

Research

Cite this article: Lukewich J, Edge DS, VanDenKerkhof E, Williamson T, Tranmer J. (2018) Team composition and chronic disease management within primary healthcare practices in eastern Ontario: an application of the Measuring Organizational Attributes of Primary Health Care Survey. *Primary Health Care Research & Development* 19: 622–628. doi: 10.1017/S1463423618000257

Received: 20 July 2017

Revised: 24 January 2018

Accepted: 12 March 2018

First published online: 15 April 2018

Key words:

chronic disease management; cross-sectional survey; nursing roles; organizational attributes; primary healthcare; team composition

Author for correspondence:

Assistant Professor, Julia Lukewich, RN, PhD, School of Nursing, Memorial University of Newfoundland, 300 Price Philip Drive, St. John's, Newfoundland, Canada A1B 3V6. E-mail: jlukewich@mun.ca

Team composition and chronic disease management within primary healthcare practices in eastern Ontario: an application of the Measuring Organizational Attributes of Primary Health Care Survey

Julia Lukewich¹, Dana S. Edge², Elizabeth VanDenKerkhof³, Tyler Williamson⁴ and Joan Tranmer⁵

¹Assistant Professor, School of Nursing, Memorial University of Newfoundland, Newfoundland, Canada, ²Associate Professor, School of Nursing, Faculty of Health Sciences, Queen's University, Kingston, Ontario, Canada, ³Professor and Sally Smith Chair in Nursing, School of Nursing and Department of Anesthesiology & Perioperative Medicine, Faculty of Health Sciences, Queen's University, Kingston, Ontario, Canada, ⁴Assistant Professor, Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada and ⁵Professor, School of Nursing and Department of Public Health Sciences, Faculty of Health Sciences, Queen's University, Kingston, Ontario, Canada

Abstract

Background: Various organizational-level attributes are being implemented in primary healthcare to improve healthcare delivery. There is a need to describe the distribution and nature of these attributes and explore differences across practices. **Aim:** The aim of this study was to better understand organizational attributes of primary care teams, focusing specifically on team composition, nursing roles, and strategies that support chronic disease management. **Methods:** We employed a cross-sectional survey design. Team composition, nursing roles, availability of health services, and chronic disease management activities were described using the 'Measuring Organizational Attributes of Primary Health Care Survey.' **Findings:** A total of 76% ($n = 26$ out of 34) of practice locations completed the survey, including family health teams (FHT; $n = 21$) and community health centers (CHC; $n = 4$). Nurse practitioners (NPs) and registered nurses (RNs) were the most common non-physician providers, and CHCs had a greater proportion of non-physician providers than FHTs. There was overlap in roles performed by NPs and RNs, and registered practical nurses engaged in fewer roles compared with NPs and RNs. A greater proportion of FHTs had systematic chronic disease management services for hypertension, depression and Alzheimer's disease compared with CHC practices. The 'Measuring Organizational Attributes of Primary Health Care Survey' was a useful tool to highlight variability in organizational attributes across PHC practices. Nurses are prominent within PHC practices, engaging in a wide range of roles related to chronic disease management, suggesting a need to better understand their contributions to patient care to optimize their roles.

Introduction

Primary healthcare (PHC) is a fundamental component of the Canadian healthcare system (Health Canada, 2004; Health Council of Canada, 2005). Many new organizational strategies have been implemented within the PHC system to improve health outcomes, increase accessibility and increase cost-efficiency (Aggarwal and Hutchison, 2012; Strumpf *et al.*, 2012). Given the increasing prevalence and costs associated with chronic diseases in Canada (Broemeling *et al.*, 2008), a particular emphasis has been placed on increasing the quality of PHC services delivered to patients with chronic conditions. Within Ontario, organizational strategies include new physician payment models, electronic medical records, after-hours care, and inclusion of non-physician health providers, such as nurse practitioners and registered nurses, to form team-based practice models. Many of these organizational strategies have purportedly increased access to healthcare services, enhanced efficiency of resource utilization, and improved chronic disease management (Hogg *et al.*, 2009; Russell *et al.*, 2009; 2010; Liddy *et al.*, 2011; Dahrouge *et al.*, 2012; Health Canada, 2012). However, Canada's PHC system still ranks lower than many other high-income countries on measures such as timely access to care, patient engagement and interprofessional teamwork, suggesting a need to better understand which organizational strategies support or hinder the delivery of high-quality PHC, especially for patients with chronic conditions (Aggarwal and Hutchison, 2012).

