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Perspectives in Practice

Three Innovative Population Health Concepts for Patient Medical Homes to Improve Diabetes Care in Family Medicine

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Key Messages

- The organization of care for diabetes is essential, and these 3 population health concepts help with the organization of care.
- Primary care clinicians need to work in teams to be able to better engage patients and use electronic medical records to identify care gaps for patients with diabetes.
- Clinical pharmacists and chronic disease coordinators can partner with physicians to create a patient medical home to enhance team-based diabetes care.

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Introduction

According to the World Health Organization, noncommunicable diseases (NCDs), also known as chronic diseases, including cardiovascular diseases, cancers, chronic respiratory diseases and diabetes, will kill 41 million people each year, equivalent to 71% of all deaths globally. With an aging population and increasing likelihood of NCDs, the United Nations and the World Health Organization have established a global target of a 25% relative reduction in the risk of premature mortality from NCDs by 2025, and the target of a one-third reduction in premature deaths from NCDs by 2030 (1).

To address the epidemic of diabetes and NCDs, many Canadian provinces are attempting to move toward a more integrated primary health-care system and are redesigning primary care around patient medical homes (PMH) (2,3). Some of the goals of implementing PMHs are 1) to improve patient health outcomes, 2) to improve patient care experiences, 3) to improve provider satisfaction and 4) to provide a reduction of health-care costs, collectively known as the quadruple aim (4). PMHs are individual physicians or clinics targeting their clinical services, personnel and activities to meet the needs of their practice population. Building a PMH is about improving the quality of care and continuity of care provided to patients through the collaborative approach of physicians working with allied health teams. Although there are different versions of PMHs, all require use of an electronic medical record (EMR) for population health management. Use of an EMR facilitates population health management with aggregation and analysis of patient roster/panel data into actionable interventions through which health-care providers can improve patient care, clinical outcomes and financial outcomes (5).

When looking at improving diabetes care as part of a primary care PMH, there are 3 population health concepts to consider. First, it is essential to have an optimized EMR with chronic disease registries. The second concept is to develop a distinct role of a chronic disease clinical coordinator (CDCC) focusing on diabetes care within the clinic to identify care gaps, to create patient recalls and to coordinate clinical care. The third concept is to integrate a team-based care approach to diabetes with clinical pharmacists and/or other allied health providers who are working to optimize the full scope of practice, engaging patients to improve diabetes self-management.

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Our first concept of an optimized EMR system can be summarized as follows: clean data are vital. When it comes to EMR chronic disease registries, it is important to accurately input discrete data in the appropriate data fields which form the basis of EMR dashboards, a real-time display of a compilation of search queries. Any combination of queries related to ICD-9 *(International Classification of Diseases, Ninth Revision)* diagnoses, ATC code (Anatomical Therapeutic Chemical Classification System of medications identifiers), laboratory data and types of visits by health-care professionals can be created to help with patient recalls for referrals to team-based care. In a literature review of over 500 articles, Dowding et al (6) found that there was evidence that EMR dashboards use was associated with improved care processes and patient outcomes. Furthermore, there is some evidence that implementing clinical dashboards helps improve clinicians' adherence to guidelines and may help improve patient outcomes. In 2017, Banerjee (7) studied the implementation of a congestive heart failure EMR dashboard combined with a quality improvement program; the results showed a reduction in the 30-day readmission rates for congestive heart failure exacerbation. Koopman et al (8) reported use of a diabetes EMR dashboard could improve both the efficiency and accuracy of acquiring data needed for high-quality diabetes care and overall showed a reduction in the time required to identify care gaps by health-care providers.

Our second population health concept requires the creation of a dedicated chronic disease coordinator role within a PMH focused on diabetes care. Two recent articles looked at the impact of a CDCC on diabetes care. Solorio et al (9) found that having a CDCC improved patient adherence to testing, but in this article, there were no improvements in surrogate laboratory outcomes. Anantharaman et al (10) found using a CDCC could optimize the number of patients with early diabetic nephropathy receiving angiotensin-converting enzyme/angiotensin II receptor antagonist therapy.

