Evaluation of the Equity of Primary Care Service Delivery models in Ontario

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Abstract

Background: In health care services, equity is the delivery of similar care for similar needs (horizontal equity), and the delivery of more care for higher needs (vertical equity). This study assessed the extent to which primary care provision is equitable across gender, age and socioeconomic groups, and whether any observed disparity is associated with the type of primary care remuneration model to which a family practice belongs. Remuneration models include Fee For Service in which the physician is paid for each encounter, Salary where payment is fixed for the number of hours worked, and Capitation where payment is tied to the number of patients under the care of the provider, and very little or no additional compensation is provided for each patient encounter.

Methods: This thesis used data from a cross sectional study of 5,361 patients receiving care from practices (n) in which primary care providers were remunerated by Fee For Service (35), Salary (35), or Capitation (68). Multi-level linear or logistic regressions were used to assess the impact of gender, age and socioeconomic strata on quality of care. The quality of health service delivery and health promotion were assessed through surveys based on the Primary Care Assessment Tool (n=5,111). The quality of preventive care (n=4,108) and chronic disease management (n-514) were evaluated through chart abstraction using the Canadian recommendations for care as the standard. The analyses were conducted stratified by remuneration model to allow the impact of the model on the extent of disparity in quality of care between social strata to be assessed.

Results: Men and women reported similar quality of health service delivery. Women were significantly more likely to be up to date on their preventive care, but adherence to recommended guidelines for chronic disease management was better for men in the Fee For Service practices. Older individuals reported better health service delivery than younger ones. The quality of chronic disease management was also age dependent with better care delivered to individuals ages 60-69. Individuals of low income and education had better accessibility than those not disadvantaged in the Salaried model and Fee For Service, but not Capitation model. Despite their higher health risks, these individuals were not more likely to receive healthy lifestyle counseling.

Conclusions: Significant inequalities in the care of patients were found across social strata. In some cases, these inequalities are deemed appropriate; a justifiable response to differing health care needs. In other cases, they are deemed inappropriate and representing inequities in the delivery of care. Some of the observed disparities were present in one remuneration model but not others, suggesting that the payment approach may be contributing to these differences. The results raise the concern that the capitation remuneration structure may compromise accessibility.

Contents

Introduction

Primary care

The introduction of a universal health care system in Canada has helped reduce disparity in survival between socioeconomic groups,[1] but inequities in several dimensions of health care services remain,[2] largely because barriers to equitable care are not strictly financial.[3,4]

Primary care is the first point of contact for care and is the cornerstone of an effective[5,6] and efficient[7] health care system that plays an important role in addressing inequalities.[8,9] Primary care is traditionally delivered by a family physician, and sometimes other health professionals, such as nurse practitioners.[10] Recently, national and international reports have advocated the investment in, and reform of, primary care to strengthen the sector. The 2008 World Health organization report on primary health care recommended four strategies to help strengthen the primary health care sector:[11] 1) A universal coverage would support health equity by improving access to the more needy; 2) Health care delivery reorganization to ensure that it is people centred, focused on needs, socially relevant and effective; 3) A broader role of primary care to encompass public health initiatives; and 4) Leadership reform that would reflect the complexity of the system and the needs of its population. Earlier this year, the World Health Organization also recognized the role of health services in maintaining health and addressing inequalities. While upstream investments are required to reduce inequities (such as the individual's social and physical context), downstream investments are also required to mitigate further inequities. The report calls for universal health coverage and identifies areas where all countries, including high income countries with some type of universal coverage, can strengthen their system.[12]

Canada

In 2002, The Commission on the Future of Health Care in Canada recommended that Canada's health care system be focused on primary health care.[13] It advocated for strengthening accessibility and prevention, including promoting healthy lifestyle and preventing disease, through that sector. As a result of this advocacy work, provincial health authorities have moved to restructure the organization of their primary care practices with a view to improve on their deficiencies. Before that time, Canada's primary care practices were largely founded on the traditional medical model in which family physicians working alone, or sometimes with nurses, were compensated on a fee for service basis where payment is strictly tied to the number and type of services provided. In response to the call for reforms over the past decade, provinces have encouraged the adoption of new models of care that vary in their remuneration structure, mandate, and organizational features such as team composition and extent of information technology.

A major component of the current primary care restructuring involves the way in which providers are compensated. During the decades preceding these changes, provinces experimented with different compensation models. In each case, the model was expected to improve or support the equitable or fair delivery of care. Equity is defined as the absence of unfair disparity in health or health care between groups that occupy different societal strata.[14] In health care services, equity is further expressed as horizontal equity – similar care for similar needs, and vertical equity – more care for higher needs.[15,16] For example, horizontal equity dictates that an individual with diabetes should receive the same care regardless of social strata, while vertical equity would require individuals with greater health needs to have better access to care.

Several studies have documented a relationship between primary care and disparities in health. Shi et al report that higher primary care investments are associated with better population health,[17] and that greater primary care resources are associated with a reduction in health disparities between socio-economic strata,[9,18-20]and racial and ethnic groups.[21] Starfield and Shi argue that investments in primary care is one approach to mitigating the effect of inequities on populations.[19,22,23]

Current inequities in Canada

Socio-economic status

An abundance of literature demonstrates the health risks associated with being socio-economically disadvantaged. People with low income or education have higher morbidity and lower life expectancy[24-29] For example, in the years between 1991 and 2001 there was a 7.4 year gap between the highest and lowest income. The disparities in health adjusted life expectancy are even greater; the highest income men can expect to live 14.1 years more in good health than the lowest income men.[30] Such disparities exist in most aspects of health and health behaviours. People with lower income are at higher risk of diabetes and other chronic conditions,.[25,31,32] Those with lower income or lower education are more likely to smoke and abuse alcohol, and are less likely to be physically active.[26,33,34] Evidence suggests that poor health habits and a lower understanding of health related issues are causally related to poor health.[29,32,35,36]

Vertical equity would dictate that socio-economically disadvantaged individuals receive greater health care because of their increased health risks. Virtually all studies evaluating the equity of health service delivery amongst the socio-economically disadvantaged focus on accessibility. These studies found that the likelihood of having at least one family physician visit is slightly lower for these individuals, suggesting an accessibility barrier amongst the population. However, amongst those who do overcome that barrier and have a family physician visit, the number of visits is significantly higher than for those not socio-economically disadvantaged, suggesting appropriate vertical equity.[2,25,37-39] As a result of poor accessibility for the population, individuals of low socio-economic status make greater use of emergency room services for non urgent matters.[25]

There is also some evidence that there are disparities in the technical quality of care delivered. Individuals of higher socio-economic status are more likely to receive preventive care, such as colorectal cancer screening,[40,41] cervical cancer screening,[42] and influenza immunization.[26,43] There is also some limited evidence that chronic disease management may also be lacking in that population, but the strength of that association is small.[44] This may be in part because some of the management of chronic diseases relies on medication which individuals of low income report having difficulty affording.[45]

Sex

There is a dearth of studies evaluating the equitable delivery of care across sexes in Canada. One study reported that the barriers to accessing primary care differed, with men and women having different competing demands; men report work related responsibilities and women report family responsibilities as barriers to accessibility.[46] Recently, the Power study published a report on the equitable access to health care for women in Ontario.[47] The study found

found that women were more likely than men (14% vs 10%) to report unmet **health care** needs in primary care. Men were also more likely to report being satisfied with their regular check up and as having less difficulty obtaining monitoring for an ongoing condition. The study also identified differences in the likelihood of having a hospital encounter for a condition that is ambulatory care sensitive. However, both sexes reported similar levels of accessibility for urgent care.

While there is abundant literature assessing disparities in chronic disease management between men and women internationally, no such Canadian study could be found. Several American studies document that women are less likely to receive care according to recommended guidelines for diabetes[48] and cardiac disease.[49,50]

Age groups

No Canadian study assessed the equitable delivery of primary care across age groups. A large American study found that the quality of care was lower in older individuals. [51]

Other studies reported specifically on the disparities between age groups in the treatment cardiac conditions, all showing a drop in adherence to recommended guidelines in the older population.[49,50,52]

Conclusions

Canadian studies of equity in primary care have focused principally on socio-economic strata. There is a paucity of studies assessing the equitable delivery of primary care across sex and age groups. The great majority of studies assessing equity were conducted at a time when the majority of practices were fee for service based. The few studies conducted more recently did not distinguish between the patients' experience across primary care models. As Canada moves toward reforming its primary care system, it is essential that we understand the extent to which changes in its structure affect the equity of care across individuals of different strata.

The Course of Change in Primary Care Service Delivery Models Prior to the reform

Community Health Centres

In the early 1970s, in an attempt to respond to the needs of its population, the Ontario Ministry of Health and Long-Term Care introduced a salary based model; the Community Health Centres. A locally based collective action had advocated for this model to address health-related social problems in the community.[53] From its inception, the Community Health Centre was a community oriented, socially minded primary health care delivery model. A major goal of Community Health Centres was to provide integrated community-based care focused explicitly, but not exclusively, on serving disadvantaged populations.[54] All Community Health Centres are governed by a community based volunteer board of directors, and tailor their programs to meet the needs of their community. Integral to many Community Health Centres' mission statements are the notions of social justice and equity. Several facets of the organizational structure of Community Health Centres support better care for the vulnerable. Their salary-based remuneration eliminates incentives to shorten visit time and increase output usually associated with fee for service. A cap on the number of patients registered to a provider ensures that these providers have the necessary time to provide the necessary care to their patients. Finally, a comprehensive list of medical and social services offered at the centres (including translators) help address some determinants of health. Throughout the years, Community Health Centres have continued to raise awareness about the differential distribution of disease in our society and the plight of the vulnerable. They have focussed their efforts on responding to the needs of disenfranchised populations, which include the poor, the uneducated, the immigrants and refugees.[55]

Capitation

In the 1970s, the Ontario Ministry of Health and Long Term Care also experimented with capitation remuneration under the Health Service Organization model. Family physicians working in Health Service Organizations received a fixed payment per patient to deliver a defined basket of services. Compensation was based on the number and type (age and sex) of patients enrolled in the care of the provider, and was independent of the number of services actually delivered.[56] The objective of this remuneration approach was to eliminate the potential incentive for physicians to overbook and perform unnecessary interventions driven by the fee for service compensation structure. Because remuneration is fixed and not tied to services rendered, providers could theoretically spend more time with patients requiring higher needs without concerns about its effect on their income. As such, practices would provide "*services which were appropriate to the population being served*",[56] and this was expected to result in more equitable care – vertical equity. However, providing longer appointments to those with greater needs does come with an opportunity cost; that of enrolling additional patients – the basis of which constitutes their earnings.

Another expected outcome of the fact that remuneration was dissociated from billings is that it would be financially attractive for practices to hire other health professionals to substitute physician tasks, resulting in a multi-disciplinary model. However, the salary for these individuals would have to come from the physician's earnings, a risky proposition if it is not assured that the participation of these additional team members would result in sufficient freed up time for the physician to allow them to increase their earnings accordingly by enrolling additional patients.

Primary care reform

Early in this millennium, the province expanded its capitation based initiative and encouraged the adoption of a new model of capitation based care, the Family Health Network. Strictly speaking, Family Health Networks are a blended model. However, most of the family physician's remuneration is derived from capitation. The non-capitation element is secured from pay for performance incentives and a small Fee For Service component. The Fee For Service component, which represents 10% of the scheduled billing fee usually allocated to the service rendered, was likely principally provided as an incentive to record services rendered for the purpose of monitoring. Finally, some financial support was also offered to these practices for the provision of additional nursing staff and to establish an electronic medical record.[57]

With each transformation, policy makers hoped to provide an effective alternative to address the deficiency of existing models. However, each of these models is not without its potential pitfalls. In the traditional fee for service model, for example, there was concern that the physician behaviour be output driven, potentially resulting in unnecessary visits and such high throughputs that the quality of care delivered at the visits be reduced. In fact, in the 1990s, government established a cap on the income of family physicians beyond which additional billings were compensated at a reduced rate.[58] In capitation models, the threat was that the link between income and patients enrolled would result in non-manageable list sizes for which good quality of care could not be delivered, potentially resulting in diminished quality of care, reduced comprehensiveness of care and increased referral to specialty care. To counter that effect, the government established a cap on the number of patients enrolled beyond which the capitation fee would be reduced by 50%.[59] In both cases, the caps were set at levels well beyond which quality could be compromised. In the salaried model, the total dissociation between compensation and all work metrics provides no incentive to optimize efficiency, increasing the risk of unduly limited list sizes and inefficient encounters. There is some evidence suggesting that provider remuneration affects behaviour, mainly surrounding the higher number of visits provided by fee for service providers.[60,61]

The impact of reform on equitable delivery of care

At the time Family Health Networks were established, there was some evidence from studies of Health Service Organizations suggesting that the quality of preventive care was better in capitation practices than in the traditional fee for service practices,[62] although this evidence was not consistent.[63,64] However, despite the expectation that Health Service Organizations would deliver care more consistent with patient needs, there was no study assessing whether this was achieved. Today, approximately 40% of practices have a compensation structure that is largely capitation based, yet no study has assessed the impact of this funding structure on equity. Similarly, Ontario continues to invest in Community Health Centres, and while American studies have established that Community Health Centres deliver good quality of care as well as equitable care,[65-69] there has been no such evaluation conducted in Canada.

Thesis topic

Despite enjoying a universal health care system, several studies have documented differential care delivery for Canadians of different socio-demographic and economic groups. This thesis focuses on the delivery of care across groups in which inequities have previously been documented: sex, age groups and different socio-economic strata. In particular, it concerns how the different models of primary care compare in terms of equity of primary care.

Although women consult their family physician more frequently than men in Canada[25] and elsewhere[70], several studies have documented that women report greater barriers to access.[71] In Canada, they report more unmet health care needs.[72] Studies have also documented gender inequities in the management of chronic diseases, with women being less likely to receive recommended care for the management of cardiovascular disease.[50,73-77] Adherence to recommended guidelines for cardiovascular disease management is also associated with age. Older Canadians[78] and Americans [50,51,74] are less likely to have received recommended cardiovascular care than their younger counterparts.

Canadians of low socioeconomic status are at greater risk of developing chronic conditions.[25,31,79] Therefore, achieving vertical equity would mean that these individuals should have more health services delivered to meet their higher needs. In fact, when considering only individuals having access to a family physician, Canadian studies find that service utilization is indeed higher amongst individuals with low socioeconomic status.[2,25,38,39,80] Canadians with low income[72,81,82] and with low education[72,81] also report equivalent or higher satisfaction with their accessibility than Canadians with high income and education. While their accessibility needs appear to be met, individuals of low socioeconomic status are at higher risk of receiving lower quality technical care. For example, members of this group were less likely to be up to date on their preventive care, such as cancer screening or flu vaccination,[40-43] findings that are in keeping with the international literature.[3,83-86]

Most studies assessing the presence of inequities in primary care in Canada have limited their evaluation to one facet of care such as accessibility or prevention, and have often focused on one risk group such as low socio-economic status. All studies documenting these disparities were conducted at a time when the majority of practices were under a fee for service structure, and none have considered the impact of the primary care model on the observed inequities.

This thesis study is unique because it assesses the extent to which primary care delivery is equitable in different organizational models. It evaluates several dimensions of care including measures of health services (such as accessibility and continuity) and technical quality of care (such as prevention and chronic disease management) within one dataset and considers several at risk populations. The results provide a comprehensive understanding of the extent of inequity present in primary care practices and an insight on the impact of primary care reform on equity.

Objectives

This thesis assesses the equity of care across gender, age groups, and socio-economic status. For each evaluation, three objectives are met:

1. Describe the profile of patients across risk group (men vs women; old vs young; socio-economically disadvantaged vs not) so as to understand their **health care** needs
2. Determine whether disparities in the quality of care delivered across risk groups in family practices exist in the four primary care models studied
3. Assess whether the extent of these disparities varies by primary care model

Methodology

Data

This study relies on analyses of data collected in a Pan Ontario evaluation conducted in 137 primary care practices in 2005 and 2006 called the Comparison of Primary Care Models study. It was a cross sectional study that included 35 Community Health Centre, 35 Fee For Service, 35 Family Health Network and 32 Health Service Organization practices.