Accordingly, comprehensive monitoring and evaluation of evolving components of the PHC system is a priority of many stakeholders involved in PHC system reform (Aggarwal and Hutchison, 2012; Canadian Institute for Health Information, 2014; Canadian Foundation for Healthcare Improvement, 2015). Although several data collection tools exist for use within PHC, many focus on patient and physician perspectives of and/or experiences with PHC. In 2013, the Canadian Institute for Health Information (CIHI) released a set of practice-based surveys to aid in acquiring high-quality data for PHC performance measurement and evaluation (CIHI, 2013). This suite of novel tools has the potential to collect important information about a wide range of PHC characteristics, including organizational attributes across practice settings in Canada. Importantly, the ‘Measuring Organizational Attributes of Primary Health Care Survey’ has items that capture data about non-physician providers, such as nurses who form the core of interdisciplinary PHC teams (CIHI, 2013; Canadian Nurses Association, 2014; Ministry of Health and Long-Term Care, 2014). Given the current shift toward interdisciplinary team structures within primary healthcare, it is imperative that nurses demonstrate their unique contributions to patient care within this setting (Canadian Nurses Association, 2014; Kennedy, 2014) to inform how to best optimize their roles in the delivery of chronic disease management services to the Canadian population.

The overall aim of this study was to better understand the organizational attributes of PHC teams in eastern Ontario. The objectives of this study were (1) to determine team composition within team-based PHC practices in eastern Ontario (2) to describe nursing roles within PHC teams and (3) to determine the range of chronic disease management services available within practices. In addition, this study examined the feasibility of using the ‘Measuring Organizational Attributes of Primary Health Care Survey’ to gather organizational-level data.

Methods

Study aim and design

A cross-sectional survey was conducted to describe the distribution and nature of organizational attributes across PHC practices within eastern Ontario, including the distribution of healthcare providers within practices, the roles of nurses in each regulatory designation, the availability of various services, and the availability of systematic patient management for various chronic conditions. This study was reviewed for ethical compliance by the Queen’s University Health Sciences Research Ethics Board.

Setting and participants

All practice locations affiliated with PHC sites that participate in the Eastern Ontario Network of the Canadian Primary Care Sentinel Surveillance Network (CPCSSN) were invited to participate in the study (*n* = 34) (CPCSSN, 2013). For the purposes of this study, ‘practice locations’ were defined as locations in which providers deliver health services to individuals, and ‘sites’ were defined as PHC organizations containing ≥1 practice location. At study completion, 13 sites were affiliated with the Eastern Ontario Network of the CPCSSN, namely nine family health teams (FHTs), three community health centers (CHCs), one nurse practitioner-led clinic (NPLC), representing a total of 34 practice locations. FHTs and CHCs both deliver PHC using an interdisciplinary team

structure. CHCs specifically serve vulnerable individuals within a community who have challenges accessing healthcare services, and focus on broader social determinants of health (Health Force Ontario, 2010; Nurse Practitioner Association of Ontario, 2011; Association of Ontario Health Centres, 2014; Ministry of Health and Long-Term Care, 2014).

Data collection tool

Organizational attributes were captured using a modified version of the ‘Measuring Organizational Attributes of Primary Health Care Survey’ developed by CIHI (2013). The decision to use this tool was informed by a systematic search and review conducted by the study authors (Lukewich *et al.*, 2014). The selected questionnaire was designed to describe the composition of the PHC team, healthcare services offered within the practice and the organization of healthcare services.

