New models for chronic disease management in the United States and China

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Abstract

In the United States (US) the role of the general practitioner in primary care is changing rapidly as the team leader in the new "Patient-centered Medical Home" model of care that is designed to improve the management of chronic disease. The "Collaborative Care Model" is an integrated model of treating multiple medical and behavioral conditions. These new approaches include a nurse case manager who serves as the key point of contact to provide education, facilitate treatment adherence, and guide the patient to improvements in nutrition and physical activity that cause obesity and chronic disease. A gap analysis was conducted comparing the US and Chinese general practitioner models for providing care to patients with chronic diseases. The results of the analysis were used to make recommendations for adding components of these models that are feasible and effective for Chinese general practitioners in community health centers.

Keywords: Integrated behavioral health or integrated behavioral care, Primary care behavioral health, Patient-centered medical home, Population health management, Disease management, Telehealth

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Chronic, non-communicable diseases now account for an estimated 80% of total deaths and 70% of total disability-adjusted life-years (DALYs) lost in China [1]. The ageing of the population is one major force driving the epidemic of chronic diseases [2] and is predicted to produce a 200% increase in deaths from cardiovascular disease in China between 2000 and 2040 [3]. The second major force is unhealthy lifestyle behaviors, such as tobacco use, and poor nutrition and physical inactivity, which lead to obesity [4, 5]. The pooled prevalence, awareness, treatment, and control of diabetes mellitus is 6.41%, 45.81%, 42.54%, and 20.87%, respectively [6]. The pooled prevalence, awareness, treatment, and control of hypertension is 42.6%, 34.1%, 9.3%, and 27.4%, respectively [7]. The estimated cumulative economic loss from the effects of heart disease, stroke, and diabetes on the labor force and savings over the time period between 2005 and 2015 is $556 billion [8]. The prevalence of major depression in China is 11.3% and <1% of such patients receive treatment. Greater than 60% of patients with major depression at baseline remained depressed throughout a 12-month follow-up period [9].

The United States (US) health care system is in the midst of a transformation driven by health care reform that is designed to improve the outcomes for the epidemic of

chronic, non-communicable diseases. The goal is to achieve the "Triple Aim" (improved patient experience of care, improved health for populations, and decreased cost of care). Because prevention and disease management lead to improved health outcomes, health costs will decrease as patients become healthier and do not need the frequent hospital visits and admissions that are currently driving health care costs [10].

The emerging model for disease management is focused on the general practitioner (GP) in primary care clinics is the "Patient-centered Medical Home" [11]. The physician is the leader of a team comprised of nurses, physician assistants, dieticians, and increasingly, a behavioral health consultant. The role of the behavioral consultant is to offer behavioral treatment for both problematic lifestyle problems, such as poor nutrition and lack of exercise, that are a primary cause of many chronic diseases, as well as the depression, anxiety, and other behavioral conditions that are co-morbidities with chronic medical diseases. The goal is to help patients lose weight through nutrition and physical activity, as well as manage stress. The primary clinic is the health care "home" for the patient to work with a physician and team members to learn "self-management" of health conditions [12].

The emerging approach to chronic disease management is the population health management-based *Collaborative Care Model* (CCM) [13]. The CCM is a principle-guided approach to preventing and treating chronic disease, which is comprised of the following five components: 1) interdisciplinary team-based approach to care; 2) patient engagement and activation; 3) structured patient assessment, stratification, and treatment; 4) long-term scheduled patient follow-up; and 5) enhanced care coordination. A hallmark of the CCM is integrated health care; multiple medical and behavioral conditions, such as diabetes, hypertension, and depression, are all treated simultaneously.

An example of the CCM is an integrated health intervention to manage depression, diabetes, and coronary heart disease [14]. The 12-month intervention combines support for patient self-management skills for chronic diseases with pharmacotherapy to control depression, hyperglycemia, hypertension, and hyperlipidemia. Patients work collaboratively with nurses and GPs to establish clinical and self-management goals. The nurse case manager is the key point contact, meeting the patient in the clinic every 2–3 weeks during the early phases. As the patient makes progress the nurse transitions to telephone follow-up during the maintenance phase.