We surveyed each practice and conducted patient waiting room surveys and chart reviews in each. Patient surveys captured patient sex, age and socio-economic status, while chart reviews only allowed sex and age to be determined. Details of the original study methodology and key features of the model is reported in Chapter 1.[87]

Framework

Inequities in health are multifactorial.[88,89] They arise from biological factors, the individual's life course, his/her current social and physician environment and lifestyle, and are influenced by health care. Several population health frameworks have been proposed that consider these factors.[89-91] The present study focuses on the equitable delivery of one sector of **health care**, primary care. Several studies have suggested that primary care is one effective strategy for mitigating the effect of social inequities on health because jurisdictions with a stronger primary care sector have lower inequities.[9,17,19-22]

The present evaluation is grounded in a framework adapted principally from the Canadian Institute of Health Information's framework for measuring equity in health care delivery. That framework was appropriate because it grounded the study in work developed for the Canadian context of the health care system.[92] The study framework was also informed by the one proposed by Stevens intended for evaluating disparity in primary care services across racial and ethnic minorities in the United States. That work highlights areas of primary care structure that should be considered when assessing equity within primary care.[93] Finally, the framework developed in Ottawa by the CT Lamont Primary Health Care Research Centre for evaluating quality of care in primary care practices was used to inform the outcome measures that should be considered in evaluating equity in primary care.[94] The ensuing framework, shown in Appendix A, is intended to inform the evaluation of equity in primary care and was used to develop the evaluation model. The model, shown in Appendix B, has guided the analysis of the evaluation of primary care performance for individuals who may be at risk of experiencing lower care.

Referring to the model in Appendix B, the study has measured the relationship between facets of the "the Individual and his Environment" (specifically sex, age and socio-economic status) and the "Health System Performance" (including measures of health service delivery and technical quality of care) in primary care. It assessed the impact of one aspect of the "Context", the family practice organizational model of care, on that relationship. It accounted for the individual's health care needs as determined by an understanding of his "Health Status".

Thesis layout

The next four chapters of this paper based thesis are the following four articles:

Chapter 1: *The Comparison of Models of Primary Care in Ontario (COMP-PC) study: Methodology of a multifaceted cross-sectional practice-based study*. Published: Open Medicine 2009 3(3) : 1 49-1 64. Authors: Simone Dahrouge, William Hogg, Grant Russell, Robert Geneau, Elizabeth Kristjansson, Laura Muldoon, Sharon Johnston

The thesis is based on study data collected for a pan-Ontario cross section data for which I managed the quantitative component. Chapter 1 reports on the original study methodology in which a stratified sample of practices (n) working under the Fee For Service (35), Salaried (35), Established capitation (32), and New capitation (32) models were evaluated.

Chapter 2: *An evaluation of gender equity in different models of primary care practices in Ontario*. Published: BioMedCentral Public Health 2010, 10:151. Authors: Simone Dahrouge, William Hogg, Meltem Tuna, Grant Russell, Rose Anne Devlin, Peter Tugwell, Elizabeth Kristjansson

The second chapter reports on the results of the evaluation of equity across gender in the four primary care models. It assesses whether differential care is provided to men and women in family practices, and whether the organizational model in which these practices function is associated with the extent of disparity.

The quality indicators assessed in the article cover several health service delivery measures, health promotion, preventive care and chronic disease management.

Chapter 3: *Age equity in different models of primary care practices in Ontario*. In print, Canadian Family Physician 2011. Authors: Simone Dahrouge, William Hogg, Meltem Tuna, Grant Russell, Rose Anne Devlin, Peter Tugwell, Elizabeth Kristjansson

The third chapter follows a similar structure to the second chapter and compares individuals of different age groups. For health service delivery and health promotion, patients were grouped into those younger than 30, those 30-64, and those 65 years of age and older. For preventive care, age cut offs were selected to better represent the eligibility criteria for the manoeuvre. Finally, because the majority of patients with chronic diseases were older, individuals were grouped as younger than 60, 60-69, and those 70 years of age and older.

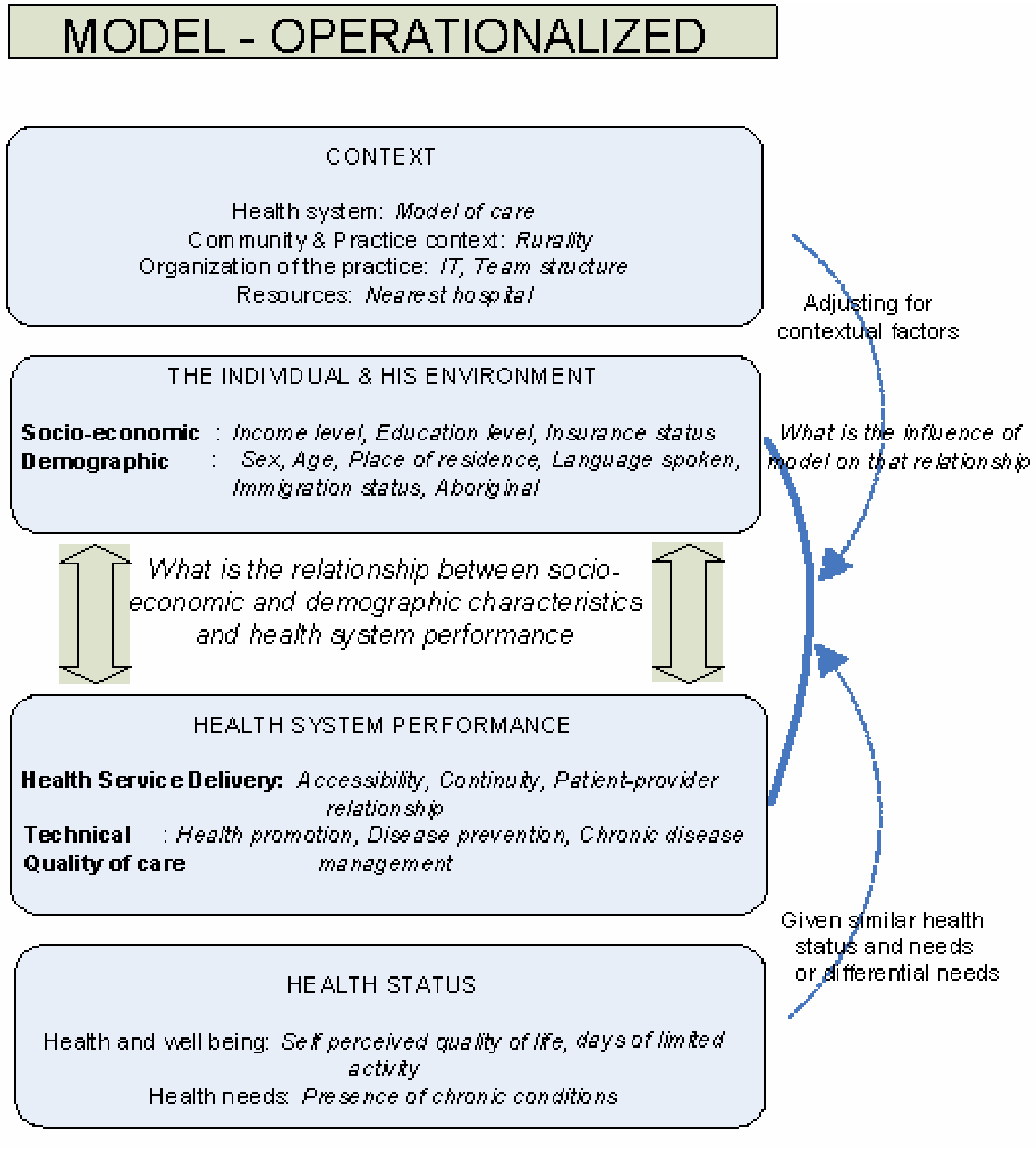
Chapter 4: *Delivery of Primary Health Care to Persons who are Socio-Economically Disadvantaged: Does the Organizational Delivery Model Matter?* Submitted for peer review in December 2010. Authors: Simone Dahrouge, William Hogg, Natalie Ward, Meltem Tuna, Rose Anne Devlin, Peter Tugwell, Elizabeth Kristjansson, and Kevin Pottie

The fourth chapter establishes the greater illness burden that individuals of lower socio-economic status experience, and assesses whether the primary care practices are responsive to their greater **health care** needs. It evaluates whether individuals with low income and/or education have better accessibility and health service delivery, in general, than those without these risk factors. It also assesses whether these individuals are more likely to receive healthy lifestyle counselling, and compares these results across primary care models to determine whether the disadvantaged are better served in one model than another.

Chapter 5: The thesis concludes with the lessons learned, the study strengths and limitations, and recommendations for further work in its final chapter.

Appendix A: Adapted framework

Appendix B: Model – Operationalized



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The Comparison of Models of Primary Care in Ontario (COMP-PC) study: methodology of a multi-faceted cross-sectional practice-based study

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ABSTRACT

Background: Many industrialized nations have initiated reforms in the organization and delivery of primary care. In Ontario, Canada, salaried and capitation models have been introduced in an attempt to address the deficiencies of the traditional fee-for-service model. The Ontario setting therefore provides an opportunity to compare these funding models within a region that is largely homogeneous with respect to other factors that influence care delivery. We sought to compare the performance of the models across a broad array of dimensions and to understand the underlying practice factors associated with superior performance. We report on the methodology grounding this work.

Methods: Between 2004 and 2006 we conducted a cross-sectional mixed-methods study of the fee-for-service model, including family health groups, family health networks, community health centres and health service organizations. The study was guided by a conceptual framework for primary care organizations. Performance across a large number of primary care attributes was evaluated through surveys and chart abstractions. Nested case studies generated qualitative provider and patient data from 2 sites per model along with insights from key informants and policy-makers familiar with all models.

Results: The study recruited 137 practices. We conducted 363 provider surveys and 5361 patient surveys, and we performed 4108 chart audits. We also conducted interviews with 40 family physicians, 6 nurse practitioners, 24 patients and 8 decision-makers. The practice recruitment rate was 45%; it was lowest in fee-for-service practices (23%) and in family health networks (37%). A comparison with all Ontario practices in these models using health administrative data demonstrated that our sample was adequately representative. The patient participation (82%) and survey scale completion (93%) rates were high.

Conclusions: This article details our approach to performing a comprehensive evaluation of primary care models and may be a useful resource for researchers interested in primary care evaluation.

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AS A GROWING BODY OF EVIDENCE REVEALS THE importance of primary care to the health of populations, there is increasing interest in the efficient, effective and equitable delivery of these services. In response, many industrialized nations have initiated reforms in the organization and delivery of primary care with the aim of optimizing care delivery.[1] Primary care is funded in several different ways by different countries. Capitation funding provides a fixed annual sum to a practice for the care of each patient registered with that practice. Fee-for-service funding provides payment to a practice according to services delivered, such as patient consultations and type of care delivered. In a salaried service, the health care providers are employed and practice income is not dependent on the number of services provided or the number of patients served. Recently some countries have made efforts to introduce quality- or performance-related payments into existing payment structures.[2-4] There is little evidence to indicate which models of funding of primary care deliver better services, and international comparisons are difficult to interpret because differences are not confined to funding models.

The situation in Ontario, Canada, provides an excellent opportunity to compare funding models for primary care because the 3 major models described above have been used side by side in recent years. This enables comparisons to be made largely unconfounded by differences in gross domestic product, percent spending on health care, patient characteristics and professional training. Over the past 2 decades, Ontario has developed an array of diverse models of primary care delivery but little information on their comparative performance is available to guide further reform initiatives. In 2002, the government of Canada established the Primary Health Care Transition Fund, an $800-million commitment to help provinces and territories develop and sustain new approaches to primary health care delivery. In this article we report on the methodology of a mixed-methods practice-based study sponsored from this fund, the Comparison of Models of Primary Care in Ontario (COMP-PC). We studied fee-for-service (FFS) practices (including the traditional FFS model and reformed family health group model), a capitation-based system called health service organizations (HSOs), a model of multidisciplinary community health centres (CHCs) employing salaried physicians with a focus on community needs, and a relatively new model of physician-run group practices, the family health networks (FHNs), which incorporated extended-hour coverage, financial support for information technology and a blended remuneration formula of capitation, performance bonuses and fee for service.

Our aim was to measure the impact of funding models of primary care on patient self-reported quality of care and on provider adherence to recommended standards of care. In this article we detail the study design and the methods used for data collection. We describe how we categorized and sampled practices using different funding models, how we collected information on processes of care that might explain model differences and how we measured the outcomes of quality and adherence. This large study used a complex methodology that cannot be sufficiently described in associated articles. This article, therefore, serves as an elaboration of the methods that will be reported in a succinct form elsewhere.

Methods

Objectives. The objectives of the COMP-PC study were to describe 4 funding models (FFS, HSOs, CHCs and FHNs), to measure and compare the quality of primary care delivered and to better understand aspects of practice organization that may influence the health care experience of patients and the quality of care they receive. The process and outcome evaluation were theory based[5] and guided by a conceptual framework (Fig. 1).[6]

Design. The COMP-PC project was a cross-sectional mixed-methods study of primary care practices involving quantitative data collection and a nested qualitative case study using a subset of 2 sites per model. The Ottawa Hospital Research Ethics Board approved the study. Figure 2 summarizes the study sampling approach and eligibility criteria.

Study population. The study involved primary care practices, their providers and patients. We also interviewed key informants and policy-makers who had in-depth knowledge of each model.

Sample size. The study measured the performance of primary care practices across numerous outcomes. Because we expected the measure of performance in disease prevention to require the greatest number of measurements, it was used to estimate sample size. Performance in disease prevention was measured as the adherence to recommended guidelines for 6 manoeuvres (see Table 1, section 2.2). A patient's disease prevention score was the proportion of manoeuvres performed to manoeuvres for which he or she was eligible.

Sample size was calculated using a minimum clinically important difference of 0.5 standard deviation, with an alpha value of 0.05 and a beta value of 0.20, and was chosen to control for the family-wise error rate and variance of the cluster (cluster correlation coefficient of 0.2).[7] The basic unit of random selection was the prac-

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See related article: Hogg W, Dahrouge S, Russell G, Tuna M, Geneau R, Muldoon L, Health promotion activity in primary care: performance of models and associated factors. *Open Med* 2009;3(3):165-173 tice. The recommendation that resulted from this calculation was to include data from 40 practices per model and data from at least 30 patients per practice. Owing to budgetary and time limitations, the number of practices was reduced to 35. We aimed to collect up to 50 surveys at each practice (instead of 30) to compensate for the possibility that surveys would not be adequately completed.

For the nested case study, we selected 8 practices (2 per model) from within the sites recruited for the cross-sectional study to allow for methodological and data triangulation.We stopped conducting interviews after wereached an acceptable level of data saturation for each model and for each category of respondent (providers, patients and key informants).

Study participants: practices

Eligibility. For practical reasons, we excluded practices in the far north of the province.[1] Over the course of the recruitment period, we noted that the majority of practices under the traditional FFS model had converted to family health groups (FHGs), a modified FFS model introduced as the study was getting underway. At the time of recruitment, the main difference between the FHG and the traditional FFS models was that FHG practices were required to register their patients and provide extended hours of service, for which they received additional compensation.[8] Three months before the end of recruitment a decision was made to include FHG practices within the traditional FFS group, and we endeavoured to enrol those FFS practices previously deemed non-eligible because they had converted to FHGs. In this document we refer to both models as FFS.