With permission from the questionnaire developers, minor modifications were made to better align the questionnaire with chronic conditions addressed by the CPCSSN and to add clarity to questions regarding nurses and their roles within the practice. For example, in a question about systematic patient management and follow-up services for patients with various chronic diseases, we added the following conditions: hypertension, depression, Parkinson’s disease, epilepsy, Alzheimer’s disease and chronic pain. With respect to questions regarding nurses, the position of ‘registered/licensed practical nurse’ (RPN) was added to the list of professions. Furthermore, the question ‘What are the roles and functions of nurses in your medical team?’ was re-organized to distinguish between each regulatory designation of nurses, including nurse practitioners (NPs), registered nurses (RNs) and RPNs. A description of each designation is located in Table 1. Lastly, a response option of ‘Unsure/Don’t know’ and/or ‘Not Applicable’ was added to each question. The updated questionnaire was reviewed for content and clarity and approved by all members of the study team and an administrative lead from one of the PHC sites.

Data collection

Data collection occurred between June and November 2014. Before questionnaire distribution, a lead (eg, Administrative Lead, Executive Director) at each site was invited to participate in the questionnaire. For sites that agreed to participate, contact information for each affiliated practice location was obtained from existing records at the Eastern Ontario Network of CPCSSN or

Table 1. Description of nursing regulatory designations in Ontario, Canada

NP	NPs are RNs who have completed a Master’s degree. NPs can autonomously diagnose patients, order and interpret diagnostic tests, prescribe medications, and perform a wider variety of clinical tasks than RNs and RPNs.
RN	RNs have obtained a college diploma or university degree. Newly educated RNs are now required to complete a university degree. RNs can care for patients with complex health needs in unpredictable situations and have a wider scope of practice than RPNs
RPN	RPNs obtain a college degree and care for patients with stable and predictable conditions. In provinces other than Ontario, the protected title for RPNs is ‘licensed practical nurse’ (LPN)

NP = nurse practitioner; RN = registered nurse; RPN = registered practical nurse. References: Canadian Nurses Association (2008); Canadian Nurses Association (2015); Canadian Council for Practical Nurse Regulators (2015).

from the site lead. Initial invitation to complete the questionnaire was sent by email through FluidSurveys™. To encourage completion, participants were sent three email reminders at two-week intervals, followed by phone call reminders at one to two-week intervals. During phone call reminders, the study coordinator explored the individual's interest in completing the questionnaire and confirmed that the email address details were accurate.

Statistical analyses

Data are presented at the practice location-level, organized by model of care (ie, FHT, CHC). Data were analyzed using descriptive statistics. Categorical data are presented as frequencies and percentages. Continuous data are presented as means and standard deviations (SDs). Data were analyzed using SPSS Version 22 (Armonk, NY: IBM Corp).

Results

Description of practices

The response rate was 76% ($n=26$) at the practice location-level. Eight FHTs (21 different practice locations), three CHCs (four different practice locations), and one NPLC completed the questionnaire. As there was only one NPLC, this data was excluded from results to maintain anonymity and allow for meaningful comparisons across settings.

The number of practice locations affiliated with a single site ranged from 1 to 5. The respondent was most commonly a manager or administrative lead ($n=15$; 60%). Other respondents included physicians ($n=5$; 20%), administrative personnel or assistants ($n=4$; 16%), or NP ($n=1$; 4%). It took participants a mean \pm SD of 52 ± 29 min to complete the questionnaire (range 24–119 min).

All CHC locations and 80.9% ($n=17$) of FHTs were located in a city or small town, with 19.1% ($n=4$) practices located in a rural setting. All CHC locations and 66.7% ($n=14$) FHT locations were in operation >10 years. Furthermore, all practice locations had 5.08 ± 3.35 (range 1–13) administrative support personnel including managerial, clerical and reception staff.

