to identify a range of communication skills training priorities for GPs in China. 58 GPs from 28 general practices attended online workshops and discussed in-depth and prioritised a list of 19 potential communication skills training items. They chose the items of ‘health education’, ‘discussing and explaining blood glucose monitoring’, and ‘diabetes complications and cardiovascular disease risk communication’ as the most important and feasible skills needed for training in communication with their patients. Group discussions were qualitatively analysed by thematic analysis to explore reasons why those items were prioritized. Although most of the participants agreed that communication skills can promote patients’ understanding of diabetes and optimal diabetes care, they lacked training opportunities and acknowledged some personal and external factors that affected their communication skills, such as level of experience and clinical workload. They tended to acquire relevant knowledge if it was easy to understand, objective and clear. These will need to be key characteristics of any training program aimed at improving communication skills.

7.2 Relationship to other studies

High-quality physician-patient communication may foster an improvement of diabetes care [15-19] . Diabetes is a chronic disease that requires self-care and management and involves multiple healthcare visits and interactions with physicians [20]. A strong physician-patient relationship and cooperation requires effective communication to achieve optimal diabetes outcomes. The importance of patient-centred communication is discussed and encouraged by guidelines from the American Association of Diabetes (ADA), the European Association for the Study of Diabetes (EASD) and NICE [21-23]. Several cross-sectional studies and qualitative studies demonstrated that good physician-patient communication can improve diabetes patients' health outcomes (e.g., HbA1c), adherence, self-management, experience, and satisfaction [24-31]. However, as the nature of the cross-sectional study, the associations observed may not be causal. Most of the cross-sectional studies were from western countries with a small sample size. Findings from Chapter 3 suggest that current randomised control trials of communication skills training for physicians did not improve clinical outcomes. Half of the included trials were at a high risk of bias and training mentioned in all trials were poorly characterized with high heterogeneity. The findings of chapters 4, 5, and 6 demonstrated the complexity of the issues surrounding communication in diabetes care, and the importance of designing and implementing evidence-based communications skills training. These findings should be considered for future trials evaluating the

effectiveness of communication skills training on diabetes care and clinical outcomes.

7.2.1 Communication in diabetes care is complex

Findings on the complexity of communication between GPs and patients with diabetes in Chapters 4, 5, and 6 are consistent with other studies. Communication happened in all the processes of diabetes care including prevention, diagnosis, glycaemic targets, behaviour change, treatment choice and adherence, risk management, complications management and education. Communication about risks in diabetes is an example that was seen as important by patients and GPs in focus groups. A lack of awareness and misunderstanding of diabetes-related risks (e.g., cardiovascular risk) are common in patients in most developing countries and GPs have difficulty communicating about risk and providing individualized risk assessments [32-37]. Furthermore, the process of risk communication is extraordinarily complex [38, 39]. GPs need to provide a clear and simple message, using language and approaches that patients can understand, such as the use of visual graphics to discuss absolute risk with patients and what can be done to prevent or treat the problem [40-43]. This process need not be achieved in one single consultation but built over time during several patient-doctor interactions over time. Even if there was a clear picture of how to implement risk communication with diabetes patients that could be taken as an example for GPs in China, effective

communication is not easy only based on theoretical studies. Translational research from previous studies into a real-world setting in China is therefore necessary. This also applies to other parts of communication in diabetes besides risk communication.

7.2.2 Factors relevant to the communication process

The communication process is also hindered by various factors identified in Chapters 4, 5, and 6. Factors can be divided into three main types that were derived from the results of these studies: patient-related factors, GP-related factors, and context-related factors. Health literacy [18, 44, 45], numeracy skills [46, 47], presence of diabetes complications [48-50] and emotional problems are patient-related factors [51, 52]. GPs in the focus groups acknowledged that patients' knowledge about diabetes was often insufficient. The level of education and socio-demographic factors were related to their health literacy. In terms of numeracy skills, patients' understanding and use of numeric information (e.g., glucose readings) were frequently discussed both in patients' and GPs' focus groups. Language discordance between physicians and patients [53-56], hurried communication [57, 58] and discrimination or threat on patients are GP-related factors [59, 60]. Plain, accurate and empathic language is needed rather than medical terminology and blaming patients. An unhurried consultation with support from GPs can help patients to express their feelings and have their questions appropriately answered. Limited consultation time and

an uncomfortable consultation environment are context-related factors. Without considering the above factors, effective communication between diabetes patients and GPs cannot be achieved even where GPs are trained well in communication skills.

7.2.3 A logical, systematic approach to developing a communication skills training program

A well-designed communication skills training program based on evidence needs to be designed and analysed in a way that will inform the effectiveness and feasibility of future relevant programs. Normally, there are four basic assumptions for a medical educational program: it should have aims or goals; it should meet the needs of learners, patients, and the context; it should be responsible for the intervention outcomes; it should have a logical, systematic approach to achieve the ends, and be a dynamic and interactive process [61]. For communication skills in diabetes care, more attention is needed on this process when compared with general communication skills training due to the complexity of diabetes care between physicians and patients.

Typically, training and educational programs should focus on the development of knowledge and skills but also attitudes and values. In Chapter 4 and 6, GPs reported that they ignored the importance of, and were reluctant to focus on (attitude), the use of communication skills (behaviour) and were lack of opportunities to learn and acquire information (knowledge). This highlights that

the objectives of communication skills training programs should not only be knowledge and skills-based but also include more attitudinal objectives. GPs in China need such a change of attitude in order for them to apply communication skills. This change in attitude ned time and culture change, and also structural changes in the system. Theories on behavioural science and education (i.e., experience based learning) may provide insights into this complex task.

It is important for a communication skills training program to have several elements including the use of educational theories, appropriate content, length of training, structure, and assessment tools. Theories have several functions in medical education research: first to inform study design and analysis through an existed organizational framework; second to develop a specific theory or generate models or frameworks for understanding particular problems in education from research data by adopting grounded theory [62]. Only one-third of communication skills training trials in diabetes care included in Chapter 3 used a clear theory to guide the research. This suggests that researchers may not be aware of the importance of using theory for intervention development. This finding was supported by other studies. A systematic review on training physicians in behavioural change counselling concluded that none of the studies included reported basing their training program on any recognized theories or frameworks [63]. Types of adult learning theories were mentioned in Chapter 2 of this thesis, but a particular theory was not focus on at the

beginning of the research. With the results from the focus groups and the NGT study, it may suggest the social learning theory could be used for future training design as Chinese GPs preferred learning in a social setting and to learn what they have seen.

In Chapter 2, a wide range of theories and frameworks were introduced, and a conceptual framework was designed to inform the following studies logically and systematically. In terms of training content, NGT was used to prioritize potential communication skills in diabetes care based on evidence from the systematic review and qualitative studies. The skills selected by GPs should reflect their needs in daily practice. For the length of training and structure, short term training and various structures were used in previous trials. However, GPs who participated in the focus groups expressed a preference for training to be for a sufficient duration (over a longer-term) incorporating continuous active learning cycles with opportunities to embed learning in practice. These findings are in agreement with those of other studies. One review of systematic reviews found that effective communication skills programs were more than one day in length, were learner-cantered, and focused on practicing skills [64]. Finally, there should be an evaluation of training outcomes, including trainers' evaluation, and immediate, intermediate and longer-term health outcomes, such as observing communication behaviour in training and real practice with patients, surveying patients about their health care experiences, and assessing

patients' quality of life and clinical outcomes [65]. Overall, both prior evidence and the findings of this thesis underline the importance of methodological considerations for developing and evaluating communication skills training programs to improve their effectiveness and feasibility.

7.2.4 Context in the implementation of a communication skills training program

When implementing well-designed communication skills training programmes in China, the context of the wider healthcare system environment in China still needs consideration. The importance of context as a role in training was frequently mentioned in Chapters 4, 5, and 6. First, there is a great diversity of patient understanding of diabetes and experience with health care system in China. Most of the evidence found in the systematic review were from Western populations, with patients' characteristics, interpersonal style, and the nature of the patient-doctor relationship potentially differing from what might be found in Eastern societies [66, 67]. So, the findings of the systematic review may not be generalisable to Eastern societies for these reasons. For example, some diabetes patients in the focus group study expressed that the responsibility of diabetes management should sit with their GPs. This was in contrast to the Western population who are expected to be more self-management of long term conditions [68]. Both patients and GPs in China mentioned that patients wanted a close doctor-relationship like would like a sort of parent-child relationship rather than an encounter between two unrelated adults.

Second, doctors in China seldom received communication skills training in their medical school or continuing medical education for residents. Even in the few training programs implemented in China, most use oral presentations as a strategy and with self-designed assessment tools by educators to evaluate the quality of programs [14]. More importantly, GPs do not receive feedback about their interactions with patients once they have left medical school or residents training. This is supported by the experiences and views expressed by GPs in the qualitative studies in Chapters 4 and 6. It is also possible that GPs lack incentives (e.g., a certification, rewards, or personal development) to participate in training programmes to develop communication skills from the perspective of a behaviourist learning theory or cognitive learning theory.