The final population health concept involves implementing collaborative team care within a PMH. Clement et al (11) reminds providers about key concepts in the organization of diabetes care. They summarize that diabetes care should be organized around the person living with diabetes and their supports, facilitated by a proactive, interprofessional team with training in diabetes. Focus should be centred on providing ongoing self-management education and support in a case management approach using evidence-based clinical information and decision support systems that include patient registries, clinician and patient reminders and benchmarking. Evidence exists for the benefit of a clinical pharmacist intervention as reported by Simpson et al (12), who evaluated the effect of adding pharmacists to primary care teams on the management of cardiovascular risk factors, including hypertension in patients with type 2 diabetes. This randomized controlled trial of 260 patients showed that significantly more patients with type 2 diabetes achieved better blood pressure and glycated hemoglobin control, resulting in an overall reduction in the 10-year risk of cardiovascular disease. One of the challenges identified in the study was a patient dropout rate of 14%, which is consistent with other randomized controlled trials involving pharmacists in chronic disease management. The effectiveness of medication reviews is well documented in the literature as being able to decrease the number of drug-related problems and adverse drug reactions (13,14). Hughes et al (15), specifically in the care of diabetes, has reported team-based care with a pharmacist can improve patient outcomes and patient adherence. Erku et al (16) state that using clinical pharmacists who are fully engaged in patient care can lead to improved medication adherence in the context of diabetes care and reduced hospitalizations.

In British Columbia, there is compensation for clinical pharmacists to provide medication reviews for patients. Our experience is that this works best when embedded within a PMH, and in doing so, we have developed a financially sustainable model where nondispensing clinical pharmacists work alongside family physicians. At our primary care clinic, we have implemented these 3 innovative population health concepts by creating an EMR diabetes dashboard to help identify care gaps based on the recent Diabetes Canada clinical practice guidelines recommendations along with other useful patient queries. Our EMR dashboard, used regularly by our CDCC, is used to identify and recall patients for our clinical pharmacists and other allied health providers focused on diabetes care. For example, we use the dashboard to recall patients when organizing group visits focused on obesity and diabetes group education or special clinics focused on insulin initiation or glucometer training. Our clinical pharmacists have added to our clinic's ability to serve our patient population as we have been able to serve an additional 11 patients per day who are seen for 40-min appointments. This shared care of patients with stable chronic disease has increased the capacity of physicians to help patients with urgent care issues while still providing chronic disease care. The pharmacists practice to full scope and are responsible for the following tasks during their one-on-one appointments: checking on medication adherence; completing diabetes chronic disease flowsheets and laboratory requisitions; conducting medication

Table 1
Example of a drillable/filterable electronic medical record diabetes dashboard or EMR queries managed by a chronic disease coordinator

Patients >55 years of age without ACE/ARB	Patients with CKD above A1C target no SGLT2/GLP1	Patients eligible for clinical pharmacist review
Patients >40 years of age with no statin	Patients with A1C >8.5%	Total number of patients with DM
Patients with LDL >2	Patients with A1C >8.5% with no pharmacist review	No A1C test in >1 year
Patients without CAD on ASA	Patients with A1C >8.5 with no CDE review	No LDL test in >2 years
Patients >50 years of age with CAD and DM above A1C target without EMPA/LIRA/CANA	Patients with billable BC MSP fee 14050	No ACR test in >2 years
	Patients eligible for BC MSP fee 14050 requiring 1 more visit	Patients with A1C >7.5 and BMI >30 kg/m^2
Patients >50 years of age with CVD and DM above A1C target without EMPA/LIRA/CANA	Patients eligible for BC MSP fee 14050 requiring 2 more visits	Patients on insulin and BMI >30 kg/m^2
	Patients eligible for BC MSP fee complex care visit	Patients with glucose intolerance based on A1C
Patients >50 years of age with PAD and DM above A1C target without EMPA/LIRA/CANA	Patients with eGFR <60 mL/min/1.73m^2 no BC MSP fee complex care visit	Patients with glucose intolerance based on FBS
		Total number of patients with glucose intolerance
	Patients with DM/CAD no BC MSP fee complex care visit	Total number of patients with newly diagnosed DM in calendar year
	Patients with DM/CHF no BC MSP fee complex care visit	