Healthcare providers

All FHT locations had at least two physicians averaging 5.2 ± 4.0 physicians per practice location (range 2–18). Similarly, CHCs had 5.0 ± 1.4 physicians per practice location (range 4–7). All CHC locations and most FHT locations had at least one NP and at least one RN, the two most common non-physician providers across all settings. In contrast, only 50.0% of CHC and 42.9% of FHT locations had ≥ 1 RPN (Table 2). In addition, there were a total of three practice locations that exclusively had RNs as nursing providers, and a total of three practice locations that only had RPNs and diabetes nurse educators as nursing providers, each of which was affiliated with the FHT model of care (data not shown in table). Furthermore, a higher proportion of CHC locations had ≥ 1 non-physician providers, including nurse practitioners, social workers, dietitians and diabetes nurse educators, compared with FHT practice locations. Some FHT locations had ≥ 1 psychologist, physiotherapist or occupational therapist, whereas these providers were not present within CHCs (Table 2). No locations had an optometrist, audiologist, speech language pathologist or chiropractor.

Table 2. Presence of healthcare providers within practices

	Model of care	
	FHT ($n=21$)	CHC ($n=4$)
Healthcare provider	≥ 1 in practice, yes % (n)	
Registered nurse	85.7 (18)	100 (4)
Nurse practitioner	66.7 (14)	100 (4)
Dietician	52.4 (11)	100 (4)
Social worker	52.4 (11)	75.0 (3)
Registered practical nurse	42.9 (9)	50.0 (2)
Pharmacist	28.6 (6)	0 (0)
Diabetes nurse educator	23.8 (5)	75.0 (3)
Occupational therapist	19.0 (4)	0 (0)
Respiratory therapist	14.3 (3)	50.0 (2)
Psychologist	14.3 (3)	0 (0)
Physician assistant	4.8 (1)	25.0 (1)
Physiotherapist	4.8 (1)	0 (0)

FHT = family health team; CHC = community health center.

Nursing roles

NPs reportedly engaged in most roles listed in Table 3. There was a higher proportion of NPs within FHT locations who engaged in support for medical activities compared with CHCs. In fact, no NPs within CHC locations performed these activities (92.9% versus 0%). In general, the percentage of practices utilizing RNs for a particular role was comparable with the percentage of practices utilizing NPs for many of the same roles. RPNs engaged in the least number of roles compared with NPs and RNs. FHT locations were the only setting where RNs reportedly prescribe medications and order diagnostic tests (Table 3).

Availability of primary healthcare services

The frequency and percent of FHT and CHC locations providing specific PHC services are outlined in Table 4. Less FHT locations reported performing various services, including point-of-care testing, rapid streptococcal testing and pulmonary function tests in comparison with CHCs (Table 4).

Chronic diseases management attributes

Most practices reported to have a process for systematic management and follow-up for the chronic conditions listed in Table 5. A greater proportion of FHT practices reported to have systematic management and follow-up for patients with hypertension (100% versus 75%), depression (100% versus 75%), heart failure (90.5% versus 75%), chronic pain (90.5% versus 75%), Alzheimer's disease and related dementias (85.7% versus 50%), osteoarthritis (76.2% versus 75%), Parkinson's disease (71.4% versus 50%), and epilepsy (61.9% versus 50%) compared with CHC practices.

Respondents from all settings reported to either always (25.0%, $n=5$) or often (75.0%, $n=20$) assist patients in setting and attaining self-management goals, and most either always

Table 3. Roles of nursing within family health teams (FHTs) and community health centers (CHCs) as reported by site lead (eg, manager, administrative lead)