Consent to participate was required from at least half of the physicians and nurse practitioners in the organization. Practices were also required to have operated under their model for at least 1 year and provide general primary care services. Practices also provided consent to allow the study investigators to access the information related to their practice contained in health administrative databases housed at the Institute for Clinical Evaluative Sciences (ICES). Practices were considered a group if the individual providers shared at least 4 of the following 5 items or resources: office space, staff, expenses, patient records and on-call duties. Practices with different geographic locations (addresses) were considered separate even if they were linked in a network.[9]

Sampling strategies and recruitment. All of the CHC, HSO and FHN practices in Ontario and a randomly selected group of 197 FFS–FHG practices were invited to participate. Forty-two of these FFS–FHG practices were found to be not eligible, leaving 155 eligible FFS–FHG practices. For the nested case study, we used a typical case sampling strategy to select the sites.[10] Practice sites were invited to participate in this qualitative component if they typified the model to which they belonged in size and composition. Practices needed to be large enough to allow sufficient provider interviews to permit data saturation within that model. We recruited 1 urban and 1 rural practice from each model, with the exception of HSOs; 2 urban sites were selected for HSOs because these organizations are concentrated in urban areas. The sample base covered practices serving approximately 90% of the provincial population of 12.6 million at the time of sampling.

Study invitation materials were mailed to eligible practices. Follow-up was done through a combination of mailings, telephone calls and face-to-face visits. We also sought the support of the model's central organizational structure where one existed (i.e., CHCs and HSOs) in delivering study information and promoting participation.

Sites were offered C$2000 in recognition of the time required by professionals and administrative staff to participate in the study. An additional C$500 was paid to those practices participating in the qualitative component of the study. Recruitment and data collection took place from June 2005 to June 2006.

Study participants: providers

Eligibility. Physicians and nurse practitioners working at the practice were eligible to participate in the study if they had practised at that site for at least 1 year or 6 months, respectively; the participating site was the principal site of their clinical practice; the majority of their services were devoted to primary care; and the majority of their patients were over the age of 17 years.

Sampling strategies and recruitment. Practices were asked to invite all eligible providers to participate in the study and were informed that participation by at least half of the eligible providers was required for the practice to be included in the study; 363 providers participated. Practices electing to also participate in the qualitative component provided names of family physicians and nurse practitioners who were interested in interviews. For 2 sites with multiple providers, this process yielded only 2 providers. In these cases, snowball sampling was then used to recruit providers through the first contact.

Study participants: patients

Eligibility. Patients were eligible to complete the survey if they were patients of consenting providers, 18 years of age or older, not severely ill or cognitively impaired, not known to the survey administrator and able to communicate in English or French either directly or

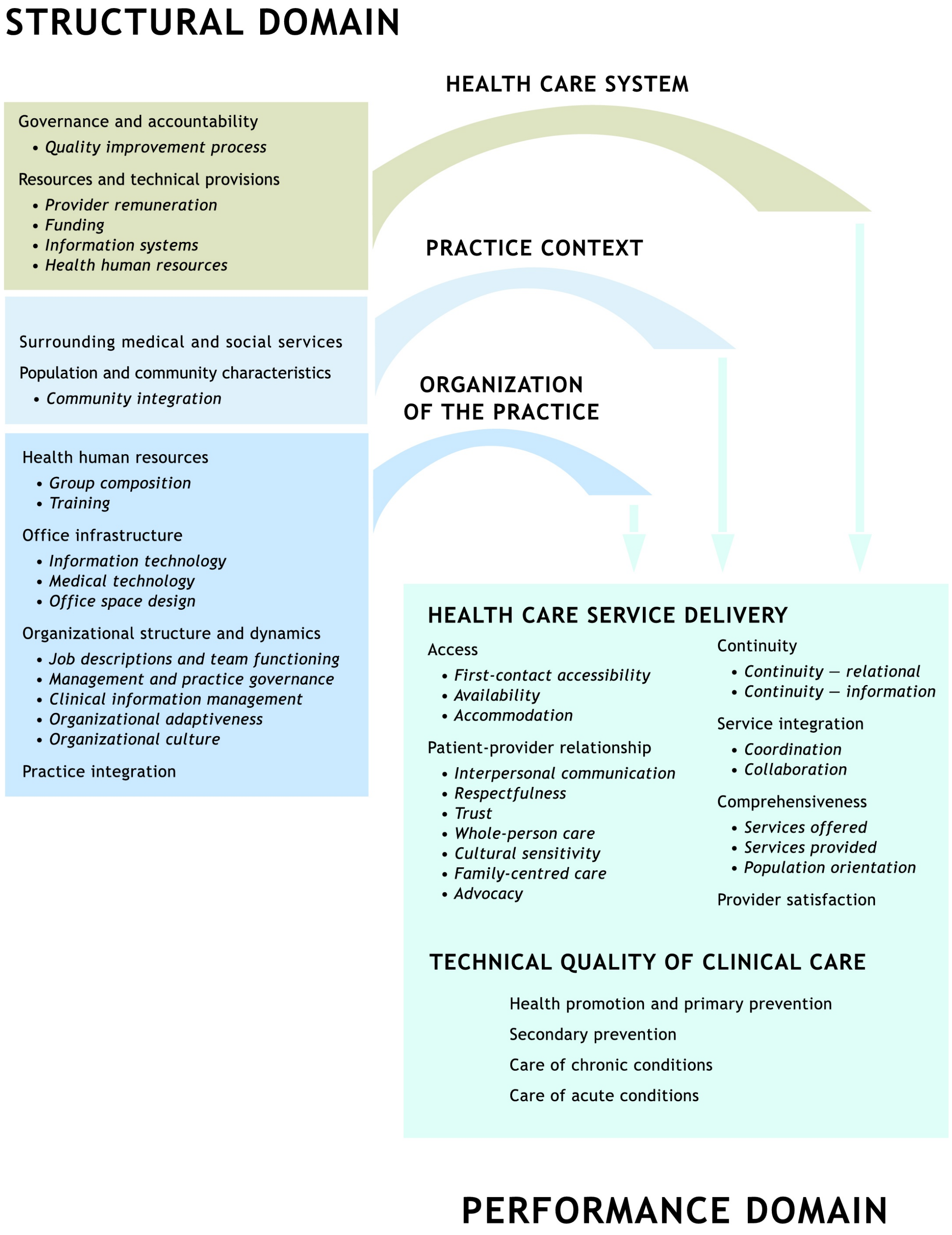
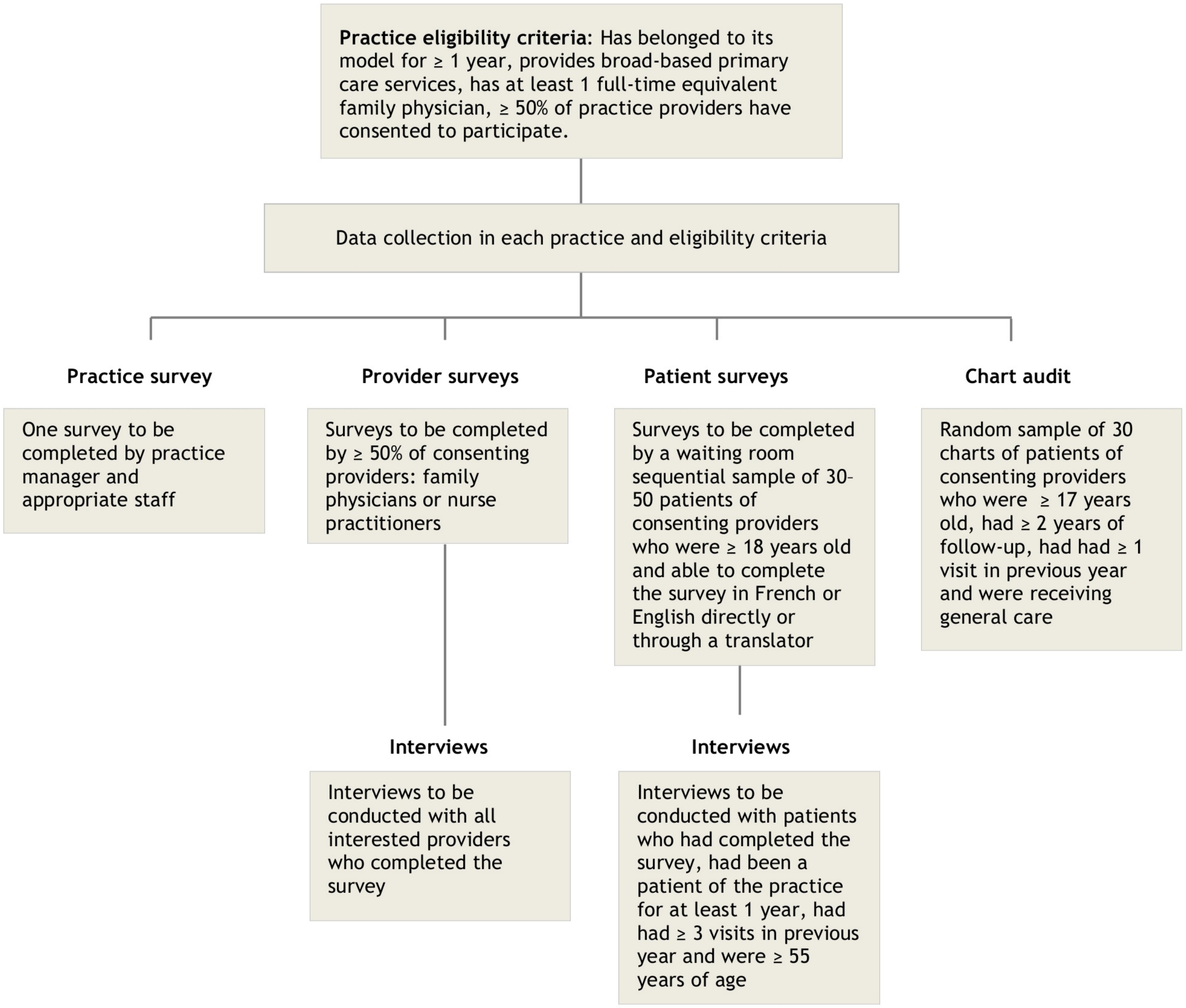


Figure 1: Conceptual framework for primary care organizations. Adapted from Hogg W, Rowan M, Russell G, Geneau R, Muldoon, L. A conceptual framework for primary care: the importance of a structural domain. *International Journal for Quality in Health Care* 2008;20(5):308-313. Used with permission of the journal and Oxford University Press.



Practice eligibility criteria: Has belonged to its model for ≥ 1 year, provides broad-based primary care services, has at least 1 full-time equivalent family physician, ≥ 50% of practice providers have consented to participate.

Data collection in each practice and eligibility criteria

Practice survey

One survey to be completed by practice manager and appropriate staff

Provider surveys

Surveys to be completed by ≥ 50% of consenting providers: family physicians or nurse practitioners

Patient surveys

Surveys to be completed by a waiting room sequential sample of 30-50 patients of consenting providers who were ≥ 18 years old and able to complete the survey in French or English directly or through a translator

Chart audit

Random sample of 30 charts of patients of consenting providers who were ≥ 17 years old, had ≥ 2 years of follow-up, had had ≥ 1 visit in previous year and were receiving general care

Interviews

Interviews to be conducted with all interested providers who completed the survey

Interviews

Interviews to be conducted with patients who had completed the survey, had been a patient of the practice for at least 1 year, had had ≥ 3 visits in previous year and were ≥ 55 years of age

Figure 2: Practice-based study recruitement and eligibiity flow chart. Two sites per model (a total of 8 practices) were selected for the in-depth qualitative assessment (the interview phase). In these practices, we interviewed a total of 40 family physicians, 6 nurse practitioners and 24 patients.

Table 1: Scales and indicators

	Attribute	Data source			Scales and indicators (source)
		Pr	Pt	C	
STRUCTURAL DOMAIN — ORGANIZATION					
1	**Health care system**				
1.1	Governance and accountability				Qualitative evaluation
1.2	Resources and technical provisions	X			Provider remuneration (IH)
2	**Practice context**				
2.1	Surrounding medical and social services	X			Types of and distance to institutions and professionals servicing the community (IH)
		X	X	X	Patient sociodemographic and economic information (adapted from PCAT) and patient health status (PCAS)
2.2	Population and community characteristics	X			Team structure and sociodemographic characteristics (IH)
3	**Organization of the practice**				
3.1	Health human resources	X			Provider sociodemographic information (IH) Practice staffing and structure (IH)
3.2	Office infrastructure	X			Information technologies implemented (adapted from National Physician Survey)[1]
3.3	Organizational structure and dynamics	X			Duration of operation as a practice and within its model (IH) Roles and responsibilities at the site and extent of sharing resources (adapted from National Physician Survey)[1] Duration of regular visit, hours of operation, provider payment structure, revenues and operation costs (IH) Quality control audits
				X	Chart organization (IH)
PERFORMANCE DOMAIN — OUTCOME					
1	**Quality of health care service delivery**				
1.1	Access	X	X		First contact accessibility scales (PCAT)
			X		First contact utilization scale (PCAT) Duration of today's consultation (IH)
		X			Practice accepting new patients (IH) Duration of routine visit (IH) Hours of operation and on-call hours (IH) Disability access (IH)
1.2	Patient-provider relationship		X		Humanism scale[2] Trust scale[3] Wait time in clinic (IH)
		X	X		Cultural competency scales (PCAT) Family centredness scales (PCAT)

Attribute		Data source			Scales and indicators (source)
		Pr	Pt	C	
1.3	Continuity		X		Ongoing care scale (PCAT) Relationship with practice and provider (IH)
1.4	Service integration	X			Coordination scale (PCAT) Coordination: information system scale (PCAT) Extent of sharing resources (adapted from National Physician Survey)[1]
1.5	Comprehensiveness	X			Services offered (PCAT) Community orientation scale: reach out (PCAT) Community orientation scale: needs assessment (PCAT) Community orientation scale: monitor (PCAT)
		X	X		Community orientation scale (PCAT)
			X		Reason for visit (IH)
1.6	Provider satisfaction	X			Provider satisfaction scale (National Physician Survey)[1] Remuneration preferences (IH)
2	**Technical quality of clinical care delivery**				
2.1	Chronic disease management			X	Manoeuvres performed in adherence with recommended guidelines: • Coronary artery disease: aspirin, beta blocker, statins • Diabetes: HbA_1C test frequency, angiotensin-converting enzyme inhibitor or angiotension receptor blocker, seen by an ophthalmologist or optometrist, feet checked or patient referred to a chiropodist or podiatrist • Congestive heart failure: angiotensin-converting enzyme inhibitor or angiotension receptor blocker, beta blocker Intermediate clinical outcomes: • Hypertension: blood pressure results • Diabetes: HbA_1C result
2.2	Disease prevention			X	Manoeuvres performed in adherence with recommended guidelines: • High risk for influenza: influenza vaccine • 50 years of age or older: colorectal cancer screening by sigmoidoscopy or hemoccult stool test • Females 50—69 years of age: breast cancer screening by mammography and clinical examination • Females under 60 years of age: cervical screening • 65 years of age or older: clinical hearing examination • 65 years of age or older: screening for visual impairment
2.3	Health promotion		X		Subjects discussed at that visit in adherence with recommended guidelines: • Healthy foods and unhealthy foods • Home safety, such as getting and checking smoke detectors and storing medicines safely • Family conflicts • Exercise • Check and discussion of the medications the patient is taking • Tobacco, smoking • Alcohol consumption • Fall prevention

Attribute		Data source			Scales and indicators (source)
		Pr	Pt	C	
2.4	Management of acute conditions			X	Appropriate prescription of antibiotic in adherence with recommended guidelines: • Sore throat • Urinary tract infection

IH = questions developed in house, PCAT = Primary Care Assessment Tool, PCAS = Primary Care Assessment Survey.