Third, short consultation times between GPs and diabetes patients posed a major barrier to GPs adopting the skills from their training. Although effective communication can result in shorter and more efficient consultations, three to five minutes of consultation time, which is standard in primary care in China, were not enough [69]. Ongoing systematic changes for the primary health care system in China can provide more consultation time in future, such as investment in the primary health care workforce and improvement of the care pathway.

Finally, improvement of healthcare resources (e.g., not being crowded with people) and health policies (e.g., protecting patient confidentiality) is necessary to ensure a comfortable consultation environment for GPs and patients. All are important for a successful communication skills training program aimed at improving patient health outcomes.

7.3 Implications for policy, practice, and research

This thesis presents a systematic and comprehensive view of challenges in communication between diabetes patients and GPs in China. Possible training strategies for GPs communication skills were developed to improve diabetes management in the context of a transforming primary healthcare system in China. Policymakers and health system administrators should recognize diabetes patients' experiences in accessing care through patient satisfaction surveys or patient-reported outcomes. They should also commit to improving the structure of the diabetes care pathway in primary care, such as diabetes information resources or platforms for patients, effective patient education and team care and a well-established referral system between primary care settings and hospitals. Patient engagement and empowerment should be encouraged as they know best the challenges they come across.

More importantly, policymakers and health system leaders should implement a wide training program for GPs to be formally trained in communication skills

and support ongoing improvement of these skills to enable the provision of efficient and patient-cantered care for diabetes patients. Such programs should also be considered in the current GP education system where 400, 000 new doctors will be trained in the next 10 years, especially by adopting efficient approaches to priority setting to high-quality evidence-based training programs which not only include diabetes but other chronic conditions. Chinese diabetes guidelines should be updated to include recommendation statements about doctor and patient communication and recognise the importance of GP training in communication skills to support diabetes care [70].

Several findings from the two focus groups studies could help GPs improve their approach to communication with diabetes patients. Although some GPs described their patients as “pseudo experts” who had too much faith in their own knowledge and did not respect GPs’ authority, such a concept can be an obstacle to doctor-patient communication and relationship. GPs should avoid undermining patients’ knowledge and self-efficacy by holding a paternalistic view. Another obstacle is the behaviour of scolding and panicking diabetes patients to make them be more compliant with treatment. Those labels and behaviours should be avoided and instead GPs need to develop a collaborative relationship to help patients develop an understanding of diabetes and self-management behaviours that are evidence-based. Second, the emerging online communication platforms were used to address the needs that diabetes

patients want more communication channels with GPs and provide more time and space. In the future, there needs to research and development on appropriate digital technologies to promote communication in conditions like diabetes. Patients can be well-informed consumers of health information through digital health systems and can provide feedback to health services.

A logical, systematic approach should be considered when designing and researching future communication skills training. Educational theories or frameworks, long-term intervention, context, and key metrics are suggested here to develop a training program for GPs in diabetes or other chronic conditions. Research on chronic conditions management in primary care should advocate for patients to be involved in finding and prioritizing research questions, informing study design, research conduct and adoption of evidence-based action from research in healthcare. Future research in diabetes care in China should also involve other members of the primary care team including nurses, pharmacists, and other healthcare providers. Communication skills training combined with other interventions (e.g., decision tools) for improving diabetes care could also be explored.

Before this thesis, there was no literature that reported communication issues between GPs and diabetes patients in China. The two focus group studies in this thesis are the first to describe both GPs and patients' experience in

communication with each other, and they have provided deep insight into the delivery of diabetes care in a patient centred way in primary care. where 150 million people were diagnosed with diabetes. This thesis also highlights the importance of communication competency for GPs in China and provides further evidence on GPs training in communication skills, which is feasible in their continuing professional development and can be applied in primary care by focusing on their needs and context.

7.4 Strengths and limitations

Strength for this thesis is the mixed methods approach using a systematic review, qualitative studies, NGT workshops and using relevant theoretical frameworks to underpin the study design and analysis. The systematic review in this thesis was the first to find and evaluate the current evidence on the impact of communication skills training for healthcare professionals on outcomes for patients with diabetes and hypertension. This review searched relevant trials globally and without language limitations. A range of training strategies were summarized in this review. The two focus group studies were also the first to explore the experience of both Chinese GPs and patients in communication with each other. The number of qualitative studies on primary care and diabetes care in China is few. Rich themes were discovered in this thesis and most of the findings were not previously reported in quantitative studies. Purposive sampling was used to ensure a heterogeneous sample of

participants. Smaller focus groups were used to promote the participants' discussion and interaction to explore deep and complex issues under a socio-cultural context [71]. The NGT study in this thesis was also the first to identify communication skills training priorities that may not only help Chinese GPs but potentially other healthcare providers supporting diabetes care in other low- and middle-income countries. The NGT study provides an example of how to design and prioritise content for other GP relevant training programs in China and globally. By learning the MRC framework, action research and adult learning theories, a theoretical framework was developed and informed the above studies. All steps were in a systematic and iterative approach with the reflection of researchers.

There are two limitations to the systematic review. First, only individual and cluster RCTs were included. RCTs are considered the 'gold standard' as they are a more valid study design for causal inference compared with non-randomized studies. While systematic reviews of RCTs offer the highest level of evidence and are more likely to provide unbiased information about the effects of training physicians, non-randomized evidence might address long-term outcomes and identify wider ways of delivering a training program. Second, for the meta-analysis of complex trials, traditional pairwise meta-analysis and subgroup analyses were used. Systematic reviews of complex training interventions may include a set of studies in which the overall intervention either

includes slightly different components in each instance or is implemented differently in every study with various contexts. By using traditional analytic approaches, the average effect can be analytic and know how effective the intervention is, however, it may eliminate details which are important to understand whether the intervention is feasible and likely to work. Future work needs to consider using newly developed tools and guidance (i.e., PRISMA-CI) specific to systematic reviews of complex interventions in medical education programs.

The main limitation of qualitative studies in this thesis is that all studies were conducted in one single city, Guangzhou in China, which may limit the generalizability of findings. However, Guangzhou is a modern industrial city located in the South of China. It is the capital city of Guangdong province with close to fifteen million urban residents at the end of 2019, 1% of the total population in China [72]. The size of the health care system in Guangzhou can be seen as a similar but smaller one compared to the whole country, so it could be representative of the whole country to some extent. Thus, the results can be used to support future diabetes care improvement in primary care in other parts of China.

There are two limitations to the NGT study. First, it may possible that participants in the NGT group may not be familiar with the pre-defined

communication skills item. They may have risked misunderstanding the items, which could have influenced their responses. However, an information pack were sent out one week prior to the NGT group and participants made ratings in the first round. In addition, the facilitator of the NGT group briefly described the listed communication skills item at the start of the NGT group. Each of these approaches could improve participants' understanding of items. Another limitation is that the NGT study was conducted online rather than in-person due to a small outbreak of Covid-19 during that time in Guangzhou. However, facilitators in NGT groups were trained before and a pilot NGT group was tested with protocols, which ensured the quality of NGT.

7.5 Personal reflection during the PhD research

I still remember some of the meaningful things that happened when conducting patient focus groups. Recruiting patients to participate in focus groups was a little more difficult compared with doctors. Many patients did not know much about this form of research- 'to sit together and talk with each other'. I think there may be some reasons. Qualitative research is rare in the field of medical research in China, instead, it is frequently used in social sciences. In medical research, most studies are quantitative with very few researchers using qualitative research methods to observe and explore patients' feelings and experiences. When I conducted the patient focus groups, I spent a lot of time trying to explain the purpose and process of the research to my participants.

I remember one participant coming up to me after a focus group and telling me that it was the first time that he could talk with somebody for so long and expressed his thoughts since he had diabetes for ten years. Many of the participants' words still touch me today. I see the pain they suffer from diabetes and the hardship they go through in their journey with diabetes. I see their compassion and care for their doctors with great clinical burden and their willingness to walk shoulder to shoulder with doctors in the face of diabetes. I feel that patient-centred diabetes care in China is still a long march that requires the efforts of all.

Medical education in China is changing dramatically, in line with the transformation of the health care system and the changing demands on health. However, medical school and post-graduate education are still using pedagogic methods. Trainer-centered and competency-based medical education are not widely implemented. Clinical communication is still taught in a teacher-centred way without active learning. In this thesis, GPs preferred various methods of clinical communication training including interactive teaching, role play and sharing clinical cases. Bridging the gap between demand and reality will take time. At the same time, environmental changes in the healthcare system have an impact on the learning behaviour and attitudes of doctors. Both medical education and the health care system need an effective coordination mechanism. This applies not only to training in clinical communication but also

to other capability learning.