Nursing roles and regulatory designations ^a	Model of care	
	FHT	CHC
	Performed indicated role [% (n)]	
Patient education (eg, blood glucose testing, blood pressure)		
Nurse practitioner	100 (14)	100 (4)
Registered nurse	100 (18)	100 (4)
Practical nurse	33.3 (3)	50.0 (1)
Counseling on tobacco use, diet and physical activity		
Nurse practitioner	85.7 (12)	100 (4)
Registered nurse	83.3 (15)	100 (4)
Practical nurse	22.2 (2)	0 (0)
Follow-up of specific patient groups (eg, chronic diseases)		
Nurse practitioner	85.7 (12)	75.0 (3)
Registered nurse	83.3 (15)	100 (4)
Practical nurse	44.4 (4)	50.0 (1)
Support for medical activities (eg, BP/weight measurements)		
Nurse practitioner	92.9 (13)	0 (0)
Registered nurse	94.4 (17)	100 (4)
Practical nurse	66.7 (6)	50.0 (1)
Counseling on sexually transmitted or blood borne infections		
Nurse practitioner	100 (14)	100 (4)
Registered nurse	38.9 (7)	50.0 (2)
Practical nurse	22.2 (2)	50.0 (1)
Liaise with long-term care, hospitals and other facilities		
Nurse practitioner	71.4 (10)	100 (4)
Registered nurse	61.1 (11)	100 (4)
Practical nurse	55.6 (5)	0 (0)
Participate in clinical decisions		
Nurse practitioner	92.9 (13)	100 (4)
Registered nurse	72.2 (13)	100 (4)
Practical nurse	44.4 (4)	100 (2)
Conduct clinical activities as part of medical directive		
Nurse practitioner	85.7 (12)	75.0 (3)
Registered nurse	66.7 (12)	100 (4)
Practical nurse	44.4 (4)	50.0 (1)
Order diagnostic examinations (eg, blood tests, radiology)		
Nurse practitioner	100 (14)	100 (4)
Registered nurse	11.1 (2)	0 (0)
Practical nurse	11.1 (1)	0 (0)

Table 3. (Continued)

Nursing roles and regulatory designations ^a	Model of care	
	FHT	CHC
	Performed indicated role [% (n)]	
Prescribe medications		
Nurse practitioner	100 (14)	100 (4)
Registered nurse	16.7 (3)	0 (0)
Practical nurse	0 (0)	0 (0)

^aPercentages based on number of practices locations that reported to have ≥1 nurse within the specified nursing regulatory designation.
FHT = family health team; CHC = community health center; BP = blood pressure.

Table 4. Availability of different primary care services and procedures

Service or procedure	Model of care	
	FHT (n = 21)	CHC (n = 4)
	Service available ^a [% (n)]	
Venipuncture	81.0 (17)	50.0 (2)
Point-of-care testing	71.4 (15)	75.0 (3)
Rapid streptococcal testing	71.4 (15)	100 (4)
Skin biopsy	95.2 (20)	100 (4)
PAP test	100 (21)	100 (4)
Intrauterine device insertion	81.0 (17)	100 (4)
Suture/minor surgery	85.7 (18)	100 (4)
Rapid urinalysis	90.5 (19)	100 (4)
Urine pregnancy test	100 (21)	100 (4)
Influenza vaccination	100 (21)	100 (4)
Pulmonary function tests	33.3 (7)	100 (4)

^aOther response options not shown in table were 'No/Unsure.'
FHT = family health team; CHC = community health center; PAP = papanicolaou.

(40.0%, n = 10) or often (52.0%, n = 13) delivered care in accordance with clinical practice guidelines. In all, 96% (n = 24) of practice locations reported having tools to assist with lifestyle counseling and health education or to help modify behaviors. Similarly, 34.6% and 46.2% of locations reported to either always or often utilize flow sheets to track critical elements of care, respectively.

