



## Type 2 diabetes: Challenges facing GPs

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### Abstract

China faces a huge task in managing the large numbers of people with diabetes. Primary care is at the forefront of this challenge, and needs to begin to adopt some of the management and organizational approaches that have been shown to be successful in tackling diabetes and similar chronic diseases.

**Keywords:** China; type 2 diabetes; general practitioners

**Significance statement:** China faces a huge task in managing the large numbers of people with diabetes. General practitioners (GPs) are in a privileged position to provide first contact and continuing care for most diabetic patients. However, the GP system in China is still in its infancy and faces a range of challenges, such as a shortage of health care providers, GPs' poor adherence to guideline recommendations, patients' poor adherence to treatment, and lack of access to health care. In this article we describe the challenges that GPs in China are struggling with and some of the management and organizational approaches that have been shown to be successful in tackling diabetes and similar chronic diseases.

### Introduction

Diabetes, especially type 2 diabetes, is a major health problem worldwide, affecting 415 million people globally in 2015 [1]. In China, there are currently more than 110 million people with diabetes, accounting for about a quarter of the total number of people with diabetes in the world [1]. Diabetes causes significant morbidity, disability, and premature mortality through microvascular and macrovascular complications such as cerebrovascular disease, retinopathy, coronary heart disease, peripheral artery disease, nephropathy, and neuropathy [1]. There is strong evidence that aggressive treatment of diabetes can decrease the morbidity and mortality

of the disease by preventing or delaying its complications [2–4]. However, the diagnosis and management of diabetes in China are not optimal. In a multicenter study of more than 25,000 patients with type 2 diabetes in China, the proportions who achieved the individual targets were 47.7% for control of blood glucose (hemoglobin A<sub>1c</sub> fraction <7%), 28.4% for control of blood pressure (<130/80 mm Hg), and 36.1% for control of total cholesterol (<4.5 mmol/L), but only 5.6% achieved all three targets [5]. These figures are far from satisfactory, implying that there is substantial room for improving the clinical management of diabetes. Although more and more new drugs are

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being developed to address treatment gaps, there are multiple factors at the level of the physician, patient, and health care system that can affect treatment and prognosis.

General practitioners (GPs) are in a privileged position to provide first contact and continuing care for most diabetic patients. Although China has a long history of providing primary care for people in both rural and urban areas, the discipline of general practice was established in the late 1990s [6]. It is still in its infancy and faces a range of challenges. In this article we describe the challenges that GPs in China are struggling with to achieve high-quality diabetes management.

### Shortage of health care providers

Health systems across China face a shortage of skilled health care providers, especially at the primary care level and in both rural and remote areas, which hampers progress toward global health care goals. Moreover, health resources are allocated unfairly across different levels of health care services. In 2007, more than 85% of China's health care resources were allocated to higher-level care facilities, including secondary and tertiary hospitals, with less than 15% remaining for primary care facilities [7]. The Chinese central government accelerated the development of GPs in the health care reform of 2009, and issued a plan for capacity development in 2010 that included the development of general practice as an academic discipline in universities, the establishment of a system for postgraduate training, and strengthening of continuing professional development for physicians already in post [8, 9]. Some incentives and motivation measures have been used to retain those who have been trained. A goal of training 60,000 GPs within 3 years and 300,000 GPs within 10 years has also been announced [8].

The limited number of GPs is compounded by a health service structure that encourages frequent, but short, consultations. This is partly driven by a prescription system that generally restricts prescriptions to a 1-month supply. Typically, in China, patients with chronic diseases such as diabetes need to visit their physician every 1–2 months simply to obtain an ongoing supply of medication, resulting in multiple, but brief, clinic visits. Financial structures are also important, and some GPs are required to see a minimum of 60 patients per day. High workload and job stress are

associated with lower practice performance and more negative patient experiences [10]. In such a setting, it is highly unlikely that the complex challenges of lifestyle advice, drug treatment of glucose level, blood pressure, and lipid levels, and annual screening for the presence of complications can be dealt with. Clinical inertia will inexorably lead to adverse events, and it may take years or even decades for the consequent adverse event to manifest itself. This is a significant problem, with the potential to cause harm to patients and GPs. Reorganization of care, in which there are fewer but longer consultations, would not necessarily require more resources but could lead to higher quality of care.