I realise that medical education is very complex and depends on the contextual environment, which influences teaching and learning. From my thesis, I see that the influence of the context may make it difficult to 'prove' that particular interventions 'work' due to the complex interplay of influences. Using RCTs in medical education may have some limitations. Trials are typically in the context of controlled environments. There should be caution about applying educational theories and interventions with the assumption that these occur in 'ideal' (trial-like) circumstances. Education is a social thing, accompanied by unintended consequences and multifactorial outcomes. On the other hand, I see more and more RCTs related to medical education. There is a broader audience than education, involving medical professionals, and those who are deeply familiar with quantitative methods. There may be more collaboration among education, medical and other professionals in the future, especially in the complex context of China.

7.6 Further planned research and work

In this thesis, patients' poor knowledge and misunderstanding of diabetes, their tendency to search for information about diabetes on the Internet, and share information online via social media networks, were highlighted by GPs. This

was thought to have a great impact on diabetes patients' self-management and influence communication with their doctors. One of the next steps in my research is to better understand the online information-seeking and online peer support people with diabetes engage with [73-76]. This would help GPs in collaboration with their patients to find and use evidence-based information in clinical encounters. A better understanding of the online content searched by patients for information on diabetes can help build an evidence-based source of diabetes information for patients locally and nationally in China. It is known that western developed countries (e.g., the UK) have official diabetes information websites for people, such as the NHS website, NICE, and Diabetes UK. People with diabetes with their doctors to help verify Internet or online social network information sources. If an official and evidence-based information website can be developed, it could more efficiently support diabetes patients' self-management in China.

Risk communication was seen as an important communication skill in diabetes care among GPs in China. An accurate understanding of risk by both patients and doctors is important for supporting positive health-related behaviours [77]. Clinical risk tools for populations in China are currently lacking, and it would be helpful to develop culturally appropriate tools and decision aids for diabetes, CVD, and other diabetes-related complications specific to Chinese populations to aid risk communication and shared decision making in primary care in China

[39, 78]. Previous evidence shows that visual presentation of risk information is useful in supporting the prevention of CVD by providing information to both patients and physicians [79]. Such tools can be leaflets, maps, or websites to present diabetes risk information based on individual characteristics. These tools can encourage patients to raise their questions and concerns to GPs and support GPs to provide relevant and focused information even in a limited consultation time. Designing a risk communication tool would need to be a systematic process involving patients, physicians and designers and based on the literature on risk assessment, as well as qualitative studies, Delphi method and field test [80].

Effective and feasible measurements of physicians in communication with their patients are necessary for patients to access and give feedback to physicians [81]. Direct observation and interviews with patients are often used in clinical encounters, but they are time-consuming and hard to provide objective feedback to physicians. Communication assessment tools are used by educators or patients to rate clinicians' communication performance to provide informative feedback and support communication skills improvement. A systematic review of assessment tools to evaluate physicians' communication skills identified 45 tools that were highly heterogeneous [82]. Most had been poorly validated and only half described who performed the evaluations. The lack of appropriate evaluation of assessment tools has made it difficult to

assess the efficacy and effectiveness of existing communication skills training programs. To rigorously validate or develop an assessment tool using scales especially for diabetes care in China can be explored in future research.

With the findings of this thesis, a pilot cluster randomized controlled trial can be conducted in future to assess the feasibility and preliminary effects of training Chinese GPs in communication skills in diabetes care. There will be several aims to this pilot study: to assess the feasibility of GP recruitment and participation; to adapt communication skills training programs; to evaluate GP satisfaction, competency of communication skills, and intention of using learnt skills in clinical practice; and to evaluate diabetes patients' experience and other patient-important outcomes in diabetes management.

A prospective, multicentre, cluster randomised controlled trial could be undertaken in the future to compare standard care with training GPs with communication skills, decision tools, and online patient health education resource strategies for people with type 2 diabetes. It is hypothesised that such strategies will improve doctor and patient communication and improve diabetes management outcomes. Participating GP clinics will be randomly assigned (1:1 ratio) into an intervention cluster and a control cluster. Each GP in the intervention group will take part in communication skills training. The training programs will not only be knowledge and skills-based but also include attitudinal

objectives. The training content will focus on diabetes complications and cardiovascular disease risk communication. The training will be a sufficient duration incorporating interactive methods such as role-play and continuous active learning cycles with opportunities to embed learning in practice. Social learning theory combined with other adult learning theories will be considered to guide the training design. Each participant with type 2 diabetes will be encouraged to use a cultural-based validated visual tool to agree on the blood glucose (HbA1c) target. This tool will include evidence of benefits and challenges in managing blood glucose. Each participant with type 2 diabetes in the intervention group will receive an online evidence-based diabetes self-management education and support. The primary endpoint is the change in glycated haemoglobin from baseline to the 1-year follow-up. Secondary outcomes are changes in weight, systolic and diastolic blood pressure, total cholesterol, LDL cholesterol, HDL cholesterol, smoking, patient-reported outcomes (i.e., quality of life, diabetes-related distress), and quality of communication and health literacy. Long-term follow-up for complications of diabetes will also be considered.

7.7 Conclusion

Based on the findings from the four main research chapters, communication skills training priorities for Chinese GPs in diabetes care were identified. Strategies may be required to improve GPs' communication skills with their

patients that also consider the context of the wider healthcare system environment in China. A communication skills training program developed through a systematic approach, and underpinned by relevant theory, can now be tested in a feasibility study in primary care in China and then evaluated within a fully powered randomized controlled trial. Further work needs to pay attention to using appropriate measurements to evaluate both GPs and patients' outcomes in future long-term follow-up studies. With the changes in communication quality and the delivery of diabetes care in primary care in China, significantly improved outcomes should be seen for the whole diabetes population in the long term.

7.7 References

1. Jia W, Tong N: **Diabetes prevention and continuing health-care reform in China**. *The Lancet Diabetes & Endocrinology* 2015, **3**(11):840-842.

2. **Reversing the rising tide of diabetes in China**. *The Lancet* 2016, **388**(10060):2566.

3. Li X, Krumholz HM, Yip W, Cheng KK, De Maeseneer J, Meng Q, Mossialos E, Li C, Lu J, Su M *et al*: **Quality of primary health care in China: challenges and recommendations**. *The Lancet* 2020, **395**(10239):1802-1812.

4. Mao W, Yip CW, Chen W: **Complications of diabetes in China: health system and economic implications**. *BMC Public Health* 2019, **19**(1):269.

5. **General Office of the State Council of the People's Republic of China: Opinions of the General Office of the State Council on Reforming and Improving General Practitioner Training and Incentive Mechanisms. 2018. Date accessed: June 30 2021.** [http://www.gov.cn/zhengce/content/2018-01/24/content_5260073.html]

6. Tan X, Zhang Y, Shao H: **Healthy China 2030, a breakthrough for improving health**. *Glob Health Promot* 2019, **26**(4):96-99.

7. Davidson JA: **The increasing role of primary care physicians in caring for patients with type 2 diabetes mellitus**. *Mayo Clin Proc* 2010, **85**(12 Suppl):S3-4.

8. Bodenheimer T, Wagner EH, Grumbach K: **Improving Primary Care for Patients With Chronic Illness**. *JAMA* 2002, **288**(14):1775-1779.

9. Heisler M, Bouknight RR, Hayward RA, Smith DM, Kerr EA: **The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self-management**. *Journal of General Internal Medicine* 2002, **17**(4):243-252.

10. Hewitt J, Smeeth L, Chaturvedi N, Bulpitt CJ, Fletcher AE: **Self management and patient understanding of diabetes in the older person**. *Diabetic Medicine* 2011, **28**(1):117-122.

11. Norris SL, Engelgau MM, Narayan KMV: **Effectiveness of self-management training in type 2 diabetes: A systematic review of randomized controlled trials**. *Diabetes Care* 2001, **24**(3):561-587.

12. Bonds DE, Camacho F, Bell RA, Duren-Winfield VT, Anderson RT, Goff DC: **The association of patient trust and self-care among patients with diabetes mellitus**. *BMC Family Practice* 2004, **5**(1):26.

13. Lee YY, Lin JL: **The effects of trust in physician on self-efficacy, adherence and diabetes outcomes**. *Social Science and Medicine* 2009, **68**(6):1060-1068.

14. Liu X, Rohrer W, Luo A, Fang Z, He T, Xie W: **Doctor-patient communication skills training in mainland China: a systematic review of the literature**. *Patient Educ Couns* 2015, **98**(1):3-14.

15. Parchman ML, Flannagan D, Ferrer RL, Matamoras M: **Communication competence, self-care behaviors and glucose control in patients with type 2 diabetes**. *Patient Educ Couns* 2009, **77**(1):55-59.

16. Jones A, Vallis M, Cooke D, Pouwer F: **Working Together to Promote Diabetes Control: A Practical Guide for Diabetes Health Care Providers in Establishing a Working Alliance to Achieve Self-Management Support**. *J Diabetes Res* 2016, **2016**:2830910.

17. Polonsky WH, Capehorn M, Belton A, Down S, Alzaid A, Gamerman V, Nagel F, Lee J, Edelman S: **Physician–patient communication at diagnosis of type 2 diabetes and its links to patient outcomes: New results from the global IntroDia® study**. *Diabetes Research and Clinical Practice* 2017, **127**:265-274.