Interpretation

This study implemented CIHI's recently developed 'Measuring Organizational Attributes of Primary Health Care Survey' (CIHI, 2013) and presents information about the organization of PHC practices in eastern Ontario, focusing specifically on team composition, nursing roles, and general strategies that support chronic disease management. Our finding that FHT practices tend to be more rurally located than CHC practices aligns with a report published by the Institute for Clinical Evaluative Sciences (Glazier et al., 2012). There were differences in the proportions of

Table 5. Systematic patient management and follow-up

Chronic diseases	Model of care	
	FHT (<i>n</i> = 21)	CHC (<i>n</i> = 4)
	Disease ^a [% (<i>n</i>)]	
Diabetes	100 (21)	100 (4)
Hypertension	100 (21)	75.0 (3)
Depression	100 (21)	75.0 (3)
COPD	90.5 (19)	100 (4)
Heart failure	90.5 (19)	75.0 (3)
Chronic pain	90.5 (19)	75.0 (3)
Asthma	85.7 (18)	100 (4)
Alzheimer's/related dementias	85.7 (18)	50.0 (2)
Osteoarthritis	76.2 (16)	75.0 (3)
Parkinson's disease	71.4 (15)	50.0 (2)
Epilepsy	61.9 (13)	50.0 (2)

^aOther response options not shown in table were 'No/Unsure.'

FHT = family health team; CHC = community health center; COPD = chronic obstructive pulmonary disease.

healthcare providers present in FHT and CHC practices. In general, CHC practices had a greater proportion of non-physician providers in comparison with FHT practices. As well, NPs and RNs were the most common non-physician healthcare providers. Furthermore, although nearly all practices engaged in important chronic disease management activities, certain activities associated with improved health outcomes were not being performed by all practices, such as goal-setting and utilizing a flow sheet or system to track critical elements of care (Bodenheimer *et al.*, 2002; Bodenheimer, 2003; Jaakkimainen *et al.*, 2003; Lin *et al.*, 2007; Nutting *et al.*, 2007; Haas *et al.*, 2013; Stellefson *et al.*, 2013). The extent to which chronic disease management activities were utilized was not captured in this study (ie, what and when goal-setting and flow sheets are being utilized).

There are few studies that specifically describe nursing roles or provide information on nurse staffing and workforce trends within the PHC setting (Hogg *et al.*, 2009; Keleher *et al.*, 2009; Russell *et al.*, 2009; Griffiths *et al.*, 2010; Russell *et al.*, 2010; Dahrrouge *et al.*, 2012). The finding that NPs and RNs were the most common providers, after physicians, is consistent with other literature that has explored staffing patterns of healthcare providers in PHC (CIHI, 2014a; 2014b; Peikes *et al.*, 2014) and with Ontario reports on nursing (College of Nurses of Ontario, 2015). In 2014, the College of Nurses of Ontario reported that there were 2462 RNs working in FHTs, CHCs or NPLCs, in comparison with 995 NPs and 1196 RPNs, making RNs the highest employed nursing provider within these settings. Although it is well-documented that nurses within all regulatory designations play a key role in health promotion, disease prevention and chronic disease management (Holcomb, 2000; Hooke *et al.*, 2001; Renders *et al.*, 2001; Way *et al.*, 2001; Loveman *et al.*, 2003; Kenealy *et al.*, 2004; Reeve *et al.*, 2004; Pascoe *et al.*, 2005; Todd *et al.*, 2007; Allen *et al.*, 2008; Halcomb *et al.*, 2008; Joyce and Piterman, 2011; Canadian Nurses Association, 2015), their distinct educational

preparations and scopes of practice should influence their participation in various roles. In this study, RNs and NPs, and to a lesser extent RPNs participated in similar patient assessment and management activities, such as counseling, teaching and assistance with clinical decisions. Our findings, and findings from other studies indicate there is substantial overlap between the roles of nurses across regulatory designations, which may result in role confusion (Allard *et al.*, 2010; Fortin *et al.*, 2010; Besner *et al.*, 2011; Canadian Nurses Association, 2014; Lukewich *et al.*, 2014; Oelke *et al.*, 2014). It is imperative that nurses within each regulatory designation optimize their roles to support high-quality care for patients within the PHC setting. To facilitate this, a better understanding between the contributions of nurses from each regulatory designation to quality and cost of care is required.