Note. Unless otherwise indicated, units are mmol/L.
A1C, glycated hemoglobin; *ACE*, angiotensin-converting enzyme; *ACR*, albumin to creatinine ratio; *ARB*, angiotensin II receptor antagonist therapy; *ASA*, acetylsalicylic acid; *BC*, British Columbia; *BMI*, body mass index; *CAD*, coronary artery disease; *CANA*, canagliflozin; *CDE*, certified diabetes educator; *CHF*, congestive heart failure; *CKD*, chronic kidney disease; *CVD*, cardiovascular disease; *DM*, diabetes mellitus; *eGFR*, estimated glomerular filtration rate; *EMPA*, empagliglozin; *FBS*, fasting blood sugar; *GLP1*, glucagon-like peptide-1; *LDL*, low density lipoprotein; *LIRA*, liraglutide; *MSP*, medical services plan; *PAD*, peripheral arterial disease; *SGLT2*, sodium-glucose cotransporter-2.

reconciliation and renewal; providing one-on-one diabetes self-management education; and optimization of drug therapy by ensuring all prescription, nonprescription and natural health products are necessary, effective and safe. Our collaborative team has been able to simplify, intensify or deprescribe complicated drug regimens for patients while working alongside a physician to ensure appropriateness in terms of clinical care.

However, there are barriers to overcome to integrate a pharmacist as a team member in a PMH. One must rely on the CDCC's use of the EMR dashboard to create patient recalls, a PMH medical office assistant team to call patients and physicians to provide new referrals. Also, clinics must partner with clinical pharmacists to overcome the many financial barriers, including the lack of compensation for overhead, EMR fees and wages. To implement a clinical pharmacist into your office, Babcock et al (17) provides an outline for the recruitment, screening of applicants and a 10-point ranking scale. Farrell et al (18) also offers several strategies for the successful integration of a clinical pharmacist in a primary care setting, including available mentorship from colleagues, an accommodating approach by other health-care providers and physicians, participation in team meetings and availability of an implementation guide, such as the one published by the IMPACT Team (Integrating Family Medicine and Pharmacy to Advance Primary Care Therapeutics; www.impactteam.info) (Table 1).

Regarding the data of our clinical pharmacists embedded in primary care, from a period of July 2017 until July 2018, there were 1,422 medication reviews performed by our clinical pharmacist over 146 clinic days, which resulted in an average of 9.73 patients seen each day.

We surveyed our pharmacist and physicians to identify some themes for quality improvement (Figure 1).

In striving for our version of the PMH, we have found the use of our diabetes EMR dashboard combined with our CDCC creating recalls for care gaps to be addressed by our collaborative team approach to be practice changing. Our program initially focused on diabetes care, but it has now expanded to also include congestive heart failure, chronic obstructive pulmonary disease, hypertension and patients with complex care or multiple comorbidities. We have also been able to address patients with polypharmacy or those recently discharged from hospital, as often our sickest patients are those who require the most medical care. In summary, implementing these 3 innovative population health concepts within our