Patients with diabetes are required to make significant behavioral and lifestyle changes over long periods to adequately control their disease. Diabetes self-management education is a critical element of diabetes care and is necessary to improve the patient's outcomes and quality of life. Therefore, to successfully manage diabetes, patients may need more contact with the care team than a single GP can provide. In some cities in China where community health services are better developed, studies have shown that primary care teams (such as GPs plus certified diabetes educator plus administrative assistance plus pharmacist) positively contributed to the improvement of efficiency and quality, the relationship between health professionals and patients, the promotion of community participation, and the combination of preventive care and clinical care [11]. Some community health services in the developed cities have implemented the incorporation of diabetes nurses, dieticians, and pharmacists so as to be closer to diabetic patients so as to help them reach their treatment targets. Such primary care teams are virtually absent in rural areas. In addition, peer support, which has been demonstrated to improve diabetes management [12–15], has not been adopted appreciably in China because of lack of programs and adequately qualified staff.

### GPs' adherence to guideline recommendations

Optimal care in type 2 diabetes requires practitioners to be competent in the complexities of disease management as well as in patient communication, counseling, and education. GPs are therefore required to master both physiological and psychosocial approaches to the treatment and management of type



2 diabetes [16]; however, evidence shows that many GPs have limited skills in combining these two approaches [16–18]. A study published in 2012 found that in the city of Dalian in the northeast of China, nearly 80% of GPs had inadequate knowledge of how to diagnose diabetes [19]. The level of knowledge was unrelated to the number of years in practice or to whether their medical degree was a bachelor, master, or doctoral qualification. Furthermore, less than optimal achievement of treatment and risk factor targets [20, 21] has been reported. Several studies have demonstrated that early assessment and control of diabetes, alongside adequate control of blood pressure and lipid levels, may delay progression of vascular complications and improve patient outcomes [2–4, 22]. A population-based study in China showed that only 20%–50% of patients with diabetes had regular blood pressure measurement, laboratory tests, and examination of their eyes or feet, and many did not have regular medical follow-up or drug treatment [23]. This could perhaps be explained by the fact that some primary care clinics are ill-equipped, making it difficult to undertake all the required assessments. Additionally, this may be compounded by the number of patients who cannot afford the out-of-pocket expenses for a full set of assessments. These findings also suggest that GPs in China may not be familiar with the latest international and national guidelines with respect to evaluation of diabetic patients and control of comorbidities. Some studies report that GPs lack knowledge of the mode of action of the different drugs they prescribe and also lack the ability to give clear explanations to their patients of how the agents work [24]. Finally, there is also evidence indicating that GPs are uncertain of when intensification of medication is required [17, 20, 25]. GPs usually do not feel competent with insulin therapy, and lack knowledge of when to initiate and how to adjust insulin therapy. While treatment intensification is most appropriate in patients who are adhering well to their current treatment regimens, providers often also intensify treatments when patients are poorly adherent to current treatment regimens. It is important to determine whether patients have good or poor medication adherence before treatment intensification is initiated.

China has done much to create a favorable environment for the growth of the GP system, including several training programs to improve the competency of the less educated

physicians and nurses [9, 26]. However, more educational initiatives should be undertaken, along with regular upgrade and dissemination of clinical guidelines.

### Patients' adherence to treatment

Poor adherence is to be expected in 30%–50% of all patients, irrespective of disease, prognosis, or setting [25, 27]. Approximately 10%–30% of patients with type 2 diabetes have been reported to withdraw from prescribed regimens within 1 year of initiation [28], and long-term persistence in use of lipid-lowering therapies and antihypertensives remains low [29, 30]. Poor medication adherence has been shown to be associated with disease progression, avoidable hospitalizations, disability, and death [31–33]. Misjudgment of patient adherence can have adverse consequences, including withholding of therapy or unnecessary changes in therapy.

In primary care, patients clearly want a patient-centered approach, based on good communication, partnership, and health promotion [34]. Evidence is increasing that involving patients more in consultations can increase adherence to treatment. A patient-centered approach encourages the use of a negotiated model of care to foster concordant treatment behaviors. Recently, a qualitative metasynthesis reported key discrepancies between patients' and care providers' understandings of barriers to medication adherence [35]. In general, providers tend to limit their focus to clinically oriented issues, while patients describe a much wider range of problems with medication adherence that arise from the personal, social, and practical challenges of having diabetes. Interventions that aim to increase medication adherence will benefit from considering the issue of adherence from a patient-centered model of care by tailoring the medication regimen to patients' daily lives, preferences, and self-management practices.