FHTs, CHCs and NPLCs all deliver care using interdisciplinary team structures that are determined by the health needs of their surrounding communities (Health Force Ontario, 2010; Nurse Practitioner Association of Ontario, 2011; Association of Ontario Health Centres, 2014; Ministry of Health and Long-Term Care, 2014). Interestingly, despite the growing need to better manage patients with diabetes within PHC, many practices in this study did not commonly have providers, such as pharmacists, dieticians, psychologists and physiotherapists, who are often integral in providing comprehensive team-based PHC to patients with diabetes, and are associated with improved diabetes outcomes (Clement *et al.*, 2013). Several studies, including two meta-analyses, have identified that practices that deliver collaborative care with a pharmacist are associated with significant decreases in hemoglobin A1c, low-density lipoprotein cholesterol, and blood pressure, and improved adherence and quality of life among patients (Chisholm-Burns *et al.*, 2010; Collins *et al.*, 2011; Simpson *et al.*, 2011). It would seem that without the support of these allied healthcare providers within practices, nurses are likely absorbing the specialized care most commonly delivered by these providers (eg, medication reconciliation, psychosocial support). Despite this extension of practice, nurses are evidently able to optimally provide these services to patients with similar results, as the presence of at least 1 RN in a PHC practice also resulted in on-target hemoglobin A1c, fasting plasma glucose, blood pressure and low-density lipoprotein cholesterol in patients with diabetes (Lukewich *et al.*, 2016). Therefore, it is not clear what the composition of the overall healthcare team should be to most effectively support chronic disease management. However, the identified variability across practices provides an opportunity to explore different team compositions and their effects on patient health outcomes.

Limitations

Although characteristics and structures that are intrinsic to the organization and delivery of care at a practice-level were accurately captured from administrative leads or managers (Lukewich *et al.*, 2014), specific roles that nurses undertook within the practices may not be as accurate had this information been collected directly from nurses themselves. Similarly, as reported by an employed individual within the practice, there is a possible inclination to provide more positive responses (ie, social desirability bias) (Kaissi and Parchman, 2006). In addition, only one NPLC was captured which prevented inclusion of this data in comparison and interpretation. Inclusion of NPLCs in future studies would provide valuable information about the roles performed by nurses and other healthcare providers in practices

without consistent physician presence, an environment which could foster role optimization. Also, only practices affiliated with the Eastern Ontario Network of CPCSSN were included in this study. Although, the patient populations of practices who participate in CPCSSN are representative of patient populations in PHC settings (Queenan *et al.*, 2016), the findings regarding organizational attributes of PHC practices are limited in generalizability to practices in other jurisdictions.

Conclusion and future directions

PHC practices across eastern Ontario have implemented many organizational strategies to support chronic disease management. In particular, it is evident that NPs and RNs play a major role in delivering PHC services, especially with respect to chronic disease management. With the evolving PHC system, it is essential that nurses within each regulatory designation identify their unique contributions within PHC. Future research should focus on examining relationships between team composition, chronic disease management services and nursing roles on health outcomes in patients within this setting. Understanding the influence of specific organizational attributes in supporting the delivery of high-quality PHC will further support the establishment of high functioning healthcare teams.

Acknowledgments. The authors would like to thank the contributions of Rachael Morkem, Research Associate, from the Eastern Ontario Network of the CPCSSN for her assistance with data collection, and Megan Kirkland, MSc Medicine (Clinical Epidemiology) Candidate, for her assistance preparing and formatting the manuscript for publication.

Financial Support. Dr Julia Lukewich received financial support as a doctoral student from the Nursing Health Services Research Unit (NHSRU), University of Toronto (Toronto, Ontario), the Centre for Health Services Policy Research (CHSPR), Queen's University, the Queen's University Graduate Award (Kingston, Ontario) and the Ontario Graduate Scholarship (Government of Ontario).

Conflicts of Interest. The authors have no competing interest to disclose.

Ethical Standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation (Queen's University Research Ethics Board) and with the Helsinki Declaration of 1975, as revised in 2008.

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