This table shows the indicators and scales used in the quantitative evaluation of the models. Assessment of the various attributes of the structural domain was principally informed by the qualitative evaluation. The performance domain was measured through surveys and chart abstractions (Pr = practice or provider survey, Pt = patient survey, C = chart). Most health service delivery attributes were measured using the PCAT scales. The instruments were supplemented with questions designed specifically for this study. The technical quality of care delivery was assessed by comparing the extent to which the care delivered was consistent with recommended guidelines for the management of patients in primary care.

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Table 2: Study participation rate by model

Variable	CHC	HSO	FHN	FFS	Overall
Practices					
Approached, no.	53	69	104	197	423
Eligible, no.	51	65	94	155	365
Participated, no.	35	32	35	35	137
Response rate, %	69	49	37	23	45
Providers					
Participated,* no.	182	42	81	58	363
Patients					
Eligible, no.	1591	1590	1583	1758	6522
Participated, no.	1219	1273	1494	1375	5361
Response rate, %	77	80	94	78	82
Chart abstraction	1050	958	1050	1050	4108

CHC = community health centre, HSO = health service organization, FHN = family health network, FFS = traditional fee-for-service and family health group.

[*] Provider recruitment was relinquished to the practice manager. We did not track the actual participation rate other than to ensure it was at least 50%.

through a translator. Patients participating in the qualitative component of the study were also required to have been patients of the practice for at least 1 year and to have attended at least 3 appointments. We gave preference to those 55 years of age or older.

Sampling strategies and recruitment. Following a prepared script, receptionists introduced the study and handed an invitation letter to all patients presenting for their appointment on the day of survey administration. Using another prepared script, the survey administrator provided more detailed information about the study, verified whether the patient met the full set of eligibility criteria and invited eligible patients to participate. In practices participating in the qualitative component of the study, the survey administrator invited patients who had completed surveys to take part in an in-depth interview at a later date, until 6–8 agreed.

Chart audit

Eligibility. Chart abstraction was limited to the charts of regular patients of consenting care providers who were 17 years of age or older at the time of their last visit and had at least 2 years of information, with at least 1 visit in the previous year. Patients were excluded if they had died or had left the practice in the previous 2 years, had used the practice for specialized services only (e.g., foot care), were known to the chart abstractor or were staff members of the practice.

Random selection. In practices with paper-based charting, the total length of the shelves containing the charts was divided into 60 "similar distance" sections, and the fifth chart from the start of each section was retrieved for evaluation. In practices with electronic medical records, a random-number generator produced a list of 100 practice patients. In each case the chart abstractor reviewed eligibility sequentially until 30 eligible charts were identified for review.

Data collection tools. We used a theory-based evaluation framework to identify the dimensions of care that should be addressed and to help select the tools used for the evaluation.[5] The process involved a review of the literature and consultation with stakeholders and experts in the field to develop the theory underpinning the approach. As a result, we developed a conceptual framework that identified key areas to measure;[6] established program logic models for each practice model that provided a detailed visualization of the link between organizational attributes, activities and performance; and produced a mapping document to guide the tool selection.

Quantitative component. The quantitative data collection tools comprised 3 surveys and a chart abstraction form. The surveys were modified from the adult edition of the Primary Care Assessment Tool (PCAT), full or abridged version. The PCAT is an instrument developed to measure the quality of primary care services. The full version of the PCAT was validated in 2001.[11,12] We selected this tool because of the high degree of congruency between the dimensions it addresses and those set out in our conceptual framework and because the instrument allows the perceptions of patients and providers to be measured. To maintain the validity of the original tool, which was developed in the US, modifications were kept to a minimum and primarily reflected the differences in context between the US and Ontario settings. To minimize the burden on providers in group practices, a subset of questions from the provider survey addressing practice factors common to all of the providers in a given practice was moved to a practice survey.

The content of the PCAT was mapped to the dimensions of the conceptual framework, and where deficiencies were noted the tool was supplemented with questions from the National Physician Survey and other studies[9,13-15] or with questions developed by the investigators. Copies of the surveys are available from the authors upon request. Details of the scales and indicators used in this evaluation are shown in Table 1.

Practice survey. The practice survey was divided into 3 sections. The first focused on the description of the practice environment including the setting, hours of operation, availability of medical and social services in the surrounding area and accessibility for disabled persons. The second section contained questions that measured performance (see Table 1). The third section captured various practice attributes, including governance, team structure, extent of information technology adoption and economic information (e.g., sources of income, salaries and operating costs).

Provider survey. The provider survey was divided into 2 sections. The first section contained questions measuring the provider's perception of practice performance on several dimensions of health care service delivery (see Table 1). The second section captured provider demographic information, information on their work setting and socio-economic information.

Patient survey. The patient survey was divided into 2 sections. The first section was completed in the waiting room before the visit with the provider. This section captured patient sociodemographic and economic information and elicited the patient's experience concerning a broad range of dimensions of health care service delivery as shown in Table 1. The second section, completed after the appointment with the provider, took less than 5 minutes to answer and captured visit-specific information, including waiting time, visit duration and measures of activities related to health promotion.

The survey was developed in English and translated to French through an extensive iterative translation process. The French version was validated against the English version on a sample of 120 bilingual individuals.[15] We made the tool available in French and English only and relied on the services of translators to reach patients who spoke neither language.

Chart audit. The chart audit forms captured 4 thematic areas: patient demographic information; visit activities, including referrals, prescriptions and orders; chart organization; and measures of performance of technical quality of care, including prevention, chronic disease management and acute disease management. We evaluated performance of technical quality of care by comparing the care provided with established guidelines for prevention, chronic disease management and acute disease management.

Qualitative component. We used the conceptual framework to define the topics and questions to be covered during qualitative data collection. At the case study sites at least 2 physicians and at least 1 nurse practitioner (if available) were interviewed. The interview guide for providers contained questions about the influence of organizational characteristics (e.g., remuneration scheme), processes (e.g., teamwork, inter-professional collaboration) and clinical routines on service delivery. The interview guide for patients focused on their experience with the practice associated with the dimensions of accessibility, continuity, coordination and comprehensiveness of care. The interviews with key informants focused on qualitative comparisons of the 4 models studied in relation to broad issues such as governance, accountability and performance measurement in primary care.

Quality control. All tools were piloted before the start of the study. A full description of the piloting process can be found in Appendix 1. Data entry verification was performed for all 4 tools, and the accuracy with which the results of the practice and provider survey were recorded was enhanced by double data entry. Chart audit validation was performed twice during the study. At each verification, chart abstractors were informed of their errors and received additional focused training then and throughout the study. Data were exported into SPSS and verified for internal consistency, missing information and outliers. Queried data were verified against the hard copy of the data collection tools. The validity of the qualitative findings was verified using naturalistic inquiries.[16] We also engaged in member-checking procedures to establish the credibility of our findings. Finally, the use of data triangulation techniques increased the construct validity of our measures for the performance domain (for both the quantitative and qualitative components). Additional details concerning the quality control processes are available in Appendix 1.

Study processes. This study involved a wide range of personnel from various backgrounds over a 3-year period and required significant organizational preparation. Details of the study team composition and study processes are available in Appendix 2.

Stakeholder advisory meeting. A stakeholder advisory committee comprised of 2 members from each model, Ministry of Health and Long-Term Care representatives, a community member and study team members met twice during the study. The committee's goals were for its members to serve as conduits between their representative group and the study team, to ensure transparency of the study process, to guide the evaluation plan and interpretation of results, and to participate in outcome dissemination.

Planned analyses. The study captures 2 types of data, 1 describing the practice structure and the other the practice performance (see Table 1). The study will use multi-level analyses to compare the performance of the models studied across the performance dimensions. It will also rely on the large number of structural attributes described for each practice to assess their impact on performance by evaluating their association with better performance. For example, we will evaluate whether a difference in first contact accessibility exists between models and then identify the components of the practice structure that are associated with better first contact accessibility across all models. In these analyses, provider information will be aggregated to the practice level, and patient level information (from surveys and chart abstraction) will be linked to the practice and provider data, allowing a hierarchical approach to data analysis accounting for intra-cluster correlations.[7] We captured measures of the quality of health service delivery as well as measures of the technical quality of care in the sample practices. Our analyses will also allow us to understand the relationship between the 2 within a practice.

Results

The study was successful in recruiting its intended number of practices (35) in all practice types except HSOs (32) (Table 2) and involved 8 practices in the qualitative evaluation. FFS–FHG practices were the most difficult ones to recruit (participation rate of 23%). We compared the profiles of the recruited family physicians with the profiles of all Ontario family physicians practising in these models to determine if there was selection bias related to practice refusal or provider

Table 3: Practice representativeness by model

Characteristic	FFS Study *n* = 58	FFS ICES *n* = 9055	FHN Study *n* = 80	FHN ICES *n* = 590	CHC Study *n* = 108	CHC ICES *n* = 186	HSO Study *n* = 42	HSO ICES *n* = 165
Provider demographic profile								
Male, %	52	66	60	65	42	51	74	73
Years since graduation, mean	22	26	23	22	19	19	29	28
Foreign trained, %	17.2	21.8	2.5	10.5	9.3	9.7	14.3	9.1
Rural, %	12	10	21	33	—	—	—	—
Provider work profile*								
Total visits, no.	5873	5389	4893	5329	—	—	—	—
Emergency visits, no.	265	199	180	331	—	—	—	—
Office visits, no.	5201	4651	4145	4279	—	—	—	—
Total payments (x 1000)	$192	$188	$140	$162	—	—	—	—

The sample sizes in the column headings represent the number of providers.

FFS = traditional fee-for-service and family health group, FHN = family health network, CHC = community health centre, HSO = health service organization, ICES = Institute for Clinical Evaluative Sciences.

* To create this profile, virtual patient rosters were built in the administrative databases in which patients were assigned to a practice if at least 50% of the billing associated with their care was submitted by a provider at that practice. These workload data were based on the period from Apr. 1, 2004, to Mar. 31, 2006.

Table 4: CHC patient representativeness

Sociodemographic factor	Study	CHC database
Age, yr (mean)	48.6	46.2
Female, %	71	50
Born in Canada, %	69	67
Duration in Canada, yr (mean)	18	13
Education, %		
No formal education	1	10
Primary or secondary	56	55
Post-secondary	43	36
Household income, %		
$0–$14 900	25	37
$15 000–$34 900	26	23
> $35 000	49	40
Single-person household, %	16	14
Insurance coverage, %		
Insured in Ontario (includes insured in Canada)	92	91
Uninsured	8	9

CHC = community health centre. Fourteen CHC practices participated in this evaluation. The table shows the sociodemographic factors of all patients in these 14 practices and of the patients participating in the study from these same practices.

Table 5: Extent of scale completion

Scale	% evaluable Pr	% evaluable Pt
Access		
First contact accessibility scales	100	94
First contact utilization scale	–	99
Patient-provider relationship		
Humanism scale	–	99
Trust scale	–	98
Cultural competency scales	99	89
Family centredness scales	100	96
Continuity		
Ongoing care scale	–	99
Service integration		
Coordination scale	100	–
Coordination: information system scale (PCAT)	100	–
Comprehensiveness		
Services offered (PCAT)	100	–
Community orientation scale: reach out	97	–
Community orientation scale: needs assessment	96	–
Community orientation scale: monitor	98	–
Community orientation scales	100	72
Provider satisfaction		
Provider satisfaction scale	100	–
Technical quality of clinical care delivery		
Health promotion	–	91
Overall average	99	93

Pr = scale included in the provider or practice survey, Pt = scale completed by the patient, PCAT = Primary Care Assessment Tool.

self-selection. We relied on the information contained in the physician workforce database and in the Ontario Health Insurance Plan (OHIP) billing database housed at ICES. The former allowed evaluation of provider demographic profiles, and the latter provided billing parameters that allowed us to compare the FFS–FHG and FHN practices only (these models rely on Ministry of Health and Long-Term Care billing for their remuneration). These comparisons showed that our sample is broadly representative for all characteristics measured in these databases (Table 3).

We compared the sociodemographic information of the CHC patients participating in the study with that of all CHC patients listed in the CHC practice electronic patient registration database to evaluate whether there was systematic bias in the selection of respondents from the CHCs (Table 4). CHC is the model most likely to serve individuals who are housebound or have language barriers and therefore less likely to have been reached in this study than patients from the other practice types. As anticipated, the waiting room sample was older and more likely to be female than the overall practice population, reflecting the profile of those who make more use of primary care services. The study sampling was not successful in reaching individuals without a formal education and those with lower income.

Survey questionnaires were not modified after the start of the study. All practices and all but 2 consenting providers completed the survey. The overall patient participation rate was 82%, with most scales adequately completed for evaluation (Table 5).

Discussion

We measured performance across a large number of primary care attributes to obtain a comprehensive picture of status of family care in Ontario. We evaluated dimensions of health service delivery and technical quality of care in the same practices. The study was complex and care was taken to ensure the quality of the data collected and to minimize disruption to the practices. At the study onset, much work was invested in ensuring that appropriate evaluation tools were used. Throughout the study, we focused on enhancing practice and patient recruitment, establishing dependable processes for data collection, verifying data quality and training and supporting personnel.

The study was successful in collecting data from 137 primary care practices for a multi-dimensional evaluation. The limitations of this mixed-methods study stem largely from the problems inherent in cross-sectional and survey-based studies. These include participant selection bias and the inability to infer causation from observed associations. Other study-specific factors are discussed below.

Sample selection. Sample selection was limited by our ability to identify all practices within a model, the geographic boundaries we established for data collection and the fact that patient recruitment was limited to those attending the practice. There was no accessible central source of reliable practice lists within each model, except for CHCs. In addition, late in 2004 the Ontario Ministry of Health and Long-Term Care instituted a new model of care, the FHG, to which FFS practices could transition. We initially excluded FHG practices, but FFS practices converted to this new model quickly; by early 2006 most FFS practices had become FHGs and it became evident that the great majority would transition by the year end. As a result, 3 months before recruitment was terminated, a decision was made to include the FFS practices that had transitioned to FHGs. Although a concerted effort was made to return to those practices initially deemed ineligible because they had converted into an FHG, not all attempts were successful, so we cannot ignore this potential source of bias toward late adopters within this subset.

The geographic boundaries set by the study resulted in the exclusion of the most northern territories of the province. These areas serve a more marginalized population living under very different conditions and for whom the experience of primary care services is not reflected by the study sample. Our study's findings cannot be extrapolated to that group.

Finally, we chose to administer the patient survey to those patients visiting the practice on a given day. This face-to-face approach is expected to have enhanced our response rate (compared with what might have been expected with a telephone or mailed questionnaire approach) but resulted in an overrepresentation of those more likely to frequent the practice. Therefore, the sample does not represent the general practice population, nor did it reach housebound patients. Rather it is weighted, perhaps appropriately so, by the frequency of visits.

In contrast, the chart-based assessment of the technical quality of care was based on a random selection of records so that the results could be generalizable to the practice level. An alternative strategy would have been to review the charts associated with the patients surveyed. Although that approach would have allowed the relationship between the quality of health service delivery and technical quality of care to be assessed at the individual patient level, the estimates of care level would have been biased toward those attending the practice more frequently.

Data. Although the original PCAT tool had been validated,[12] for some scales we relied on the nonvalidated abridged version of a validated scale. We made the tool available in 2 languages only (French and English) and used the services of translators to reach patients who spoke neither of these languages. Although we felt it was essential to capture the essence of the experience of patients from linguistic minority groups, the use of an intermediary allows for biases or inconsistencies to be introduced during the translation process.

Ideally, the selection of practices for the case study would have been informed by the results of the quantitative surveys concerning the quality-of-care indicators. This would have allowed us to select negative or deviant cases within each model for in-depth analyses. However, because of time constraints, sites were invited to participate in both components (quantitative and qualitative) of the onset of the study.

Participation. This study was conducted at a time when Ontario primary care practices were saturated with government-sponsored studies, which likely contributed to the suboptimal participation rate. The practice response rate was best in models from which we obtained support from their central organizational group (CHC and HSO). Despite lower participation rates in FFS–FHG and FHN practices, comparative data suggest that the study population was adequately representative. All but 1 scale had completion rates of 94% or higher.