"Treat to target" pharmacotherapy protocols are used to guide adjustments of medications in patients who do not achieve specific goals [15, 16]. "Treat to target" pharmacotherapy protocols involve setting objective target treatment goals (blood pressure, HbA1c, and depression scores) and closely monitoring progress towards the goals over the course of treatment. The nurse uses motivational interviewing and helps patients solve problems and set goals for improved medication adherence and self-care (e.g., nutrition, exercise, and self-monitoring of blood pressure and glucose levels). Patients receive self-care materials, including a depression handbook and materials on chronic disease management, and self-monitoring devices (e.g., blood pressure or blood glucose meters).

When the patient achieves the initial target levels for measures, the nurse and patient develop a maintenance plan that includes stress reduction, continued work on nutrition and physical activity goals, and medications. The plan includes identification of prodromal symptoms that are warning signs of relapse or disease progression, such as increased depression or poor glycemic control. The nurse calls the patient every 4 weeks during the maintenance phase to assess depression, as well as patient goals, adherence, and laboratory test results. Patients with loss of disease control are scheduled for follow-up clinic visits or telephone calls, and the treatment intensity is increased based on the protocols [14].

Compared with "treatment as usual" controls, patients in the intervention group had greater overall 12-month improvement in the HbA1c and LDL cholesterol levels, systolic blood pressure, and depression scores. Patients in the intervention group were also more likely to have one or more adjustments of insulin, anti-hypertensive medications, and anti-depressant medications. Patients had a better quality of life and greater satisfaction with care for diabetes, coronary heart disease, and depression [14]. The CCM has been applied to many other medical and behavioral conditions, such as anxiety, pain, insomnia, and bipolar disorder, with similar evidence for greater effectiveness than "treatment as usual" groups and evidence for reduced medical utilization and cost savings [17].

The CCM often incorporates group education and skills-building groups for improved nutrition, physical activity, and stress management. The groups include structured education and skills-building activities designed to help patients lose weight by improving nutrition and physical activity. Patients complete written exercises in the group and are assigned take-home activities. Patient use a log to self-monitor daily nutrition, physical activity, and weight. Progress is reviewed in each group session. An ongoing support group is often offered for patients who complete the basic group sessions. There are many standardized group programs, such as the Dietary Approach for Stopping Hypertension (DASH) diet [18] and the Diabetes Prevention Program [19], that have been adopted for primary care and the Chinese population [20, 21]. In addition to efficiency, groups have the added advantage of other patients offering peer support that can enhance and sustain patient motivation.

In summary, the health care reform movement in the US is explicitly designed to transform primary care and the role of the GP to focus on improved prevention of chronic disease and integrated care to treat both medical and behavioral conditions simultaneously. Lifestyle behavioral change for nutrition, physical activity, and stress management are key components of these programs because only weight loss based on improved diet and activity levels have proven effective in preventing and in many cases reversing conditions, such as type 2 diabetes [22].

It appears that at least 12 months of follow-up is necessary to help patients achieve disease self-management. This should not be surprising because replacing longstanding unhealthy lifestyle habits, such as eating high-calorie, high-fat diets, lack of physical activity, and poor ability to manage daily stress require a sustained effort over time. On a positive note, once these changes are achieved the gains are long-term with evidence of sustained improvements in nutrition and physical activity and continued reductions in cardiovascular and metabolic risk for >10 years [23].

The key question for GPs, and hospital and government leaders in China is as follows: Will these approaches to chronic disease management and health care that are proving effective in the US work in China? Like the US, China faces an epidemic of chronic diseases, increased cardiovascular and metabolic risk factors, untreated behavioral conditions, rising obesity, and trends for unhealthy diets and deceased physical activity. Health care costs are also rising in China, raising similar government concerns over the adverse impact of rising chronic diseases on the national economy [24]. The health care delivery systems, however, have many significant differences that lead to a gap between the type of care increasingly provided in the US and what is available in the current health care system in China.