18. Schillinger D, Bindman A, Wang F, Stewart A, Piette J: **Functional health literacy and the quality of physician-patient communication among diabetes patients**. *Patient Education and Counseling* 2004, **52**(3):315-323.

19. Heisler M, Cole I, Weir D, Kerr EA, Hayward RA: **Does physician communication influence older patients' diabetes self-management and glycemic control? Results from the health and retirement study (HRS)**. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences* 2007, **62**(12):1435-1442.

20. O'Hara LL, Shue CK: **Discourses of diabetes management in patient-physician interactions**. *Qualitative Report* 2018, **23**(6):1282-1300.

21. Association AD: **Improving Care and Promoting Health in Populations: Standards of Medical Care in Diabetes—2021**. *Diabetes Care* 2021, **44**(Supplement 1):S7.

22. Cosentino F, Grant PJ, Aboyans V, Bailey CJ, Ceriello A, Delgado V, Federici M, Filippatos G, Grobbee DE, Hansen TB *et al*: **2019 ESC Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD: The Task Force for diabetes, pre-diabetes, and cardiovascular diseases of the European Society of Cardiology (ESC) and the European Association for the Study of Diabetes (EASD)**. *European Heart Journal* 2020, **41**(2):255-323.

23. **Type 2 diabetes in adults: management. 2020. Date accessed: 13th Oct 2021.** [https://www.nice.org.uk/guidance/ng28/chapter/Recommendations]

24. Sohal T, Sohal P, King-Shier KM, Khan NA: **Barriers and facilitators for type-2 diabetes management in south asians: A systematic review**. *PLoS One* 2015, **10**(9).

25. Ratanawongsa N, Karter AJ, Parker MM, Lyles CR, Heisler M, Moffet HH, Adler N, Warton EM, Schillinger D: **Communication and medication refill adherence the diabetes study of Northern California**. *JAMA Internal Medicine* 2013, **173**(3):210-218.

26. Gao J, Wang J, Zheng P, Haardörfer R, Kegler MC, Zhu Y, Fu H: **Effects of self-care, self-efficacy, social support on glycemic control in adults with type 2 diabetes**. *BMC Family Practice* 2013, **14**:66.

27. Inoue M, Takahashi M, Kai I: **Impact of communicative and critical health literacy on understanding of diabetes care and self-efficacy in diabetes management: A cross-sectional study of primary care in Japan**. *BMC Family Practice* 2013, **14**:40.

28. Jalil A, Zakar R, Zakar MZ, Fischer F: **Patient satisfaction with doctor-patient interactions: a mixed methods study among diabetes mellitus patients in Pakistan**. *BMC Health Services Research* 2017, **17**(1):155.

29. Abdulhadi N, Al Shafaee M, Freudenthal S, Östenson CG, Wahlström R: **Patient-provider interaction from the perspectives of type 2 diabetes patients in Muscat, Oman: A qualitative study**. *BMC Health Services Research* 2007, **7**:162.

30. Peimani M, Nasli-Esfahani E, Sadeghi R: **Patients' perceptions of patient–provider communication and diabetes care: A systematic**

review of quantitative and qualitative studies. *Chronic Illness* 2018, **16**(1):3-22.

31. Heisler M, Tierney E, Ackermann RT, Tseng C, Venkat Narayan KM, Crosson J, Waitzfelder B, Safford MM, Duru K, Herman WH *et al*: **Physicians' participatory decision-making and quality of diabetes care processes and outcomes: Results from the triad study**. *Chronic Illness* 2009, **5**(3):165-176.

32. Okosun IS, Davis-Smith M, Seale JP: **Awareness of diabetes risks is associated with healthy lifestyle behavior in diabetes free American adults: Evidence from a nationally representative sample**. *Primary Care Diabetes* 2012, **6**(2):87-94.

33. Wang C, Yu Y, Zhang X, Li Y, Kou C, Li B, Tao Y, Zhen Q, He H, Kanu JS *et al*: **Awareness, treatment, control of diabetes mellitus and the risk factors: Survey results from Northeast China**. *PLoS One* 2014, **9**(7).

34. Lau SL, Debarma R, Thomas N, Asha H, Vasan K, Alex R, Gnanaraj J: **Healthcare planning in North-east India: A survey on diabetes awareness, risk factors and health attitudes in a rural community**. *Journal of Association of Physicians of India* 2009, **57**(4):305-309.

35. Alanazi FK, Alotaibi JS, Paliadelis P, Alqarawi N, Alsharari A, Albagawi B: **Knowledge and awareness of diabetes mellitus and its risk factors in saudi arabia**. *Saudi Medical Journal* 2018, **39**(10):981-989.

36. Pan CW, Wang S, Qian DJ, Xu C, Song E: **Prevalence, Awareness, and Risk Factors of Diabetic Retinopathy among Adults with**

Known Type 2 Diabetes Mellitus in an Urban Community in China. *Ophthalmic Epidemiology* 2017, **24**(3):188-194.

37. Liu X, Li Y, Li L, Zhang L, Ren Y, Zhou H, Cui L, Mao Z, Hu D, Wang C: **Prevalence, awareness, treatment, control of type 2 diabetes mellitus and risk factors in Chinese rural population: The RuralDiab study**. *Scientific Reports* 2016, **6**.

38. Mentrup S, Harris E, Gomersall T, Köpke S, Astin F: **Patients' Experiences of Cardiovascular Health Education and Risk Communication: A Qualitative Synthesis**. *Qualitative Health Research* 2020, **30**(1):88-104.

39. Neuner-Jehle S, Senn O, Wegwarth O, Rosemann T, Steurer J: **How do family physicians communicate about cardiovascular risk? Frequencies and determinants of different communication formats**. *BMC Family Practice* 2011, **12**:15.

40. Navar AM, Wang TY, Mi X, Robinson JG, Virani SS, Roger VL, Wilson PWF, Goldberg AC, Peterson ED: **Influence of Cardiovascular Risk Communication Tools and Presentation Formats on Patient Perceptions and Preferences**. *JAMA Cardiology* 2018, **3**(12):1192-1199.

41. Navar AM, Pencina MJ, Mulder H, Elias P, Peterson ED: **Improving patient risk communication: Translating cardiovascular risk into standardized risk percentiles**. *American Heart Journal* 2018, **198**:18-24.

42. Bonner C, Jansen J, McKinn S, Irwig L, Doust J, Glasziou P, McCaffery K: **Communicating cardiovascular disease risk: An interview**

study of General Practitioners' use of absolute risk within tailored communication strategies. *BMC Family Practice* 2014, **15**(1):106.

43. Gidlow CJ, Ellis NJ, Cowap L, Riley V, Crone D, Cottrell E, Grogan S, Chambers R, Clark-Carter D: **Cardiovascular disease risk communication in NHS Health Checks using QRISK®2 and JBS3 risk calculators: the RICO qualitative and quantitative study**. *Health technology assessment (Winchester, England)* 2021, **25**(50):1-124.

44. White RO, Chakkalakal RJ, Presley CA, Bian A, Schildcrout JS, Wallston KA, Barto S, Kripalani S, Rothman R: **Perceptions of Provider Communication Among Vulnerable Patients With Diabetes: Influences of Medical Mistrust and Health Literacy**. *Journal of Health Communication* 2016, **21**:127-134.

45. Al Sayah F, Williams B, Pederson JL, Majumdar SR, Johnson JA: **Health literacy and nurses' communication with type 2 diabetes patients in primary care settings**. *Nursing Research* 2014, **63**(6):408-417.

46. Osborn CY, Cavanaugh K, Kripalani S: **Strategies to address low Health Literacy and Numeracy in Diabetes**. *Clinical Diabetes* 2010, **28**(4):171-175.

47. Cavanaugh K, Wallston KA, Gebretsadik T, Shintani A, Huizinga MM, Davis D, Gregory RP, Malone R, Pignone M, DeWalt D *et al*: **Addressing literacy and numeracy to improve diabetes care: Two randomized controlled trials**. *Diabetes Care* 2009, **32**(12):2149-2155.

48. Merz CNB, Buse JB, Tuncer D, Twillman GB: **Physician attitudes and practices and patient awareness of the cardiovascular complications of diabetes**. *Journal of the American College of Cardiology* 2002, **40**(10):1877-1881.

49. Okrainec K, Booth GL, Hollands S, Bell CM: **Impact of language barriers on complications and mortality among immigrants with diabetes: A population-based cohort study**. *Diabetes Care* 2015, **38**(2):189-195.

50. Buckloh LM, Lochrie AS, Antal H, Milkes A, Canas JA, Hutchinson S, Wysocki T: **Diabetes complications in youth: Qualitative analysis of parents' perspectives of family learning and knowledge**. *Diabetes Care* 2008, **31**(8):1516-1520.

51. Dennick K, Bridle C, Sturt J: **Written emotional disclosure for adults with Type 2 diabetes: a primary care feasibility study**. *Primary health care research & development* 2015, **16**(2):179-187.