We compared the study patient population with the general practice population in CHCs and found that CHC participants were older, more likely to be female, had completed a higher level of education and had a higher income than the general CHC population. In Canada older people, women and people with higher socio-economic status are more likely to visit their family physician, and thus these differences between the CHC patients surveyed and those served in CHCs may be related to our waiting room sampling approach rather than participation bias.[17]

Conclusions

This is the first comprehensive pan-Ontario evaluation of models of primary care. The breadth of data collected will allow an in-depth description of the practices belonging to each model type. An evaluation of the practice factors (organizational features and practice attributes) associated with better performing practices should help inform policy-makers about optimal features in primary care practices and shoud help inform practice managers about how best to structure their practices to serve their disadvantaged patients. This article may also be useful to researchers interested in investigating issues related to quality of care and organizational performance in primary care.

Contributors: Simone Dahrouge participated in finalizing the study methodology, managed the quantitative component and was the principal writer of the manuscript. William Hogg conceived the project, oversaw the data collection and analysis and participated in all phases of the writing. Grant Russell helped implement the study, worked on finalizing the methodology and contributed to the writing and editing of the manuscript. Robert Geneau described the qualitative methods used in the study and reviewed all manuscript drafts. Elizabeth Kristjansson participated in editing and reviewing manuscript drafts. Laura Muldoon conceived the study and oversaw its implementation and participated in the writing of the manuscript. Sharon Johnston helped guide the analysis and participated in the writing. All of the authors approved the final version of the manuscript.

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Appendix 1: Quality control processes

Tool piloting

Drafts of the surveys were reviewed and piloted iteratively by members of the study team until general consensus was reached about tool readiness. External piloting of the surveys and chart audit took place between July and October 2005 and involved 6 practices in the Ottawa area: 2 FFS practices, 2 FHGs, 1 FHN and 1 CHC. The practices were recruited sequentially, allowing for adjustments to be made to the study tools in response to the results from the previous site piloted. At each site 1 practice survey was completed, 30 patients were surveyed and 30 charts were reviewed. In total, 18 consenting physicians completed the provider survey.

The piloting process identified a number of issues that allowed us to refine the chart audit, to clarify some survey questions and to streamline the process. Most of the changes were to the questions that had been added to the instrument by the study team. We modified a validated scale only when absolutely necessary. Smaller numbers of concerns were raised at successive iterations of the tools; the iterative process was stopped when no new issues were identified. Two of the pilot sites (1 CHC and 1 FHN) were also visited by the qualitative researchers to validate the provider and patient interview guides.

Validation of survey data entry

Survey administrators administered the patient surveys and entered the data into a web-based program. In certain sites, they also recruited patients for the qualitative component. Chart abstractors were responsible for distributing the provider and practice surveys and performing the chart audit and its web-based data entry. Shortly after we initiated data collection, a research associate performed duplicate data entry for patient surveys and chart audits for 8 sites to estimate data-entry error rates for all chart abstractors and survey administrators. Error rates were 1.3%, 1.4%, 4.4% and 0.33% for patient, provider and practice surveys and chart audits, respectively. A substantial proportion of the discrepancies observed in the survey data related to the assignment of "0" by the survey administrators in numeric fields where no data had been recorded on the form. Detailed feedback and instructions were provided to all personnel involved in data entry. To ensure that high-quality data were collected, at the end of the study the data from all provider and practice surveys were re-entered by another research associate (double data entry) and errors were corrected. A final random verification of the data entry for the patient surveys found that the overall error rate had dropped to 0.5%.

Chart audit validation

Seven chart abstractors performed chart abstractions at 137 practices. Because this process is rather complex and prone to human error, a review process was set up to ensure the quality and consistency of data extraction. The abstractors were informed that validation would take place throughout the study and were required to maintain for that purpose a list of the charts they had reviewed at each practice. Validation involved duplication of the entire data extraction for 8 charts. We defined levels of error and took action according to the extent to which these errors were observed. An error that led to the failure to recognize eligibility for more than one manoeuvre (e.g., age miscalculated, chronic disease not recognized) was considered most significant (level 1). A level 2 error was defined as a missing visit record or incorrect attribution of eligibility that led to a single manoeuvre or sub-question being missed. All other coding errors were considered minor. The presence of at least one level 1 error or two level 2 errors was considered a significant problem and led to the validation of all the remaining charts that had been reviewed at that practice. Errors encountered were corrected on the data collection form. The chart abstractors were informed of their errors, and this opportunity was used for further general training. The abstractors also received ongoing training and support throughout the chart abstraction process.

The first round of validation was performed very shortly after the start of the study and involved the first 2 sites completed by each of the 7 chart abstractors. At that time, level 2 errors (at least 2) were identified in the charts of 2 abstractors. The second round of validation occurred during the winter of 2006. At that time, 6 abstractors were active; again 2 sites were randomly selected for each abstractor and the same procedure was followed. No significant problems were encountered.

Qualitative component

We used several procedures to ensure the validity of the qualitative findings. We adopted the criteria defined by Lincoln and Guba for naturalistic inquiries.[16] First, we offered a detailed description of each site and of each primary health care model. Providing a thick description is one of the key characteristics leading to the transferability of qualitative results to other contexts.[17] Second, we asked external peer reviewers to critique and challenge our research design, analytic strategy and interpretation of findings to increase the level of dependability of our study. We also engaged in member-checking procedures to establish the credibility of our findings by sending our case study reports to members of the 8 participating sites. The key informants were also asked to review a draft copy of the final report. Finally, the use of data triangulation techniques increased the construct validity of our measures for the performance domain (for both the quantitative and qualitative components). We blended qualitative and quantitative approaches to answer the research questions and reach consistent and valid conclusions. This approach also allowed us to verify the validity of the constructs addressed in the quantitative survey.

Appendix 2: Study processes

Two goals directed our study process: data quality and minimal practice disruption.

Data quality

Personnel training. The survey administrators received a half-day of training at a central location and were then paired with an experienced survey administrator for 2–3 days of fieldwork at 1 practice. The chart abstractors received 2 days of training at a central location and then carried out 1 day of fieldwork with an experienced chart abstractor. Each group was guided by a detailed instruction manual. Data collectors were also provided with a toll-free telephone number for the project team so that they could call if they had any questions or needed to report problems encountered in the field. Instruction manuals were revised periodically to reflect new information and were re-disseminated to the data collectors.

Data collection processes. At the first visit to the practice, the chart abstractor met with the office manager (and, when possible, the participating providers) to distribute and review the content of the practice and provider surveys and to offer assistance in interpreting the questions. If a survey was not completed during the data collection period in the practice, it was left with the respondent together with a cover letter and a self-addressed, postage-paid return envelope. A research assistant telephoned non-responders after 2 weeks, and, when required, this was followed by the mailing of a second (and, if necessary, third) copy of the survey package. The site received financial compensation only when all surveys had been returned and data collection completed. To increase the rate of completion of patient surveys, the survey administrators were available to answer patient questions and ensure that patients leaving the office completed the post-visit survey.

Chart abstractors were required to familiarize themselves with the charting system of each practice and inquire about all potential sources of clinical information, including electronic and paper-based medical records, registries of influenza vaccinations, medication lists and laboratory results.

All patients and providers participating in semi-structured interviews had first completed the survey. Our early access to quantitative data allowed us to customize to some extent the interview guide for each respondent. The providers' interviews focused on interrelationships between the organizational structures and processes, the practice context and the various dimensions of quality of care. The interviews with patients explored their experience receiving health care whereas those with key informants emphasized macro level issues such as governance and accountability. The average interview duration was 90 minutes.

Data entry. We used a web-based clinical data management tool (TrialStat Corporation, Ottawa, Ont.) to store all quantitative data. The customized electronic data capture forms contained rules for data entry validation (ranges, missing information and internal consistency [i.e., congruence between the data entered in related fields]) so as to minimize data entry errors. The survey administrators and chart abstractors entered the results of the surveys and chart audits, respectively, into the system from remote locations. Variable fields, labels and data were then exported directly into SPSS (SPSS Inc., Chicago, Ill.) for analysis. Data entry validation (targeting all chart abstractors and survey administrators) was performed by a research associate. All qualitative interviews were transcribed verbatim using Microsoft Word and were then validated and imported into N6 (QSR International, Doncaster, Victoria, Australia) for analysis.

Minimum disruption to the practice

To minimize disruption to the practice and to ensure a seamless effort, the data collectors received relevant information for each site, including the type of facility, contact information, participating providers and the best day and time to call. The chart abstractor and survey administrator coordinated the logistics of their data collection efforts before contacting the site. One team member was assigned to be the point of contact with the practice, and the 2 team members maintained contact with each other throughout the data collection period. Survey administration and chart abstraction required an average of 31 and 20 hours per practice, respectively.

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An evaluation of gender equity in different models of primary care practices in Ontario

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Abstract

Background: The World Health Organization calls for more work evaluating the effect of health care reforms on gender equity in developed countries. We performed this evaluation in Ontario, Canada where primary care models resulting from reforms co-exist.

Methods: This cross sectional study of primary care practices uses data collected in 2005-2006. Healthcare service models included in the study consist of fee for service (FFS) based, salaried, and capitation based. We compared the quality of care delivered to women and men in practices of each model. We performed multi-level, multivariate regressions adjusting for patient socio-demographic and economic factors to evaluate vertical equity, and adjusting for these and health factors in evaluating horizontal equity. We measured seven dimensions of health service delivery (e.g. accessibility and continuity) and three dimensions of quality of care using patient surveys (n = 5,361) and chart abstractions (n = 4,108).

Results: Health service delivery measures were comparable in women and men, with differences ≤ 2.2% in all seven dimensions and in all models. Significant gender differences in the health promotion subjects addressed were observed. Female specific preventive manoeuvres were more likely to be performed than other preventive care. Men attending FFS practices were more likely to receive influenza immunization than women (Adjusted odds ratio: 1.75, 95% confidence intervals (CI) 1.05, 2.92). There was no difference in the other three prevention indicators. FFS practices were also more likely to provide recommended care for chronic diseases to men than women (Adjusted difference of -11.2%, CI -21.7, -0.8). A similar trend was observed in Community Health Centers (CHC).

Conclusions: The observed differences in the type of health promotion subjects discussed are likely an appropriate response to the differential healthcare needs between genders. Chronic disease care is non equitable in FFS but not in capitation based models. We recommend that efforts to monitor and address gender based differences in the delivery of chronic disease management in primary care be pursued.

Background

Primary care is the foundation of the Canadian health care system. Recent Canadian [1] and international policy recommendations [2] have emphasised the need for investments in primary health care systems to improve efficiencies and reduce inequities. There is convincing evidence that stronger primary health care systems can reduce disparities in health between regions [3]. However few studies have investigated whether the organization of the primary care system impacts on equitable care across individuals.

Evaluations of equity can be seen from two perspectives. Vertical equity addresses whether treatment is preferentially delivered to those with greater health needs, while horizontal equity considers whether there is the provision of equal treatment for equivalent needs [4]. For example, vertical equity would dictate that an individual with multiple health problems should receive greater care than a healthy individual, while horizontal equity would require that two individuals with similar health status receive similar care levels regardless, for

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example, of their socio-economic status. Both paradigms are important to consider.

Ontario, Canada's largest province, organises primary care practices under different "models of care", most of which emerged following a series of provincial initiatives over the past four decades that aim to build a more accessible, patient oriented system and eliminate the barriers inherent in the traditional Fee For Service (FFS) model [5]. The first attempts at reforming primary care came with the introduction of Community Health Centres (CHC) and Health Service Organizations (HSO) in the 1970s. CHCs are a community orientated model in which providers are salaried. Integral in many CHCs' mission statement are the notions of social justice and equity [6-8]. HSO is a capitation based model; a payment structure that offers a fixed monthly remuneration fee based on the age and sex of enrolled patients for basic primary care services, regardless of the number of services provided [9]. A second capitation model which also offered additional accessibility and comprehensiveness incentives, Family Health Networks, (FHNs) was established in the early 2000s. Because compensation in capitation based practices is dissociated from visit number, proponents of this type of remuneration approach expect care to be more equitably dispensed; in response to need with reduced concerns over output. In fact, primary care capitation based funding was recently introduced in New Zealand [10] and Thailand [11] in part in an effort to reduce inequities. Today, capitation based practices and CHCs serve approximately 40%, and 3%, respectively of the population in Ontario.

Some studies have evaluated the impact of these reforms on the quality of the care delivered, [12,13] but none have studied their impact on the equitable delivery of care. In a recent review, the World Health Organization calls for more work evaluating the effect of health care reforms on gender equity [14]. This study evaluates whether gender differences in the primary care experience in each model exist and whether the extent of gender differences between models differs. This study is part of a larger evaluation exploring the impact of primary care reforms on equity.

Methods

Design

This study uses data from a cross sectional study conducted in Ontario, Canada in 2005-6; the Comparison of Models in Primary Care (COMP-PC) [15]. Data were gathered from primary care practices, providers (family physicians and nurse practitioners) and patients receiving care at these practices. A detailed description of the overall study methodology is available elsewhere. The study was approved by the Ottawa Hospital Research Ethics Board.

Sample

The COMP-PC study evaluated the performance of FFS, CHC, HSO, and FHN across a number of domains. Table 1 summarizes key features of each model. The study had a recruitment strategy stratified by model. Randomly selected eligible FFS practices (n = 155) and all (n) known and eligible CHC (51), HSO (65), and FHN (94) practices were approached for participation. Recruitment was closed when 35 practices per model agreed to participate or when time constraints didn't permit further recruitment.

Data collection

The study recruited 137 practices, surveyed 5,361 patients in the waiting room sequentially (response rate: 82%) as they presented for their appointment ("index visit") and performed a review of 4,108 randomly/systematically selected charts. Those patients not participating in the survey most frequently sited a lack of time to participate. Surveyed patients (30-50/practice) were required to be under the care of one of the participating providers, aged 18 years or older, not severely ill or cognitively impaired, and able to communicate in English or French either directly or through a translator. Charts reviewed were limited to those of patients ages 18 years and older who had been with the practice at least two years.

Instruments

Surveys were adapted from the Primary Care Assessment Tool (PCAT)-Adult edition[16,17] and supplemented with two additional scales [18,19]. The patient survey was divided into two sections. The first was completed in the waiting room before the encounter with the provider and captured socio-demographic and economic information, and elicited patient's experience on the quality of health service delivery. The second was completed after the appointment with the provider and captured visit-specific information, including a measure of health promotion activity. The survey tool was available in English and French [20]. Translators were used in practices in which a significant proportion of the population was expected to have limited or no English or French language skills.

The chart audit collected patient sex, age, and insurance status and measured preventive care and chronic disease management by comparing chart documentation of these activities against recommended guidelines. We measured the provider's recommendation for a manoeuvre rather than patient compliance, and coded it as "done" if it was performed or recommended/discussed even it not done.

Table 1 Ontario's main primary care models in 2005/2006.

	Community Health Centre (CHC)	Fee for service (FFS)		Family Health Network (FHN)	Health Service Organization (HSO)
		Traditional Fee for Service	Family Health Groups (FHG)[1]		
Year introduced	1970s	-	2004	2001	1970s
Group size	Groups practice - Unspecified size	1 Physician	Minimum 3	Minimum 3	Minimum 3
Physician remuneration	Salary	FFS	FFS and incentives	Capitation[2] with a 10% FFS component, and incentives	Capitation[b] and incentives
Patient enrolment	Required No roster size limit	Not required	Required No roster size limit	Required Disincentive to enrol >2,400[3]	Required Disincentive to enrol >2,400[3]
Access	No specified requirements	No specified requirements	THAS[4] Extended hours[5]	THAS Extended hours[5] Access bonus[6]	THAS Extended hours[5] Access negation[7]
Multi-disciplinarity[8]	Significant	None	None	Some	Some
Assistance for Information Technology	Some	None	None	Yes	None
Objectives/ Priorities	Responsiveness to population needs, multi-disciplinarity, prevention, focus on underserved, equity community governed	-	Accessibility	Accessibility, comprehensiveness, doctor-nurse collaboration, use of technology	Responsiveness to population needs, multi-disciplinarity, health promotion, cost effectiveness

[1] Late in 2004, the Ontario Ministry of Health (MOH) created a new model of care, the FHG, to which FFS practices could transition. Family Health Groups (FHG) needed to comprise three or more family physicians practicing together. These physicians need not be located in the same physical office space, but must be within reasonable distance of each other. FFS practices converted to this new model quickly, so that by early 2006 most FFS practices had become FHGs, and it became evident that the great majority would transition by the year end.