Gap analysis

A gap analysis that compares the key components of the new model of chronic disease prevention and management in the US and China will highlight these differences. The following six dimensions appear to be useful for this comparison:

1. the GP disease prevention and management model;
2. how to combine pharmacotherapy with integrated disease management of chronic medical and behavioral conditions efficiently;
3. health care policy;
4. how to address disease management for early stages of disease;
5. how to address disease management for advanced stages of disease; and
6. methods or disease management protocols that can be used to achieve changes in nutrition, physical activity, weight loss, and stress management in Chinese hospitals and general practice.

The disease management model

The US model of disease management is based on a new role for the GP as the leader of a team-based approach focused on prevention and disease management rather than high-volume, acute care visits that have dominated US health care for decades. In China the acute care model still predominates with GPs seeing a much higher average number of patients per day that result in very brief visits focused on pharmacotherapy. In the US the patient is usually assigned to a GP who remains the key point of contact on follow-up visits, whereas in China patients who visit the clinic see any available GP.

A case manager, typically a nurse or increasingly a lesser trained health coach or patient peer recovery specialist who is

the key point of contact for the patient, offers intensive protocol driven treatment that includes lifestyle behavior change over 12 months or longer. In China the role of the nurse is a physician extender focused on medical management and acute care. Other positions, such as dietician, behavioral health consultant, or physician assistant that comprise the new US team-based approach, are not typically available in Chinese health centers.

Integrating pharmacologic and integrated disease management

Pharmacotherapy is the first-line, and often only GP treatment in China health centers. Disease management programs that offer lifestyle behavior change are typically not available. Patient education materials, such as CDC patient information sheets or booklets, are available and in many cases provided to patients; however, education groups to guide patients to learn disease self-management are not typically available. Another component of the US model is long-term patient follow-up by the nurse for patients prescribed medication to manage effects and side effects. Review of laboratory results, depression screening, and protocols for guiding medication management is typically not used.

Health policy

The Chinese health care system for GPs is similar to the US system before health care reform was implemented. High-volume patient care with brief visits is the norm. In China the volume of patients seen by GPs dwarfs the typical US caseload, but the incentives for high-volume caseloads and pharmacotherapy are the same. In the US patients are generally satisfied with their GP office as the key point of entry for routine health care. Most patients are required by insurance to have their GP direct them to an emergency department or hospital care. In China many patients prefer to seek routine care from hospitals due to perceptions of higher quality care and lack of trust or confidence in community health centers. The team-based approach characteristic of emerging US GP practice is typically not available in China. The GP is responsible for all aspects of care (pharmacotherapy, acute care, lifestyle behavior change, behavioral health, patient engagement, and motivation).

GPs and nurses in China and the US are in general highly dedicated to patient care. Physicians and nurses in China are under significantly greater stress than US GPs due to patient dissatisfaction with treatment outcome that often leads to violence against physicians and nurses. Patient dissatisfaction in China often appears driven by unrealistic expectations that all conditions can be cured and further worsened by sensational media coverage may be biased against physicians [25].

Perhaps the most important difference is in the changing model of reimbursement and management of US versus China GP clinics. Government health insurance is moving from the traditional fee for service model that rewards high patient volume to models of capitation and shared risk. In a capitation model, patients are assigned to a specific GP practice and the practice is then paid a set fee to cover the cost of all patients assigned to the practice instead of paying a fee for each service provided. The capitation model is coupled with required performance metrics designed to reflect improved outcome for chronic disease. The GP practice reports and analyses values, such a blood pressure, and is required to achieve improvements to meet performance targets to earn additional financial incentives or avoid penalties [10].

A final difference is the increased application of innovative management techniques based on quality improvement models, such as LEAN, that are designed to decrease waste and increase efficiency. The US GP system is moving to "accountable" care in which performance metrics are used to drive care that is focused on reducing cardiovascular risk factors and chronic disease [10].

Managing early- and late-stage treatment

The population health management model is increasingly used in US GP clinics to identify and stratify patients based on cardiovascular risk. Patients are grouped into low-, medium-, and high-risk groups based on cardiovascular risk factors and treatment is based on "stepped care" in which lower risk patients receive less intensive education or health coaching interventions, whereas higher risk patients receive more intensive interventions, such as group education sessions and nurse case manager follow-up [26]. The population health management is not typically used in China GP clinics.