52. Hajos TRS, Polonsky WH, Twisk JWR, Dain MP, Snoek FJ: **Do physicians understand Type 2 diabetes patients' perceptions of seriousness; the emotional impact and needs for care improvement? A cross-national survey**. *Patient Education and Counseling* 2011, **85**(2):258-263.

53. Dickinson JK, Guzman SJ, Maryniuk MD, O'Brian CA, Kadohiro JK, Jackson RA, D'Hondt N, Montgomery B, Close KL, Funnell MM: **The Use of Language in Diabetes Care and Education**. *Diabetes Care* 2017, **40**(12):1790.

54. Schenker Y, Karter AJ, Schillinger D, Warton EM, Adler NE, Moffet HH, Ahmed AT, Fernandez A: **The impact of limited English proficiency and physician language concordance on reports of clinical interactions among patients with diabetes: The DISTANCE study**. *Patient Education and Counseling* 2010, **81**(2):222-228.

55. Speight J, Conn J, Dunning T, Skinner TC: **Diabetes Australia position statement. A new language for diabetes: Improving communications with and about people with diabetes**. *Diabetes Research and Clinical Practice* 2012, **97**(3):425-431.

56. Parker MM, Fernández A, Moffet HH, Grant RW, Torreblanca A, Karter AJ: **Association of patient-physician language concordance and glycemic control for limited-English proficiency Latinos with type 2 diabetes**. *JAMA Internal Medicine* 2017, **177**(3):380-387.

57. Kruse RL, Olsberg JE, Oliver DP, Shigaki CL, Vetter-Smith MJ, LeMaster JW: **Patient-provider communication about diabetes self-care activities**. *Fam Med* 2013, **45**(5):319-322.

58. Ritholz MD, Beverly EA, Brooks KM, Abrahamson MJ, Weinger K: **Barriers and facilitators to self-care communication during medical appointments in the United States for adults with type 2 diabetes**. *Chronic Illn* 2014, **10**(4):303-313.

59. Lyles CR, Karter AJ, Young BA, Spigner C, Grembowski D, Schillinger D, Adler N: **Provider factors and patient-reported healthcare discrimination in the Diabetes Study of California (DISTANCE)**. *Patient Education and Counseling* 2011, **85**(3):e216-e224.

60. Lawson VL, Bundy C, Harvey JN: **The influence of health threat communication and personality traits on personal models of diabetes in newly diagnosed diabetic patients**. *Diabetic Medicine* 2007, **24**(8):883-891.

61. Thomas PA, Kern DE, Hughes MT, Chen BY: **Curriculum development for medical education : a six-step approach**, Third edition. Baltimore : Johns Hopkins University Press; 2016.

62. Cleland JA, Durning SJ, Artino AR: **Researching medical education** Chichester, England : Wiley Blackwell.; 2015.

63. Dragomir AI, Julien CA, Bacon SL, Boucher VG, Lavoie KL: **Training physicians in behavioural change counseling: A systematic review**. *Patient Education and Counseling* 2019, **102**(1):12-24.

64. Berkhof M, van Rijssen HJ, Schellart AJM, Anema JR, van der Beek AJ: **Effective training strategies for teaching communication skills to physicians: An overview of systematic reviews**. *Patient Education and Counseling* 2011, **84**(2):152-162.

65. Levinson W, Lesser CS, Epstein RM: **Developing physician communication skills for patient-centered care**. *Health Aff (Millwood)* 2010, **29**(7):1310-1318.

66. Hawley ST, Morris AM: **Cultural challenges to engaging patients in shared decision making**. *Patient Educ Couns* 2017, **100**(1):18-24.

67. Flores G: **Culture and the patient-physician relationship: Achieving cultural competency in health care**. *Journal of Pediatrics* 2000, **136**(1):14-23.

68. Green EGT, Deschamps JC, Páez D: **Variation of individualism and collectivism within and between 20 countries: A typological analysis**. *Journal of Cross-Cultural Psychology* 2005, **36**(3):321-339.

69. Irving G, Neves AL, Dambha-Miller H, Oishi A, Tagashira H, Verho A, Holden J: **International variations in primary care physician consultation time: a systematic review of 67 countries**. *BMJ Open* 2017, **7**(10):e017902.

70. Jia W, Weng J, Zhu D, Ji L, Lu J, Zhou Z, Zou D, Guo L, Ji Q, Chen L *et al*: **Standards of medical care for type 2 diabetes in China 2019**. *Diabetes Metab Res Rev* 2019, **35**(6):e3158.

71. Richard A. Krueger MAC: **Focus Groups: A Practical Guide for Applied Research**, 5th edn. London: SAGE Publications Ltd; 2015.

72. **Guangzhou statistics bureau: Population size and distribution in Guangzhou in 2019. 2020. Date accessed: June 31 2021.** [http://tjj.gz.gov.cn/tjdt/content/post_5727607.html]

73. Longo DR, Schubert SL, Wright BA, LeMaster J, Williams CD, Clore JN: **Health information seeking, receipt, and use in diabetes self-management**. *Ann Fam Med* 2010, **8**(4):334-340.

74. Kuske S, Schiereck T, Grobosch S, Paduch A, Droste S, Halbach S, Icks A: **Diabetes-related information-seeking behaviour: a systematic review**. *Syst Rev* 2017, **6**(1):212.

75. Fergie G, Hilton S, Hunt K: **Young adults' experiences of seeking online information about diabetes and mental health in the age of social media**. *Health Expect* 2016, **19**(6):1324-1335.

76. Greene JA, Choudhry NK, Kilabuk E, Shrank WH: **Online social networking by patients with diabetes: a qualitative evaluation of communication with Facebook**. *J Gen Intern Med* 2011, **26**(3):287-292.

77. French DP, Cameron E, Benton JS, Deaton C, Harvie M: **Can Communicating Personalised Disease Risk Promote Healthy Behaviour Change? A Systematic Review of Systematic Reviews**. *Ann Behav Med* 2017, **51**(5):718-729.

78. Webster R, Heeley E: **Perceptions of risk: understanding cardiovascular disease**. *Risk Manag Healthc Policy* 2010, **3**:49-60.

79. Näslund U, Ng N, Lundgren A, Fhärm E, Grönlund C, Johansson H, Lindahl B, Lindahl B, Lindvall K, Nilsson SK *et al*: **Visualization of asymptomatic atherosclerotic disease for optimum cardiovascular prevention (VIPVIZA): a pragmatic, open-label, randomised controlled trial**. *The Lancet* 2019, **393**(10167):133-142.

80. Coulter A, Stilwell D, Kryworuchko J, Mullen PD, Ng CJ, van der Weijden T: **A systematic development process for patient decision aids**. *BMC Med Inform Decis Mak* 2013, **13 Suppl 2**(Suppl 2):S2.

81. Makoul G, Krupat E, Chang CH: **Measuring patient views of physician communication skills: development and testing of the Communication Assessment Tool**. *Patient Educ Couns* 2007, **67**(3):333-342.

82. Boucher VG, Gemme C, Dragomir AI, Bacon SL, Larue F, Lavoie KL: **Evaluation of Communication Skills Among Physicians: A**

Systematic Review of Existing Assessment Tools. *Psychosom Med* 2020, **82**(4):440-451.

APPENDIX

Appendix 1 Search strategy for systematic review

1. Search strategy for Ovid MEDLINE

1 physician*.mp.
2 doctor*.mp.
3 clinician*.mp.
4 General Practitioner*.mp.
5 specialis*.mp.
6 nurse*.mp.
7 pharmacist*.mp.
8 health professional*.mp.
9 health provider*.mp.
10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9

11 exp Communication/
12 communicat*.mp.
13 consultation*.mp.
14 conversation*.mp.
15 interview.mp.
16 shared decision making.mp.
17 11 or 12 or 13 or 14 or 15 or 16

18 train*.mp.
19 course*.mp.
20 program*.mp.
21 intervention*.mp.
22 workshop*.mp.
23 teach*.mp.
24 learn*.mp.
25 educat*.mp.
26 module*.mp.
27 session*.mp.
28 curriculum*.mp.
29 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28

30 exp Diabetes Mellitus/
31 diabet*.mp.
32 (IDDM or NIDDM or MODY or T1DM or T2DM or T1D or T2D).mp.
33 (non insulin* depend* or non insulin* depend* or non insulin?depend* or non insulin?depend*).mp.
34 (insulin* depend* or insulin?depend*).mp.

35 hypertension.mp.
36 hypertens$.mp.
37 blood pressure.mp.
38 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37

39 randomized controlled trial.pt.
40 controlled clinical trial.pt.
41 randomized.ab.
42 placebo.ab.
43 drug therapy.fs.
44 randomly.ab.
45 trial.ab.
46 groups.ab.
47 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46
48 exp animals/ not humans/
49 47 not 48

50 10 and 17 and 29 and 38 and 49

Note: RCT filters were referenced to Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021. Available from www.training.cochrane.org/handbook.