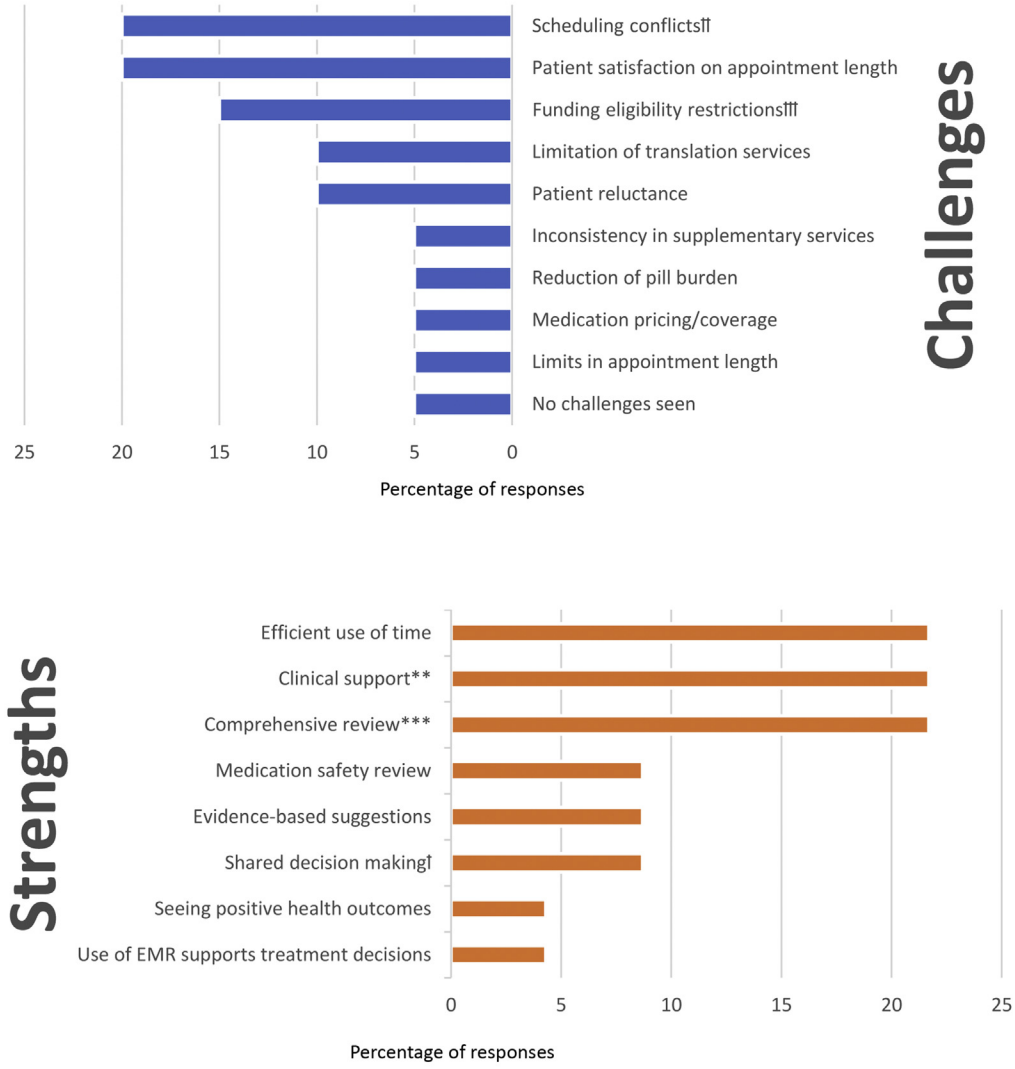

Figure 1. Advantages and challenges in integrating team-based diabetes care at our clinic: Survey of medical doctors and pharmacists. †Shared decision-making between patient, physician and clinical pharmacist. ††Scheduling conflict between physician schedule and pharmacist schedule. †††Restrictions based on appointments scheduled ≥6 months only or reviews done on patients with ≥5 medications. **Supplementary clinical supports include flu vaccine, anthropomorphic measurements, translation support and medication refills. ***Comprehensive review of patient profile and medications with consistent follow up. *EMR*, Electronic medical record.

medical home has contributed to improved patient care, improved physician satisfaction and increased physician capacity and should be considered by clinicians looking for innovative health solutions to improve diabetes care.

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Author Contributions

Daniel Ngui was the primary author. Melissa Silva was the chronic disease coordinator.

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