### Lack of access to health care

In a 2009 health care reform, the Chinese government improved the capacity of basic primary health care institutions. However, these institutions still possess only basic health care equipment. Lack of screening or monitoring of diabetic complications and comorbidities may delay treatment, which could lead to poor outcomes, and impose a substantial burden on health care expenditure.



Currently there is no reimbursement for self-monitoring of blood glucose (SMBG) in China. SMBG provides real-time glucose values that may help provide information on any change in diet, physical activity, and medications, and help identify hypoglycemia. An increasing body of data demonstrates the value of structured SMBG for improving metabolic outcomes in type 2 diabetes [36–39]. Hence international and Chinese guidelines have recommended SMBG as part of the management of type 2 diabetes, especially in insulin-treated patients. An evaluation of self-care practices in Chinese patients with type 2 diabetes receiving treatment with oral antidiabetics, and in some cases an oral antidiabetic plus insulin, showed that only 13% actually used SMBG [40]. The COMPASS study, which was conducted in type 2 diabetic patients receiving insulin treatment, reported low use of SMBG, with only one-third of patients reporting regular, structured use of SMBG [41]. The expense of test strips might be one of the major reasons for the low rates of SMBG.

In addition, as insulin injection devices (pens, syringes, and pumps) are not supported by government medical insurance coverage, reusing a pen needle or disposable syringe needle for subcutaneous insulin injections is very common among people with diabetes receiving insulin treatment in China [42]. This leads to numerous health risks, including infection, cutaneous lipodystrophy, more painful punctures, and loss of accuracy in insulin dose administration [42].

China is undergoing a complex health care reform throughout its population of 1.37 billion people. This leads to both opportunities and challenges in the development of primary care. The Chinese government has taken steps to gradually increase its budget for primary health care. Since 2009 the Chinese government has provided CNY15 (USD2.3) per head (raised to CNY45 in 2016, with future increases promised) for primary health care providers to deliver a defined package of basic public health services, which is included as part of the GP services [43]. Diabetes management is a key part of the service package; for example, diabetes management includes a yearly clinical assessment, a quarterly plasma glucose assessment, education on healthy diets, physical activity, and medication adherence, and routine follow-up visits [15].

A number of different diabetes care models have been explored. A study in a Shanghai community showed that

a diabetes care model involving GPs and specialists, telemedicine, and self-management goal-setting techniques significantly improved the control of blood glucose and blood pressure and lowered medical costs [44]. In Hong Kong, one of the most developed regions of China, the Hospital Authority set up diabetes centers and pilot schemes to create career paths for diabetes nurses in 2010 [45]. With supervision by endocrinologists, highly trained nurses in these diabetes centers served as liaisons between patients and other care professionals, including family physicians, specialists, dietitians, and podiatrists, to provide regular comprehensive assessments and education programs. Hong Kong released a reference framework for diabetes care among adults in primary care settings in 2010, which was directed at GPs, specialists, other health care staff, and the general public [46]. The Primary Care Office has developed various strategies to promote the adoption of the guideline. The rest of China could learn some lessons from Hong Kong's experience with diabetes management in primary care settings, and some of the larger cities have started to establish diabetes care teams. China already has a national guideline for diabetes [47], but the existence of the guideline itself will not be enough to ensure that the essential information contained within it will be consistently used and applied. The implementation of the guideline and identification of the hindering factors that affect the adoption of the guideline in GPs' daily practice should be further explored.

## Conclusion

In summary, China faces a huge task in managing the large numbers of people with diabetes. Primary care is at the forefront of this challenge, and needs to begin to adopt some of the management and organizational approaches that have been shown to be successful in tackling diabetes and similar chronic diseases.

## Conflict of interest

Lili Huo has received speaker honoraria, consultancy fees, and/or travel sponsorship from AstraZeneca, Lilly, Sanofi and Novo Nordisk. Jonathan E. Shaw has received speaker honoraria, consultancy fees, and/or travel sponsorship from AstraZeneca, Boehringer Ingelheim, Lilly, Sanofi, Mylan, Novo Nordisk, Merck Sharp & Dohme, and Novartis.



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## Author contributions

Lili Huo searched and summarized various databases, and wrote the first draft of the manuscript. Jonathan E. Shaw reviewed, edited, and provided intellectual input to the content and structure.

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