2. Search strategy for Embase

1 physician*.mp.
2 doctor*.mp.
3 clinician*.mp.
4 General Practitioner*.mp.
5 specialis*.mp.
6 nurse*.mp.
7 pharmacist*.mp.
8 health professional*.mp.
9 health provider*.mp.
10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9

11 exp Communication/
12 communicat*.mp.
13 consultation*.mp.
14 conversation*.mp.
15 interview.mp.
16 shared decision making.mp.
17 11 or 12 or 13 or 14 or 15 or 16

18 train*.mp.
19 course*.mp.
20 program*.mp.
21 intervention*.mp.
22 workshop*.mp.
23 teach*.mp.
24 learn*.mp.
25 educat*.mp.
26 module*.mp.
27 session*.mp.
28 curriculum*.mp.
29 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28

30 exp Diabetes Mellitus/
31 diabet*.mp.
32 (IDDM or NIDDM or MODY or T1DM or T2DM or T1D or T2D).mp.
33 (non insulin* depend* or non insulin* depend* or non insulin?depend* or non insulin?depend*).mp.
34 (insulin* depend* or insulin?depend*).mp.
35 hypertension.mp.
36 hypertens$.mp.
37 blood pressure.mp.
38 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37

39 Randomized controlled trial/
40 Controlled clinical study/
41 random$.ti,ab.
42 randomization/
43 intermethod comparison/
44 placebo.ti,ab.
45 (compare or compared or comparison).ti.
46 ((evaluated or evaluate or evaluating or assessed or assess) and (compare or compared or comparing or comparison)).ab.
47 (open adj label).ti,ab.
48 ((double or single or doubly or singly) adj (blind or blinded or blindly)).ti,ab.
49 double blind procedure/
50 parallel group$1.ti,ab.
51 (crossover or cross over).ti,ab.
52 ((assign$ or match or matched or allocation) adj5 (alternate or group$1 or intervention$1 or patient$1 or subject$1 or participant$1)).ti,ab.
53 (assigned or allocated).ti,ab.
54 (controlled adj7 (study or design or trial)).ti,ab.
55 (volunteer or volunteers).ti,ab.

56 human experiment/
57 trial.ti. 333158
58 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57
59 Cross-sectional study/ not (randomized controlled trial/ or controlled clinical study/ or controlled study/ or randomi?ed controlled.ti,ab. or control group$1.ti,ab.)
60 (((case adj control$) and random$) not randomi?ed controlled).ti,ab.
61 (Systematic review not (trial or study)).ti.
62 (nonrandom$ not random$).ti,ab.
63 Random field$.ti,ab.
64 (random cluster adj3 sampl$).ti,ab.
65 (review.ab. and review.pt.) not trial.ti.
66 we searched.ab. and (review.ti. or review.pt.)
67 update review.ab.
68 (databases adj4 searched).ab.
69 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/
70 Animal experiment/ not (human experiment/ or human/)
71 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70
72 58 not 71

73 10 and 17 and 29 and 38 and 72

Note: RCT filters were referenced to Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021. Available from www.training.cochrane.org/handbook.

3. Search strategy for CINAHL

S1 "physician*"
S2 "doctor*"
S3 "clinician*"
S4 "General Practitioner*"
S5 "specialis*"
S6 "nurse*"
S7 "pharmacist*"
S8 "health professional*"
S9 "health provider*"
S10 S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9

S11 (MH "Communication+")

S12 "communicat*"
S13 "consultation*"
S14 "conversation*"
S15 "interview"
S16 "shared decision making"
S17 S11 OR S12 OR S13 OR S14 OR S15 OR S16

S18 "train*"
S19 "course*"
S20 "program*"
S21 "intervention*"
S22 "workshop*"
S23 "teach*"
S24 "learn*"
S25 "educat*"
S26 "module*"
S27 "session*"
S28 "curriculum*"
S29 S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28

S30 (MH "Diabetes Mellitus+")
S31 "Diabetes Mellitus" OR "diabet*"
S32 "IDDM"
S33 (MH "Diabetes Mellitus, Type 2")
S34 "MODY"
S35 "T1DM"
S36 "T2DM"
S37 "T1D"
S38 "T2D"
S39 "non insulin* depend*"
S40 "non insulin* depend*"
S41 "insulin* depend*"
S42 "hypertension"
S43 "hypertens*"
S44 "blood pressure"
S45 S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41 OR S42 OR S43 OR S44

S46 MH randomized controlled trials
S47 MH double‐blind studies
S48 MH single‐blind studies
S49 MH random assignment
S50 MH pretest‐posttest design

S51 MH cluster sample
S52 TI (randomised OR randomized)
S53 AB (random*)
S54 TI (trial)
S55 MH (sample size) AND AB (assigned OR allocated OR control)
S56 MH (placebos)
S57 PT (randomized controlled trial)
S58 AB (control W5 group)
S59 MH (crossover design) OR MH (comparative studies)
S60 AB (cluster W3 RCT)
S61 MH animals+
S62 MH (animal studies)
S63 TI (animal model*)
S64 S61 OR S62 OR S63
S65 MH (human)
S66 S65 not S64
S67 S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54 OR S55 OR S56 OR S57 OR S58 OR S59 OR S60
S68 S67 not S66

S69 S10 AND S17 AND S29 AND S45 AND S68

Note: RCT filters were referenced to Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021. Available from www.training.cochrane.org/handbook.

4. Search strategy for PsycINFO

1 physician*.mp.
2 doctor*.mp.
3 clinician*.mp.
4 General Practitioner*.mp.
5 specialis*.mp.
6 nurse*.mp.
7 pharmacist*.mp.
8 health professional*.mp.
9 health provider*.mp.
10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9

11 exp Communication/
12 communicat*.mp.
13 consultation*.mp.

14 conversation*.mp.
15 interview.mp.
16 shared decision making.mp.
17 11 or 12 or 13 or 14 or 15 or 16

18 train*.mp.
19 course*.mp.
20 program*.mp.
21 intervention*.mp.
22 workshop*.mp.
23 teach*.mp.
24 learn*.mp.
25 educat*.mp.
26 module*.mp.
27 session*.mp.
28 curriculum*.mp.
29 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28

30 exp Diabetes Mellitus/
31 diabet*.mp.
32 (IDDM or NIDDM or MODY or T1DM or T2DM or T1D or T2D).mp.
33 (non insulin* depend* or non insulin* depend* or non insulin?depend* or non insulin?depend*).mp.
34 (insulin* depend* or insulin?depend*).mp.
35 hypertension.mp.
36 hypertens$.mp.
37 blood pressure.mp.
38 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37

39 random*.mp.
40 control*.mp.
41 exp Treatment/
42 39 or 40 or 41

43 10 and 17 and 29 and 38 and 42

Note: RCT filters were referenced to Eady AM, Wilczynski NL, Haynes RB. PsycINFO search strategies identified methodologically sound therapy studies and review articles for use by clinicians and researchers. Journal of Clinical Epidemiology. 2008 Jan;61(1):34-40.

5. Search strategy for Cochrane Central Register of Controlled Trials (CENTRAL) and Cochrane Database of Systematic Reviews (CDSR)

#1 (physician*):ti,ab,kw
#2 (doctor*):ti,ab,kw
#3 (clinician*):ti,ab,kw
#4 (General Practitioner*):ti,ab,kw
#5 (specialis*):ti,ab,kw
#6 (nurse*):ti,ab,kw
#7 (pharmacist*):ti,ab,kw
#8 (health professional*):ti,ab,kw
#9 (health provider*):ti,ab,kw
#10 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9

#11 (Communication):ti,ab,kw
#12 (communicat*):ti,ab,kw
#13 (consultation*):ti,ab,kw
#14 (conversation*):ti,ab,kw
#15 (interview):ti,ab,kw
#16 (shared decision making.):ti,ab,kw
#17 #11 or #12 or #13 or #14 or #15 or #16
#18 (train*):ti,ab,kw
#19 (course*):ti,ab,kw
#20 (program*):ti,ab,kw
#21 (intervention*):ti,ab,kw
#22 (workshop*):ti,ab,kw
#23 (teach*):ti,ab,kw
#24 (learn*):ti,ab,kw
#25 (module*):ti,ab,kw
#26 (session*):ti,ab,kw
#27 (curriculum*):ti,ab,kw
#28 (educat*):ti,ab,kw
#29 #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28

#30 (Diabetes Mellitus):ti,ab,kw
#31 (diabet*):ti,ab,kw
#32 ((IDDM or NIDDM or MODY or T1DM or T2DM or T1D or T2D)):ti,ab,kw
#33 ((non insulin* depend* or non insulin* depend* or non insulin?depend* or non insulin?depend*)):ti,ab,kw
#34 ((insulin* depend* or insulin?depend*)):ti,ab,kw
#35 (hypertension):ti,ab,kw
#36 (hypertens$):ti,ab,kw
#37 (blood pressure):ti,ab,kw
#38 #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37

#39 #10 and #17 and #29 and #38

6. Search strategy for ClinicalTrials.gov and World Health Organization International Clinical Trials Registry Platform

Condition or disease:

Diabetes or hypertension or blood pressure

Other terms:

Communication or consultation or conversation or interview or shared decision making

Appendix 2 PRISMA checklist for the systematic review

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	75
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	76
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	78-79
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	80
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	81
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	82
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	84
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	283
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	84
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	84
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	84

Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	85
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	86
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	86
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	85
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	86
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	87
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	89
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	107
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	90
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	110
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	109
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	111
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	112
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	113
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	116
FUNDING			

Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	81

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

Appendix 3 COREQ checklist for the focus group study with GPs

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	135
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	135
Occupation	3	What was their occupation at the time of the study?	135
Gender	4	Was the researcher male or female?	135
Experience and training	5	What experience or training did the researcher have?	135
Relationship with Participants			
Relationship established	6	Was a relationship established prior to study commencement?	133
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	133
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	134
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	136
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	134
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, Email	134
Sample size	12	How many participants were in the study?	137
Non-participation	13	How many people refused to participate or dropped out? Reasons?	137
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	135
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	135
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	138
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	133
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	135
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	135
Field notes	20	Were field notes made during and/or after the inter view or focus group?	135
Duration	21	What was the duration of the inter views or focus group?	138

Data saturation	22	Was data saturation discussed?	136
Transcripts returned	23	Were transcripts returned to participants for comment and/or	136

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	136
Domain 3: analysis and Findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	136
Description of the coding tree	25	Did authors provide a description of the coding tree?	136
Derivation of themes	26	Were themes identified in advance or derived from the data?	136
Software	27	What software, if applicable, was used to manage the data?	136
Participant checking	28	Did participants provide feedback on the findings?	136
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	139-154
Data and findings consistent	30	Was there consistency between the data presented and the findings?	139-154
Clarity of major themes	31	Were major themes clearly presented in the findings?	139
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	136

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Appendix 4 Participant information sheets

4.1. Participant information sheets (general practitioners)

1. **Study title**
   The experiences of general practitioners in communication with people with type 2 diabetes.
2. **The invitation**
   You are being invited to take part in this research project. Before you decide to do so, it is important you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.
3. **The purpose**
   The research project aims to understand your feelings and experiences when communicating with people with type 2 diabetes.
4. **What would the study involve?**
   Your involvement would be to participate in one focus group discussion with other GPs, facilitated by two members of the research team. The main topic of discussion will be your experience in communicating with people with type 2 diabetes. The focus group will take place at a convenient time for you. The discussion will last for around an hour and will be audio-recorded. Data collected from the focus group will be analyzed independently by the research team.
5. **What are the possible benefits?**
   Participation in the study will help to better understand the current communication process between doctors and patients, and participants will receive 200 RMB of shopping vouchers as compensation.
6. **What are the possible risks?**
   We understand that there are many demands on your time and there is some inconvenience in taking part in the focus group. We will be asking you about both positive and negative experiences. There is a very small chance you may become upset if you voluntarily disclose an experience that was particularly stressful or unhappy.
7. **Confidentiality**
   Information will be stored confidentially in a password-protected file in an online data storage platform of the First Affiliated Hospital of Sun Yat-sen University, and no identifiable personal data will be published. You are free to withdraw up to 7 days after taking part focus group, without giving any reason. If withdraw, your data will be removed from the study and will be destroyed.
8. **What will happen as a result of the study?**
   The data collected from you will be aggregated with the data from other participants and this will be analyzed and used to produce a report which will be made available for all participants. This report will be published and will be available to inform future doctors' training programs.
9. **Who has reviewed the study?**
   This study has been reviewed by Medical Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University. Reference number: [2019]369.
10. **Further contact**
    If you have any further questions then please feel free to contact Mi Yao, telephone number_____.

4.2. Participant information sheets (people with type 2 diabetes)

1. **Study title**
   The experiences of people with type 2 diabetes in communication with general practitioners.
2. **The invitation**
   You are being invited to take part in this research project. Before you decide to do so, it is important you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.
3. **The purpose**
   The research project aims to understand your feelings and experience when you were initially diagnosed with type 2 diabetes, so as to experience living with diabetes; to understand your feelings and experiences when communicating with general practitioners.
4. **What would the study involve?**
   Your involvement would be to participate in one focus group discussion with other people with type 2 diabetes, facilitated by two members of the research team. The main topic of discussion will be your experience living with diabetes and communicating with general practitioners. The focus group will take place at a convenient time for you. The discussion will last for around an hour and will be audio-recorded. Data collected from the focus group will be analysed independently by the research team.
5. **What are the possible benefits?**
   Participation in the study will help to better understand the current communication process between doctors and patients, and participants will receive 200 RMB of shopping vouchers as compensation.
6. **What are the possible risks?**
   We understand that there are many demands on your time and there is some inconvenience in taking part in the focus group. We will be asking you about both positive and negative experiences. There is a very small chance you may become upset if you voluntarily disclose an experience that was particularly stressful or unhappy.
7. **Confidentiality**
   Information will be stored confidentially in a password-protected file in an online data storage platform of the First Affiliated Hospital of Sun Yat-sen University, and no identifiable personal data will be published. You are free to withdraw up to 7 days after taking part focus group, without giving any reason. If withdraw, your data will be removed from the study and will be destroyed.
8. **What will happen as a result of the study?**
   The data collected from you will be aggregated with the data from other participants and this will be analyzed and used to produce a report which will be made available for all participants. This report will be published and will be available to inform future doctors' training programs.
9. **Who has reviewed the study?**
   This study has been reviewed by Medical Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University. Reference number: [2019]369.
10. **Further contact**
    If you have any further questions then please feel free to contact Mi Yao, telephone number_____.

4.3. Participant information sheets (general practitioners)

1. **Study title**
   Identifying communication skills training priorities for GPs in diabetes care.
2. **The invitation**
   You are being invited to take part in this research project. Before you decide to do so, it is important you understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.
3. **The purpose**
   The research project aims to identify important things for GP education on communication skills for patients with diabetes
4. **What would the study involve?**
   Your involvement would be to participate in one online nominal group discussion with other GPs, facilitated by two members of the research team. The main two topics of the study will be the rating importance and feasibility of potential training components in communication skills in diabetes care and the discussion of the rating difference. The nominal group will take place at a convenient time for you. The discussion will last for around two hours and will be video recorded. Data collected from the nominal group will be analyzed independently by the research team.
5. **What are the possible benefits?**
   Participation in the study will help to better understand the communication skills training priorities for GPs in diabetes care. There is no financial reimbursement for your participation.
6. **What are the possible risks?**
   We understand that there are many demands on your time and there is some inconvenience in taking part in the nominal group.
7. **Confidentiality**
   Information will be stored confidentially in a password-protected file in an online data storage platform of the First Affiliated Hospital of Sun Yat-sen University, and no identifiable personal data will be published. You are free to withdraw up to 7 days after taking part nominal group, without giving any reason. If withdraw, your data will be removed from the study and will be destroyed.
8. **What will happen as a result of the study?**
   The data collected from you will be aggregated with the data from other participants and this will be analyzed and used to produce a report which will be made available for all participants. This report will be published and will be available to inform future GPs training programs.
9. **Who has reviewed the study?**
   This study has been reviewed by Medical Ethics Committee of The First Affiliated Hospital of Sun Yat-sen University. Reference number: [2019]369.
10. **Further contact**
    If you have any further questions then please feel free to contact Mi Yao, telephone number_____.

Note: There is no explicit rules on data storage time (when data will be deleted) for the online storage platform in the First Affiliated Hospital of Sun Yat-sen University.

Appendix 5 Consent form

Study title:

Please tick to confirm

1. I confirm that I have read and understand the participant information sheets and have had the opportunity to ask questions which have been answered fully. ☐
2. I understand that my participation is voluntary and that I am free to withdraw up to 7 days after taking part focus group, without giving any reason. If I withdraw, my data will be removed from the study and will be destroyed. ☐
3. I understand the interview will be recorded. ☐
4. I understand that my data will be treated as confidential and will be anonymized in the outputs of the research. ☐
5. I agree to take part in the above study. ☐

Name of participant	Signature	Date
Name of researcher	Signature	Date

Note: 1 copy for the participant; 1 copy for the researcher.