[2] Under capitation remuneration, family physicians received a fixed monthly fee per patient enrolled, independent of the number of visits made to the practice by that patient. The capitation fee is based on the enrolled patient sex and age. FHN physicians receive an additional 10% of the FFS structure for each visit. The later is principally intended to allow for a better monitoring of the services delivered.

[3] The base capitation rate is reduced to 50% for patients enrolled to a provider with a practice size exceeding 2,400

[4] THAS = Telephone Health Advisory Service - A 24 hrs/7 days a week patient telephone advisory service available to enrolled patients.

[5] Each physician is required to provide at least one 3 hour session outside regular hours (evening/week end) per week (up to 5 sessions per group/network/organization)

[6] An incentive bonus that is reduced in relation to the number of visits patients make to non-specialists outside the FHN.

[7] A penalty incurred from the capitation fee for visits patients make to non-specialists outside the FHN.

[8] Multi-disciplinarity refers to the presence of allied health workers (e.g. dietician, social worker, and pharmacist), excluding nursing staff, but including nurse practitioners.

Informed by the Ontario Medical Association's "Comparison of Models" table - https://www.oma.org/PC/PCRComparisonJan0807.pdf (PCRComparisonJan0807.pdf)

Performance measures

We assessed performance across seven dimensions of health service delivery and three dimensions of technical quality of care (Table 2). The technical quality of care scales are further described in related manuscripts [[12,21], Dahrouge S, Hogg W, Russell G, Tuna M, Geneau R, Muldoon L *et al.*: The Impact of Remuneration and Organizational Factors on Prevention Activity in Primary Care: A cross sectional study. *Submitted*].

Analysis

1. Identify gender differences

We compared the performance scores for women to those of men while adjusting for potentially confounding factors using multi-level multivariate regressions for all evaluations except chronic disease management. For the latter, too few observations per practices were available to warrant adjusting for clustering effect with multi-level analyses. For analyses relying on patient survey data, we adjusted for patient socio-demographic and economic characteristics (identified as SE in Table 3) in one analysis, and added measures of health (identified as H in Table 3) in the second analysis. The analyses including health factors inform the horizontal equity evaluation, while those in which it was omitted inform the vertical equity evaluation. For analyses relying on chart data, we had inadequate information on health status, and so only conducted analyses adjusted for age, rurality, and insurance status. In all analyses, Age*Gender interactions were considered and used where

Table 2 Scales for the measurement of performance

Quality of Health Care Service Delivery[a] (items in the scale, categories in the likert scale of each item)		**Source of data**	**Overall score ranges[c]**
Access	*First contact accessibility (4, 4)*	Patient survey	74% - 83%
	First contact utilization (3, 4)	Patient survey	96% - 98%
Patient-Provider Relationship	*Humanism (8, 7)*	Patient survey	90% - 91%
	Trust (10, 5)	Patient survey	87% - 88%
	Cultural competency (3, 4)	Patient survey	83% - 85%
	Family centeredness (3, 4)	Patient survey	89% - 90%
Continuity	*Ongoing care (4, 4)*	Patient survey	85% - 90%
Technical Quality of Clinical Care Delivery[b]- Adherence to recommended guidelines (items in the scale)			
Health Promotion	*Healthy lifestyle counseling (7)*	Patient survey	46% - 59%
Prevention	*Preventive care (6)*	Chart audit	52% - 68%
Chronic Disease Management	*Chronic disease management (9)*	Chart audit	60% - 72%

[a] All health care service delivery scales are based on the PCAT[16,17], except for the Humanism, [42] and Trust [43] scales.

A respondent's scale was included only if at least 50% of its items contained a response. Performance scores for each health service delivery scale were derived by summing the individual item scores and normalizing these to a percentage. For example, for first contact accessibility, the sum of the scores for the four questions, each on a likert scale of 1-4, is divided by 16

[b] Health promotion and prevention evaluations were based on the Canadian Task Force on Preventive Health Care (CTFPHC) clinical practice guidelines [44]. Chronic disease management was assessed against recommended guidelines accepted in Ontario for the management of the conditions [45-51].

For health promotion, patients were asked to indicate which of 7 subjects were discussed with them on that day's visit. We assessed whether at least one subject was discussed on that visit, and estimated the overall extent of health promotion delivered yearly by multiplying the number of subjects discussed at the index visit by the patient's estimated number of visits to that practice for the year. Preventive care was determined by assessing the performance of 6 indicator manoeuvres in the chart audit. The prevention score was the proportion of preventive manoeuvres for which the individual was eligible that were documented. Finally, chronic disease management was also evaluated by chart audit using 2-4 indicators in each of three conditions (Diabetes, Coronary Artery Disease and Congestive Heart Failure). For each condition the score was derived as for prevention, and the overall chronic disease management score was the average of the individual disease scores.

[c] Indicates the range of scores for each scale in the four models.

appropriate. Variable imputation was used to avoid case-wise deletions.

We performed multi-level linear regressions for continuous outcomes using SPSS 16, and multi-level logistic regressions for binary outcomes using the Glimmix procedure in SAS. The analyses were stratified by model. All results shown reflect the effect of being a female compared to being a male.

2. Compare the extent of gender differences between models

The effect sizes (absolute beta values) of the gender variable in each model derived from the regressions performed to meet objective #1 were compared using the t-statistics to evaluate whether models were significantly different in their gender effect.

When meaningful gender differences are observed, we estimated the adjusted performance level for the "typical" women and men. Using the beta coefficients from the regression equation developed to meet objective #1, we calculated the performance level for the "typical" practice patient.

Results

Characteristics of the study population

The study population was determined to be adequately representative of its underlying population [15]. There were significant differences in several patient characteristics between genders (Table 3). Notably, women surveyed were significantly more likely to report days with poor mental or physical health and limitations related to these conditions. However, self perceived health was similar in both groups.

Gender differences in performance

Overall, women reported more visits than men (6.6 vs 5.8, p < 0.01), with adjusted differences (95% confidence interval (CI)) of CHC: +1.0 (-0.7, 2.7); FFS: +0.6 (-0.4, 1.5); FHN: +1.2 (0.6, 1.8); HSO: +0.8 (0.3, 1.3). We found no difference in the reported duration of the index visit between women and men.

Health service delivery scales

Differences between genders in all health service delivery measures were not clinically meaningful (≤ 2.2%) in the analyses including and excluding health status variables (Figure 1).

Technical quality of care scales

Health promotion The odds that at least one health promotion item was discussed at the index visit were lower in women in all models but CHCs (Figure 2). However, since women have more frequent yearly visits, the overall estimated number of subjects discussed over a 12 months period was not significantly different in the two groups in any model. We observed significant gender differences in the type of subjects discussed at the

Table 3 Profile of patients by gender

Survey patient profile		Men	Women
[1]	Socio-demographic and economic profile		
SE	Age (mean‡, median in years)	53/53	48/47
SE	Household income (% under LICO)‡	13	19
SE	Low education (% with less than high school degree) *	19	16
SE	Not speaking English or French at home (%)	1.7	1.9
SE	Aboriginal (%)*	0.8	1.6
SE	Uninsured (in Canada) (%)	1.6	2.3
SE	Not working outside the house (%)	37	26
SE	Recent immigrant (< 5 years) (%)	2.0	2.5
SE	Rurality index (mean)	13	13
SE	Distance from home to practice > 10 km (%)	26	25
Health status			
H	At least one day with poor mental health in past 30 days (%)‡	34	49
H	At least one day with poor physical health in past 30 days (%)‡	56	62
H	At least one day limited by poor mental or physical health in past 30 days (%)*	40	43
H	Physical, mental or emotional problem lasting more than one year (%)	43	41
H	Self perceived health good-excellent (%)	82	82
H	Presence of at least one chronic disease/Number of chronic diseases (%)	74/1.9	73/1.8
	Relationship with the practice		
	Provider is a Nurse Practitioner (%)‡	2.1	7.5
	Seeing their own provider at that visit (%)	91.5	92.1
	Attending the practice for more than 2 years (%)	83	83
	Number of visits to the office in previous year (mean†, median)	5.8, 4	6.6,4
	Main reason for visit - Check up/Chronic problem/Recent problem	35/30/36	36/27/37
	Chart audit patient profile		
	Uninsured in Ontario (%)*	0.7	1.6
	Age (mean‡, median in years)	49.5/48	46.0/45
	Number of visits to the office in previous year (mean‡, median)	4.3/3	5.0/4

[1] In this column socio-demographic and economic factors used for adjustment in the vertical equity analyses are identified as SE, and health related factors used for adjustment in the horizontal equity analyses are identified as H.

LICO = Low Income Cut off, a measure of household deprivation used by Statistics Canada [52].

The following symbols reflect the significance level * $p < 0.05$, † $p < 0.01$, ‡ = $p < 0.001$ compared by Pearson Chi Square or independent t-test.

index visit. Women were more likely to have discussed family conflicts in CHCs and FHNs. This effect in was significantly larger than in all other models. Men were significantly more likely to have discussed smoking in FFS and FHNs, and exercise and alcohol consumption in all models but CHCs. The gender effect for exercise discussion was significantly larger in FFS, FHN and HSO compared to CHCs.

Figure 3 shows the estimated adjusted likelihood of each subject being discussed in the "typical" women and men in each model. Men were not less likely to report discussing smoking, alcohol, or exercise in CHC than in other models. In contrast, women reported HP discussion for virtually all subjects more frequently in CHCs than other models.

Preventive care The composite prevention score for all 6 manoeuvres in the 3,284 eligible individuals was significantly higher in women than men in all models. The adjusted effect sizes (95% CI) were: CHC 18% (12%, 25%); FFS 21% (15%, 27%); FHN 13% (8%, 19%); HSO 17% (10%, 23%). This was due to the greater adherence to recommended care for the two female specific manoeuvres measured. When these are excluded from the evaluation, the adjusted effect sizes (95% CI) based on the four remaining manoeuvres in the 2,096 patients were: CHC -2% (-10%, 6%); FFS 4% (-3%, 11%); FHN -4% (-11%, 3%); HSO 0% (-6%, 6%). With one exception, there were no significant gender differences in individual manoeuvres (Figure 4).

Chronic disease management Overall adherence to recommended guidelines for chronic disease

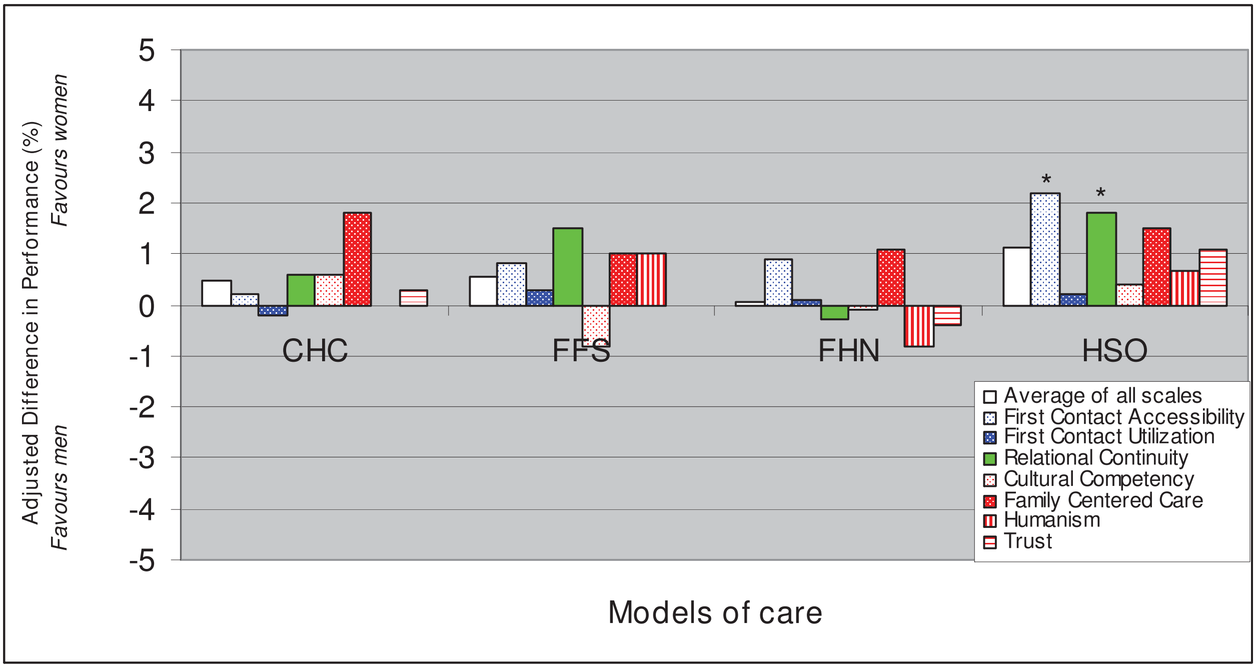

Figure 1 Health service delivery across gender - Effect of being a woman. (Adjusted for socio-economic and health status). The number of evaluable patients in each analysis was as follows: First contact accessibility: 5005; First contact utilization: 5272; Cultural competency: 4709; Humanism: 5243; Family centered care: 5097; Trust: 5227; Relational continuity: 5245. The adjusted difference in performance between women and men are shown. The effect is adjusted for patient socio-demographic and economic factors and health status using multi-level linear regression. Statistically significant ($p < 0.05$) results are indicated by "*". Results of the analyses in which health status were not included are consistent with these results. There were no significant differences in the extent of gender differences in any performance measure across models.

management was significantly inferior in women in FFS (difference of -11.2%, 95% CI: -21.7%, -0.8%), and showed a similar trend in CHCs (Figure 5). However, there was no statistically significant difference in the gender effect between models.

Figure 6 shows the estimated adjusted chronic disease management score in the "typical" women and men in each model. CHCs provided significantly better care to women than other models, while the care received by men was similar for most measures between models. The chronic disease management score in women was not significantly lower in FFS than FHN or HSO. Despite showing a tendency for gender disparity, CHCs were superior to other models in the delivery of chronic disease care for men and women.

Discussion

Women attending FFS practices were significantly less likely to have received chronic disease care according to recommended guidelines. We observed a similar trend in CHCs but not in capitation based practices. We also found differences in the health promotion topics reported being discussed between women and men, and these differences varied by model. Women were more likely than men to report discussing family conflicts in CHCs and FHNs, whereas men were more likely than women to report discussing smoking in FFS and FHN consultation, and discussing exercise and alcohol consumption in all models but CHCs.

Health Service Delivery

Consistent with a previous Canadian report, women reported more frequent visits to their primary care practice than men [22]. However, self reported measures of accessibility as well as other dimensions of health service delivery were not meaningfully different in the two groups. We conclude that the delivery of primary care services is equitable across gender in all models.