Another significant difference between the health care system in China and the US is that the US employers are actively involved in promoting health prevention and disease management programs for their employees because US employers support a large percentage of employee health insurance costs, so the employer is motivated to have a healthy workforce to keep costs down and because of evidence that reducing chronic medical and behavioral conditions improves employee productivity and reduces disability [27]. Employers conduct health risk assessments for their employees and refer them to the GP for disease management. This is an important difference because in China most health center patients are the elderly, who are retired. The population of younger and middle-aged adults who would benefit from disease management does not visit the health centers other than for acute care, and even then often visit the hospital instead.

Closing the gap: efficient and effective methods of disease management for China

It is clear that the Chinese government, hospital leaders, physicians, and nurses are in agreement that changes in GP health care delivery are needed to improve prevention and management of chronic disease. The challenge is how to close the significant gap between the US model that is proving effective and the current Chinese GP system. The following recommendations are ranked from easiest to most challenging based on this writer's experience consulting with Chinese GPs.

A first step is to make available group education sessions for improved nutrition, physical activity, and stress. Physicians and nurses can learn these approaches quickly and have good outcomes. Group education is efficient, with the potential to have 30 or more patients receive a full hour of physician or nurse care, instead of the same 30 patients each receiving only a two-minute individual session. The groups should be available continuously so that new patients can be referred throughout the year and support groups are available for patients who need long-term follow-up.

A second step is to train physicians and nurses on practical techniques to engage patients in treatment, increase motivation, and address the many barriers to helping patients change nutrition and physical activity. Techniques, such as motivational interviewing and health coaching, are feasible and effective [28]. This training is also likely to reduce the climate of mistrust and improve patient satisfaction with treatment and reduce patient violence against physicians [25].

A third step is to train how to identify and treat the most common behavioral conditions common in China. This includes stress-related depression and anxiety, insomnia, alcohol abuse, pain, and physical symptoms caused by stress. GPs can readily learn how to screen for these conditions and the great majority of patients can be treated successfully with stress management or behavioral groups, such as depression. A depression CCM trial is currently under study in Hangzhou [29].

A fourth step is to have GP clinics adopt population health management techniques, such as identifying high-risk patients, conducting outreach to engage these patients in treatment, offering stepped care, and systematic follow-up by a nurse. Ideally, a health risk assessment (HRA) in the EHR is needed to both stratify patients and conduct outcomes research [30]. In addition to telephone follow-up, the nurse may use the increasingly available smart phones and tablet applications for health improvement in exercise, nutrition, stress, and disease management that are now available in China [31]. This will be especially helpful for younger patients.

The fifth step is to adopt management and quality improvement techniques to re-design GP practice to treat patients using disease management efficiently. China is already excellent at managing a volume of patients that would overwhelm US physicians; however, techniques, such as "value stream mapping," will likely be as useful in China as in the US at reducing waste and making disease management care available to more patients. This step includes applying stepped care treatment protocols to manage patients ranging from early- to late-stage of disease progression. A related step is to conduct outcomes research with the results used to identify variation in best practices, evaluate the effectiveness of new approaches, such as group education, and apply to a continuous quality improvement model for each clinic [10].

Steps one through five above can all be implemented in the current GP clinic model. Other changes will require changes in health policy driven by hospital leaders and Ministry of Health officials. These systemic changes require changes in current health policy in order to implement the following:

- Add a new position to GP clinics, the health coach. This can be a specially-trained nurse, a college student, or a patient peer recover specialist. The health coach will assume the role of the case manager in the CCM model and lead patient education groups.
- Identify and implement approaches to engage younger and middle-aged patients in GP clinic care. Many Chinese government employers do conduct health screening, but do not systematically work with GP practice to refer patients. Community-based screening and public health initiatives to drive patients to GP care should increase.

The opportunity is great for China to close this gap in disease management and prevention. The awareness of a need to change GP practice and interest in improving disease management is high from top government officials to hospital and clinic leaders, and to GPs and nurses. Chinese researchers have proven these approaches are effective for Chinese patients and training experiences demonstrate that GPs can readily master these practical techniques.

Conflict of interest

The author declares no conflict of interest.

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