Appendix 6 COREQ checklist for the focus group study with patients

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	170
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	170
Occupation	3	What was their occupation at the time of the study?	170
Gender	4	Was the researcher male or female?	170
Experience and training	5	What experience or training did the researcher have?	170
Relationship with Participants			
Relationship established	6	Was a relationship established prior to study commencement?	170
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	170
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	170
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	173
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	171
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, Email	171
Sample size	12	How many participants were in the study?	174
Non-participation	13	How many people refused to participate or dropped out? Reasons?	174
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	172
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	172
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	176
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	170
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	172
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	172
Field notes	20	Were field notes made during and/or after the inter view or focus group?	172
Duration	21	What was the duration of the inter views or focus group?	176

Data saturation	22	Was data saturation discussed?	172
Transcripts returned	23	Were transcripts returned to participants for comment and/or	172

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	172
Domain 3: analysis and Findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	172
Description of the coding tree	25	Did authors provide a description of the coding tree?	172
Derivation of themes	26	Were themes identified in advance or derived from the data?	172
Software	27	What software, if applicable, was used to manage the data?	172
Participant checking	28	Did participants provide feedback on the findings?	172
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	178-192
Data and findings consistent	30	Was there consistency between the data presented and the findings?	178-192
Clarity of major themes	31	Were major themes clearly presented in the findings?	177
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	177

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Appendix 7 Supplementary Table 6.1. Details of GP participants and facilitators in 8 NGT workshops

	Group 1 (N=8; M3, F5) Facilitators: MY & LL	Group 2 (N=7; M6, F1) Facilitators: KL & BL	Group 3 (N=7; M1, F6) Facilitators: GY & HT	Group 4 (N=7; M3, F4) Facilitators: RW & JX	Group 5 (N=8; M4, F4) Facilitators: LL & GY	Group 6 (N=7; M4, F3) Facilitators: HT & LB	Group 7 (N=7; M4, F3) Facilitators: MY & JX	Group 8 (N=7; M4, F3) Facilitators: KL & RW
GP 1	43, 16, E3, P3, D1	37, 14, E2, P2, D2	33, 8, E2, P2, D2	35, 10, E2, P2, D1	32, 6, E3, P2, D1	45, 20, E2, P2, D1	38, 16, E1, P2, D1	38, 12, E2, P3, D2
GP 2	44, 22, E2, P2, D1	37, 8, E1, P2, D2	45, 22, E2, P3, D2	37, 13, E2, P2, D2	36, 12, E2, P2, D1	38, 15, E2, P1, D2	46, 26, E2, P2, D1	36, 11, E2, P3, D2
GP 3	40, 16, E2, P3, D1	42, 22, E2, P1, D2	39, 9, E2, P2, D2	35, 7, E2, P2, D1	49, 25, E2, P4, D1	38, 14, E2, P2, D1	35, 11, E2, P2, D1	43, 20, E2, P4, D1
GP 4	39, 10, E2, P3, D1	40, 15, E2, P3, D2	43, 19, E2, P3, D2	34, 12, E2, P2, D2	36, 9, E2, P2, D1	40, 11, E2, P2, D1	36, 6, E2, P2, D1	32, 2, E2, P1, D1
GP 5	39, 8, E3, P3, D1	37, 2, E2, P2, D2	42, 14, E2, P3, D2	34, 7, E3, P2, D1	51, 10, E2, P4, D1	39, 5, E2, P2, D1	37, 13, E2, P3, D1	38, 3, E2, P2, D1
GP 6	38, 7, E2, P2, D1	35, 5, E2, P2, D2	33, 18, E2, P2, D2	31, 4, E3, P2, D1	35, 11, E2, P2, D1	41, 17, E2, P3, D1	41, 15, E2, P2, D1	35, 11, E3, P2, D1
GP 7	40, 15, E2, P2, D1	37, 11, E2, P2, D2	35, 10, E2, P2, D2	38, 14, E3, P3, D1	35, 7, E2, P1, D1	31, 5, E2, P2, D1	43, 21, E2, P3, D2	49, 16, E2, P3, D2
GP 8	36, 12, E2, P2, D1				49, 24, E2, P3, D1			

[a] Gender (M/F), Age (years), GP experience (years worked as GPs), Education background (E1-E3, E1 College degree, E2 Bachelor's degree, E3 Master's degree), Professional title (P1-P4, P1 physician, P2 attending physician, P3 associate chief physician, P4 chief physician), District in Guangzhou (D1-D2, D1 city center, D2 rural or suburb)

Note: MY is both a male doctor and PhD student; LL, HT are female doctors and GP trainers; KL, BL, GY, RW are male doctors and GP trainers; JX is a female nurse and researcher. All facilitators were trained.

Appendix 8 Supplementary Table 6.2. Last round score and ranking of 19 items in the NGT study: feasibility

Items	Group 1		Group 2		Group 3		Group 4		Group 5		Group 6		Group 7		Group 8		Total	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1 Active listening	57	6	51	1	44	8	48	8	64	2	41	10	49	4	54	1	408	5
2 Express empathy	58	5	35	11	46	6	50	6	64	2	47	6	46	7	48	5	394	6
3 Share bad news	52	10	33	12	45	7	42	13	61	5	44	9	46	7	45	7	368	13
4 Use examples	63	3	45	5	51	2	55	2	64	2	55	1	53	2	52	2	438	2
5 Idea, concerns and expectations	55	8	33	12	46	6	46	10	56	9	41	10	44	9	39	11	360	14
6 Nonverbal skills	52	10	38	10	51	2	44	11	53	11	35	13	45	8	39	11	357	15
7 Negotiation of behavioral change	56	7	44	6	41	9	47	9	63	3	49	5	43	10	44	8	387	9
8 Evaluate the patients' confidence, support patients' self-efficacy and optimism	47	12	31	14	47	5	43	12	52	12	29	15	44	9	39	11	332	17
9 Motivational interviewing	44	13	32	13	45	7	36	16	47	14	24	16	48	5	36	12	312	18
10 Shared decision making	55	8	41	9	48	4	54	3	59	7	46	7	44	9	43	9	390	8
11 Discuss blood glucose monitoring and explanation	66	1	49	3	51	2	53	4	62	4	50	4	55	1	47	6	433	3
12 Diabetes complications and	60	4	47	4	50	3	49	7	60	6	45	8	52	3	50	3	413	4

cardiovascular disease risk communication																		
13 Medication adherences	53	9	50	2	46	6	51	5	53	11	40	11	44	9	48	5	385	10
14 Follow up or referring	60	4	50	2	45	7	40	14	58	8	40	11	49	4	43	9	385	11
15 Cultural biases and patients background awareness	55	8	43	7	51	2	46	10	55	10	38	12	47	6	43	9	378	12
16 Explore the patient's emotional and psychosocial (mental health) problems	47	12	29	15	37	10	37	15	43	16	33	14	38	11	35	13	299	9
17 Use online or telephone communication technic	50	11	32	13	46	6	35	17	46	15	41	10	44	9	42	10	336	16
18 Health education	64	2	51	1	52	1	56	1	67	1	53	2	53	2	49	4	445	1
19 Patient held health record management	56	7	42	8	46	6	48	8	50	13	52	3	52	3	47	6	393	7

Appendix 9 Supplementary Table 6.3. Last round score and ranking of 19 items in the NGT study: the importance

Items	Group 1		Group 2		Group 3		Group 4		Group 5		Group 6		Group 7		Group 8		Total	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
1 Active listening	69	1	62	2	58	5	60	1	67	2	58	4	49	10	57	1	480	7
2 Express empathy	69	1	61	3	55	8	56	5	64	4	57	5	55	6	53	3	470	9
3 Share bad news	68	2	57	7	56	7	57	4	63	5	57	5	56	5	54	2	468	10
4 Use examples	65	5	58	6	57	6	60	1	60	6	60	2	55	6	51	4	466	11
5 Idea, concerns and expectations	66	4	60	4	62	2	60	1	68	1	60	2	57	4	47	8	480	8
6 Nonverbal skills	68	2	59	5	58	5	52	8	60	6	54	8	51	8	47	8	449	16
7 Negotiation of behavioral change	68	2	62	2	61	3	59	2	68	1	61	1	56	5	50	5	485	2
8 Evaluate the patients' confidence, support patients' self-efficacy and optimism	60	8	59	5	60	4	57	4	63	5	55	7	56	5	47	8	457	14
9 Motivational interviewing	62	6	58	6	56	7	54	7	58	8	47	11	58	3	49	6	442	17
10 Shared decision making	67	3	63	1	63	1	58	3	67	2	57	5	57	4	51	4	483	4
11 Discuss blood glucose monitoring and explanation	67	3	63	1	61	3	60	1	64	4	61	1	57	4	49	6	482	6
12 Diabetes complications and	67	3	62	2	60	4	60	1	65	3	59	3	59	2	53	3	485	3

cardiovascular disease risk communication																		
13 Medication adherences	68	2	62	2	62	2	58	3	68	1	60	2	56	5	49	6	483	5
14 Follow up or referring	61	7	60	4	60	4	57	4	63	5	58	4	52	7	50	5	461	13
15 Cultural biases and patients background awareness	62	6	57	7	53	9	52	8	59	7	48	10	43	11	47	8	421	18
16 Explore the patient's emotional and psychosocial (mental health) problems	62	6	59	5	60	4	55	6	63	5	56	6	52	7	48	7	455	15
17 Use online or telephone communication technic	54	9	53	8	50	10	47	9	55	9	51	9	52	7	48	7	410	19
18 Health education	68	2	63	1	61	3	59	2	65	3	58	4	60	1	53	3	487	1
19 Patient held health record management	65	5	59	5	58	5	56	5	64	4	58	4	50	9	53	3	463	12