Technical quality of care

Health promotion

The World Health Organization states that gender equity "... *requires that men and women will be treated equally where they have common needs, and that their differences will be addressed in an equitable manner.*" [23] Men are more likely to smoke and abuse alcohol and illicit drugs than women, [24-26] while women are more likely to suffer from family conflicts, [27]

CHC	Odds ratio	95% CI
HP: At least one subject	1.12	(0.84, 1.50)
Healthy foods	1.30	(0.93, 1.82)
Home safety	1.09	(0.59, 2.02)
Family conflicts	2.29	(1.43, 3.66)
Exercise	0.96	(0.71, 1.30)
Smoking	0.96	(0.65, 1.44)
Alcohol	0.69	(0.46, 1.05)
Falls prevention	0.67	(0.13, 3.56)
FFS		
HP: At least one subject	0.76	(0.59, 0.98)
Healthy foods	0.88	(0.63, 1.22)
Home safety	1.11	(0.54, 2.28)
Family conflicts	1.01	(0.64, 1.59)
Exercise	0.60	(0.46, 0.78)
Smoking	0.69	(0.49, 0.99)
Alcohol	0.56	(0.36, 0.88)
Falls prevention	1.27	(0.67, 2.40)
FHN		
HP: At least one subject	0.72	(0.56, 0.92)
Healthy foods	0.79	(0.59, 1.06)
Home safety	0.71	(0.32, 1.55)
Family conflicts	1.95	(1.21, 3.14)
Exercise	0.60	(0.46, 0.78)
Smoking	0.71	(0.51, 0.97)
Alcohol	0.50	(0.35, 0.72)
Falls prevention	2.39	(0.66, 8.61)
HSO		
HP: At least one subject	0.62	(0.48, 0.80)
Healthy foods	0.91	(0.66, 1.25)
Home safety	1.74	(0.77, 3.92)
Family conflicts	0.89	(0.58, 1.37)
Exercise	0.54	(0.41, 0.71)
Smoking	0.81	(0.56, 1.16)
Alcohol	0.44	(0.29, 0.68)
Falls prevention	1.83	(0.42, 8.03)

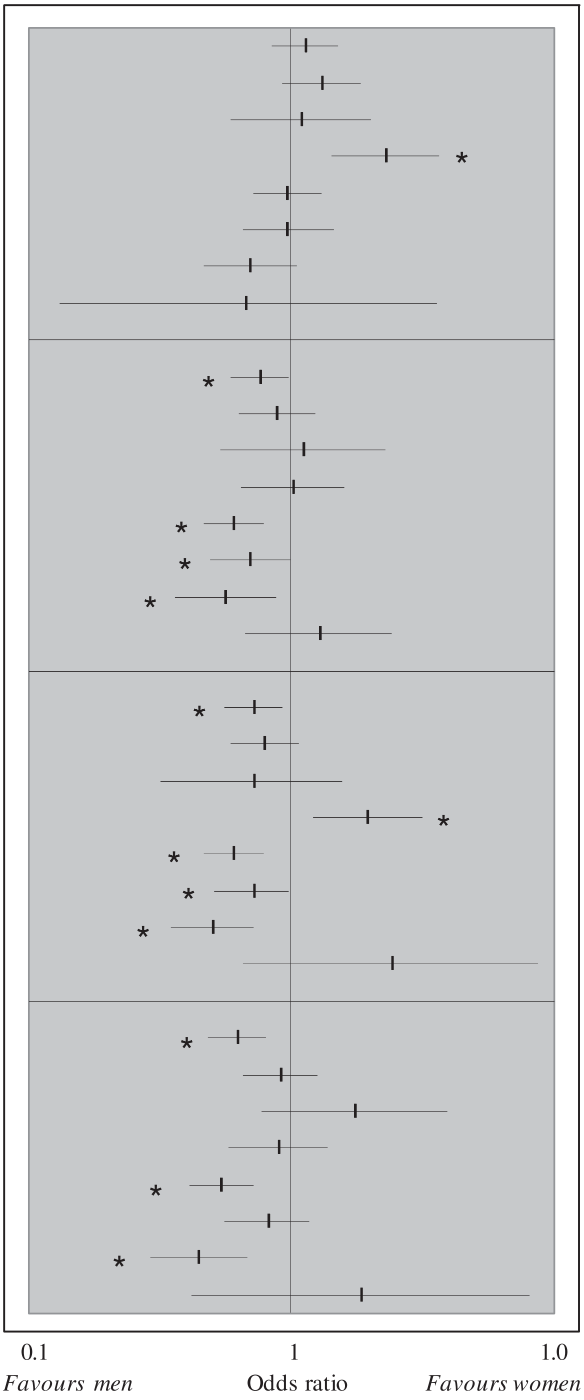

Figure 2 Health promotion across gender - Odds ratio of women relative to men. (Adjusted to socio-economic and health status). 4,794 individuals had provided sufficient information to be included in this analysis. The "HP: At least one subject" variable represents the likelihood that at least one health promotion subject was discussed at the index visit. All other variables represent the likelihood that the subject was discussed at the index visit. Odds ratios are adjusted for patient socio-demographic and economic factors and health status. Statistically significant gender differences ($p < 0.05$) are indicated by "*". Results of the vertical equity analyses in which health status were not included are consistent with these results.

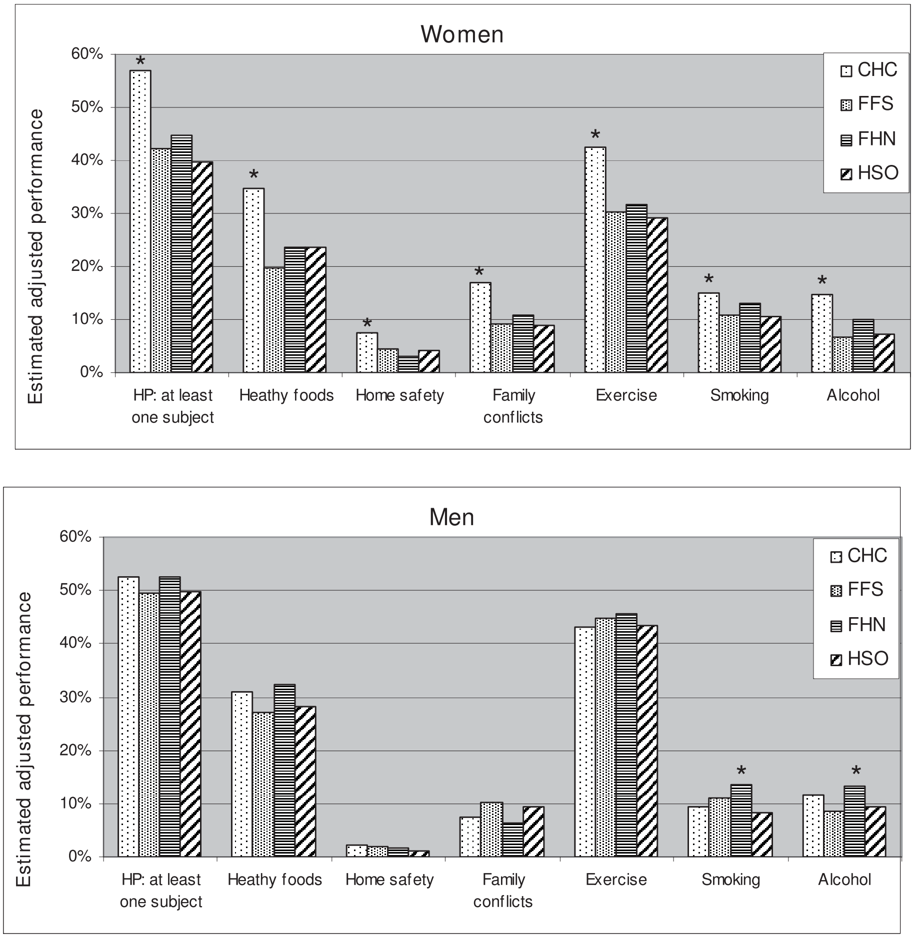

Figure 3 Adjusted estimated likelihood of a subject being discussed. (Adjusted for socio-economic and health status). Women were more likely to discuss HP items in CHCs than in any other model. CHCs were statistically superior to all models for all items, except smoking in FHN. Men were usually equally likely to discuss HP items in all models, although men attending FHNs were more likely than those attending HSO to discuss smoking and more likely than those attending FFS to discuss alcohol. The estimated performance for men and women in each model is shown for the "typical" patient; an individual with the most common features: Age 30-49 (except for fall prevention, where it is <75), without a disadvantaged feature (low education, income below low cut off, language barrier, aboriginal status, uninsured), travel distance less than 10 km, not rural, no limitations due to physical or mental health, or problem lasting more than one year, health good-excellent, and the presence of at least one chronic disease. Results of the vertical equity analyses in which health status were not included are consistent with these results. Statistically significant gender differences ($p < 0.05$) are indicated by "*".

suggesting that the gender differences observed are likely an appropriate response to the differential healthcare needs between sexes.

We found the smallest gender gap and best performance for women in CHCs. These results may reflect the focus on health promotion and preventive care integral to CHCs, and the substantially longer visits that would allow time for these activities.

Prevention

We observed no significant gender differences in the delivery of colorectal cancer screening and hearing or visual impairment screening in any model but found that men attending FFS were significantly more likely to have been up to date on influenza immunization. Other studies had also found no gender difference in colorectal cancer screening[28] but a higher likelihood of influenza immunization in men receiving care under the Veteran's Health Administration's services, a system that supports both the fee for service and capitation structures [29]. Conclusions about whether gender disparities exist in preventive care is appreciably impacted by the indicators selected. Other studies, as our did, find significantly better preventive scores when conditions specific to women (breast and cervical cancer screening) are included in the overall preventive score, [30] likely because significant investments have been made to promote awareness and compliance for these manoeuvres.

CHC	Odds Ratio	95% CI
Influenza immunization	0.91	(0.54, 1.54)
Colorectal cancer screening	1.08	(0.67, 1.75)
Hearing impairment screening	3.64	(0.7, 19.11)
Visual impairment screening	1.17	(0.52, 2.6)
FFS		
Influenza immunization	1.75	(1.05, 2.92)
Colorectal cancer screening	1.21	(0.79, 1.84)
Hearing impairment screening	0.62	(0.26, 1.50)
Visual impairment screening	0.66	(0.30, 1.45)
FHN		
Influenza immunization	0.80	(0.45, 1.43)
Colorectal cancer screening	0.96	(0.63, 1.44)
Hearing impairment screening	1.02	(0.39, 2.70)
Visual impairment screening	0.76	(0.37, 1.55)
HSO		
Influenza immunization	1.21	(0.71, 2.06)
Colorectal cancer screening	0.89	(0.58, 1.35)
Hearing impairment screening	0.66	(0.27, 1.62)
Visual impairment screening	0.84	(0.46, 1.53)

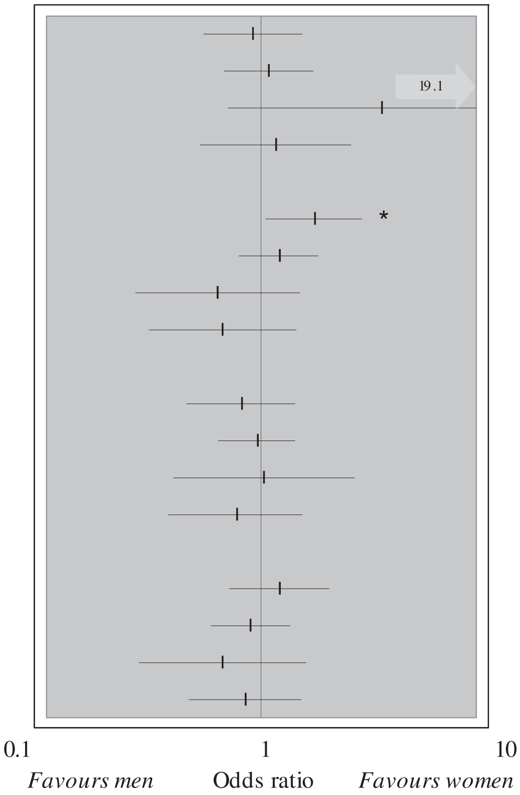

Figure 4 Individual preventive manoeuvres across genders. Odds ratios are adjusted for age, insurance status and rurality. The number of patients eligible for individual manoeuvres was: influenza immunization: 1,365; colorectal cancer screening: 1,753; hearing impairment screening: 651; and visual impairment screening: 735. In CHCs, 2 of 31 men while 17 of 67 women 65 years of age or older had a hearing impairment screening. Because of the small number of events amongst men, the odds ratio confidence interval is unstable. Statistically significant gender differences ($p < 0.05$) are indicated by "*".

Chronic disease management

Our results suggest that gender gaps in the quality of care received may be dependent on the model of care. Women attending FFS practices but not in capitation based models were significantly less likely to have received recommended care for chronic diseases. Because this study captured the provider's intent for processes of care, the results point to a disparate approach in the primary care providers' management of chronic diseases between men and women in FFS practices rather than, say, gender differences in patient compliance to these processes.

Studies using simulated patients with congestive heart failure found men were more likely undergo clinical investigations [31]. Others have found men to be more likely to receive more evidence based cardiovascular preventive care for aspirin prescription, [32,33] triple anti-anginal therapy, [34] beta blocker, [35,36] and angiotensin converting enzyme inhibitors [37-39]. Evidence for diabetic care is less well documented and doesn't show preferential gender treatment [40,41].

FFS is the most common model of care in Ontario, serving nearly 60% of its population. Critics of the FFS model contend that the "per visit" fee structure encourages shorter, problem focused visits, while capitation or salary based remuneration systems should achieve better care because the provider is not penalized for additional time spent on those with greater needs. The results of this evaluation support this notion.

Impact of primary care reform on gender equity

Our results suggest that primary care reforms have not had a negative impact on the equitable delivery of primary care across gender. In fact, capitation based practices may provide more equitable chronic disease management and influenza immunization than FFS practices.

Strengths and limitations

The survey study population is limited individuals accessing care, and its results cannot be extrapolated to the general population. Because estimates of health service delivery are based on self reported measures, the patient's prior experience and expectation of care, which

	Beta	95% CI
CHC		
Chronic Disease Management	-10.6	(-21.5, 0.3)
Diabetes	-4.7	(-18.2, 8.8)
Coronary Artery Disease	-6.4	(-25.9, 13.2)
FFS		
Chronic Disease Management	-11.2	(-21.7, -0.8)
Diabetes	-8.3	(-21.2, 4.6)
Coronary Artery Disease	-8.4	(-23.3, 6.5)
FHN		
Chronic Disease Management	-4.2	(-13.7, 5.3)
Diabetes	-2.1	(-21.2, 4.6)
Coronary Artery Disease	-1.2	(-16, 13.5)
HSO		
Chronic Disease Management	-2.1	(-11.3, 7.1)
Diabetes	-2.4	(-14.4, 9.7)
Coronary Artery Disease	-1.3	(-14.5, 11.8)

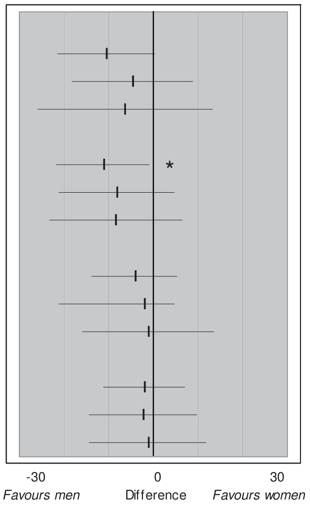

Figure 5 Overall chronic disease management across gender. 514 patients had at least one of the three indicator chronic diseases and were included in evaluating CDM; 313 had diabetes, and 273 had CAD. Too few patients had CHF (57) to perform a gender evaluation across models. The gender effect is adjusted for age, insurance status, and rurality. Statistically significant gender differences (p < 0.05) are indicated by "*".

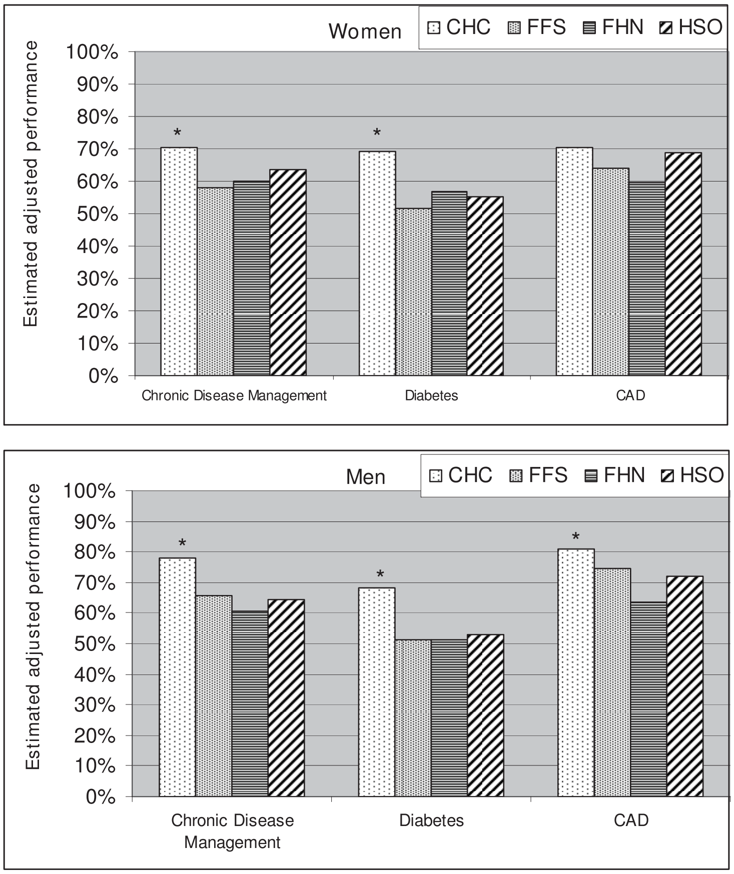

Figure 6 Adjusted estimated likelihood of a subject being discussed - Horizontal equity. The estimated performance for men and women in each model is shown for the "typical patient profile", i.e. an individual with the most common features: Age 70 years or older with public health insurance (rurality "0"). Adherence to recommended guidelines in women was highest in CHC than other models for diabetes and for overall chronic disease management. Adherence to recommended guidelines in men was highest in CHC than other models for chronic disease

could plausibly differ by gender, is likely to impact their response.

The evaluation of preventive care and chronic disease management was based on the abstraction of charts. Since these contain very limited patient socio-demographic information we were unable to account for differences in these factors across gender. We also did not capture additional health information to allow us to evaluate whether gender differences in care is related to existing co-morbidities. Finally, we could not evaluate whether patient provider gender concordance is a vehicle to gender disparity.

This "within model" approach to evaluating equity has two advantages. First, it eliminates the effect of differences in the profile of the populations within a model for which one could not adjust. It also allows us to evaluate the impact of the primary care reform initiative that addresses remuneration approach on equity.

Conclusions

This is the first study to perform an evaluation of that scope of primary care dimensions. We found the experience of health care service delivery to be similar in women and men. The gender differences that we found in the discussion of healthy lifestyle subjects may be an appropriate and efficient response to prioritizing care in response to differential health needs given limited visit time. This study documents inequities in the delivery of chronic disease care in FFS practices but not in capitation based practices. We recommend that efforts to monitor and address gender based differences in the delivery of chronic disease management in primary care be pursued.

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Authors' contributions

SD conceptualised the analysis, participated in data collection interpreted the data and wrote the initial draft of the manuscript. MT contributed towards methodological and statistical analysis, as well as critically reviewed and edited the manuscript. WH, GR, RAD, EK conceptualized the original study, and along with PT were consulted on the analytical approach, critically reviewed and edited the manuscript. All authors have read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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Age equity in different models of primary care practices in Ontario

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Abstract

Background: Canada has restructured its primary care models of service delivery, shifting from the traditional Fee-For-Service models (FFS) to salaried Community Health Centres (CHCs), and to models that are based largely on capitation (Health Service Organizations (HSOs) and Family Health Networks (FHNs)). Our study assessed whether the model of service delivery affects the equity of the care provided across age groups.

Methods: We relied on data from a cross-sectional study of 137 practices to compare the quality of care across age groups, using multi-level linear or logistic regressions. We assessed health service delivery measures and health promotions through surveys based on the Primary Care Assessment Tool (n=5,111) and prevention and chronic disease management through chart abstraction based on Canadian recommendations for care (n=4,108).

Results: Older individuals reported better health service delivery in all models. This age effect ranged from 1.9% to 5.7%, and was larger in the two capitation models. Individuals 30 years and younger attending CHCs had more disadvantaged characteristics and were more likely than older individuals to have reported discussing at least one health promotion subject at the index visit. These differences were deemed an appropriate response to greater needs in the younger individuals. The prevention score showed an age-sex interaction in all models, with adherence to recommended care dropping with age for women. These results are largely attributable to the fact that manoeuvres recommended for younger women are considerably more likely to be performed than other manoeuvres. Chronic disease management scores showed an inverted U relationship with age in FFS, FHN and HSO, but not CHC.

Discussion: The salaried model may have an organizational structure that is more conducive to providing appropriate care across age groups. The thrust towards adopting capitation-based payment is unlikely to have an impact on age disparities.

Key words: Primary Care, Age groups, Model(s)

Introduction

Equity in health care concerns “fair arrangements that allow equal geographic, economical, and cultural access to available health care for all in need of equal care”.(1) According to Culyer and Wagstaff, the main focus of equity in health care should, insofar as possible, be achieving equal health for all.(2) Equity in access to health care is a key goal in health care systems in many countries.(3)

In the 1960s, Canada introduced a publicly financed health care system that provides free access to medical services provided by hospitals and physicians. More than one half of all physician visits are made to a family doctor;(4) and investments in primary care have been advocated as a means to strengthen health care systems and mitigate health inequities.(3;5-9)

For many years, primary care delivery in Canada’s most populous province, Ontario, has relied on fee for service practice, where compensation is directly related to the types and number of services rendered. Beginning in the1970s, the province introduced Community Health Centres (CHCs), a community-oriented multi-disciplinary primary care model focused on social justice and equity in which providers are salaried and which today serves approximately 3% of the Ontario population.(10-12) In the same decade, the province introduced a capitation-based model for delivering primary care services, Health Service Organizations (HSOs), in which family physician compensation is based on the number and age/sex profile of patients registered to them.(13) It was believed that the dissociation between patient visit and physician payment would result in a more equitable delivery of care, focused on patient need rather than output. In the last decade, Ontario has continued its investments in models where providers derive the largest proportion of their compensation from capitation payments. Family Health Networks (FHNs) are an example of this. Today, FHNs and other capitation models serve approximately 40% of the Ontario population. As a result of these reform initiatives, Ontario now has multiple primary care payment models, providing a unique opportunity to evaluate the impact of these structures, unconfounded by time or contextual factors. Some studies have focused on evaluating the impact of these different models on the quality of care,(14-16) but none have sought to assess whether these models have had an effect on the equity of the care delivered to patients across a broad spectrum of needs.

This study is part of a larger evaluation exploring the impact of these four models (FFS, CHC, HSO, and FHN) on equity.(17) The study objectives are to: 1) describe the profile of patients across age groups so as to understand their healthcare needs; 2) determine the extent to which disparities in the quality of care delivered across age groups in family practices exist; and 3) assess whether the extent of these disparities varies by primary care models.

Methods

Design

This analysis used a data set collected for a study conducted in 2005-2006: The Comparison of Models in Primary Care (COMP-PC).(18) The study was approved by the Ottawa Hospital Research Ethics Board.

Sample

The COMP-PC was a cross-sectional study evaluating care in FFS (including Family Health Groups), CHC, HSO, and FHN practices. The study approached all known and eligible (n) FHN (94), CHC (51) and HSO (65) practices. We approached a random sample of 155 FFS practices from a list of 1,884 practices. Recruitment efforts were discontinued when 35 practices in each model agreed to participate or when time constraints required us to cease recruiting. We recruited 35 CHC, FFS, and FHN practices, and 32 HSO practices. Details of the study methodology and key features of the model are reported elsewhere.(18)

Data collection

In each practice, we surveyed patients (30-50/practice) and conducted chart reviews (30/practice). Surveyed patients were required to be: under the care of one of the participating providers; age 18 years or older; not severely ill or cognitively impaired; able to communicate in English or French either directly or through a translator; and attending the practice on the day of survey administration. Charts reviewed were limited to patients aged 17 years and older and who had been with the practice at least two years.

Instruments

Patient surveys were adapted from the Primary Care Assessment Tool (PCAT)-Adult edition(19;20) and supplemented with two scales.(21;22) The largest portion of the survey was completed prior to the encounter with the provider and measured the quality of health service delivery and elicited patient socio-demographic and economic information. The second portion, a single page, was completed after the visit and captured information relating to that “index visit”, including a measure of health promotion activity. The survey tool was available in English and French.(23)

We measured preventive care and chronic disease management by comparing documented activities (intent/recommendations/actions relating to a manoeuvre) in the chart against indicators for recommended guidelines.

Performance measures

We assessed performance across seven dimensions of health service delivery and three dimensions of technical quality of care (Table 1). In each case, the score was normalized to be represented as a percentage.

Table 1: Scales for the measurement of performance

	N[c]	**Score ranges[d]**
Quality of Health Care Service Delivery[a] (items in the scale, categories in the likert scale of each item) (Patient survey)		
Overall PCAT score	5,073	86% - 88%
Access		
First contact accessibility (4, 4)	5,033	74% - 83%
First contact utilization (3, 4)	5,323	96% - 98%
Patient-Provider Relationship		
Cultural competency (3, 4)	4,755	83% - 85%
Family centeredness (3, 4)	5,146	89% - 90%
Humanism (8, 7)	5,292	90% - 91%
Trust (10, 5)	5,031	87%-88%
Continuity		
Ongoing care (4, 4)	5,252	85% - 90%
Technical Quality of Clinical Care Delivery[b] - Adherence to recommended guidelines (items in the scale)		
Health Promotion (Patient survey)		
Healthy lifestyle counseling (6)	4,642	46% - 59%
- Exercise	4,562	32% - 40%
- Healthy foods	4,592	17% - 28%
- Family conflicts	4,528	10% - 17%
- Smoking	4,574	13% - 18%
- Alcohol	4,551	8% - 14%
- Home safety	4,527	3% - 7%
Prevention (chart audit)		
Preventive care (6) [eligibility]	3,284	52% - 68%
Screening for:		
- Colorectal cancer [individuals ≥ 50 years]	1,753	30% - 46%
- Breast cancer [women 50-69 years]	698	73% - 85%
- Cervical cancer [women 17-69]	1,954	65% - 84%
- Vision impairment [individuals ≥ 65 years]	735	27% - 41%
- Hearing impairment [individuals ≥ 65 years]	651	14% - 21%
Immunization for:	1,365	59% - 70%
- Influenza [individuals at high risk or ≥ 65 years]		
Chronic Disease Management (Chart audit)		
Chronic disease management (9)	514	60% - 72%
- Coronary Artery Disease (3)	263	66% - 79%
- Diabetes (4)	313	52% - 69%
- Congestive Heart Failure (2)	57	56% - 76%

[a] All health care service delivery scales are based on the PCAT,(19;20) except for the Humanism,(22) and Trust(24) scales.

A respondent's scale was included only if at least 50% of its items contained a response. Performance scores for health service delivery scales were derived by summing the individual item scores and normalizing these to a percentage. For example, for first contact accessibility, the sum of the scores for the four questions, each on a likert scale of 1-4, is divided by 16.

The Overall PCAT score was computed as the sum of all 17 PCAT questions divided by the maximum potential score; 68 if all questions were answered.

[b] Health promotion and prevention evaluations were based on the Canadian Task Force on Preventive Health Care (CTFPHC) clinical practice guidelines.(25) Chronic disease management was assessed against recommended guidelines accepted in Ontario for the management of the conditions.(26-32)

For health promotion, patients were asked to indicate which of seven subjects were discussed with them on that day's visit. One question relating exclusively to individuals older than 65 years of age (how to prevent falls) was excluded. We assessed whether at least one of six subjects was discussed on that visit, and analyzed each subject individually.

Preventive care was determined by assessing whether six indicator manoeuvres were documented in the chart as performed/recommended in the previous 24 months. The prevention score was the proportion of preventive manoeuvres for which the individual was eligible that were documented as performed/recommended.

Chronic disease management was also evaluated by chart audit using 2-to-4 indicators in each of three conditions. For each condition, the score was derived as for prevention, and the overall chronic disease management score was the average of the individual disease scores.

[c] The sample size showing represents the number of cases for which age was available and that were included in the age analysis.

[d] Indicates the range of each scale's average scores across the four models.

Analysis

Description of patient profile

To understand the health needs of the different age groups, we compared the profile of patients in each group using Pearson chi square statistics and Analysis of Variance, as appropriate.

Age disparities in measures of performance

Because this is an exploratory study, age was grouped into categories based on its relationship with the outcome of interest. To demonstrate the impact of age on performance, we compared the scores of older individuals to those of individuals in the youngest category. For all analyses, except chronic disease management, we performed multi-level linear or logistic regressions using the Glimmix procedure in SAS, as appropriate, to account for the clustering effect of patients within practices. Because of the small number of eligible charts per practice, chronic disease management was evaluated using standard linear regression.

Analyses in which we adjust for health assess horizontal equity (health needs having been made equal, is care similar?), while those in which we do not adjust for health assess vertical equity (if greater health needs could be demonstrated for a group, is care greater?). Based on the different health profile of patient across age, we determined that older individuals would require more health services. For that reason, our primary analysis for health service delivery included adjustments for patient socio-economic characteristics (identified as SE in Table 2) but not health to assess vertical equity (more services for more need). In a second analysis, we added measures of health (identified as H in Table 2) to assess whether the observed differences were in fact due to the differing health status. Because health lifestyle advice is felt to be equally important across all age groups, our primary analysis for health promotion included adjustments for socio-economic characteristics and health status and assessed horizontal equity (same care for same need). In a secondary analysis we excluded health variables to determine the impact of health on differences observed. Prevention and chronic disease management analyses were based on chart abstraction data and could be adjusted for gender, rurality, and insurance status only. In all analyses, age-gender interactions were evaluated and used where appropriate. All analyses were stratified by model.

Table 2: Profile of patients by age groups

	Age group	**<30**	**30-64**	**65+**
	Survey patient profile **n**	714	3297	1100
[1]	**Socio-demographic and economic profile**			
SE	Sex (% women) ‡	76	66	61
SE	Household income (% under LICO) ‡	21	16	14
SE	Low education (% with less than high school degree) ‡	14	13	33
SE	Not speaking English or French at home (%) ‡	2.6	1.6	1.5
SE	Aboriginal (%) *	1.1	1.6	0.6
SE	Uninsured (in Canada) (%) ‡	4.6	1.5	0.6
SE	Not working outside the house (%) ‡	33	34	89
SE	Recent immigrant (< 5 years) (%) ‡	3.3	2.6	0.5
SE	Rurality index (mean) ‡	11	13	15
SE	Distance from home to practice > 10 km (%) ‡	23	25	19
	Health status			
H	Average number of days with poor mental health in past 30 days‡	5.1	4.7	2.4
H	Average number of days with poor physical health in past 30 days	5.1	5.4	5.4
H	Average number of days day limited by poor mental or physical health in past 30 day	3.8	4.2	3.7
H	Physical, mental or emotional problem lasting >1 year (%)‡	32	45	41
H	Self perceived health very good-excellent (%)‡	53	56	39
H	Presence of at least one chronic disease/Number of chronic diseases [2]	56/1.2	70/1.7	90/2.7
	Relationship with the practice			
	Provider is a Nurse Practitioner (%)‡	10	5	2
	Seeing their own provider at that visit (%)‡	91	94	96
	Attending the practice for more than 2 years (%)‡	75	82	88
	Number of visits to the office in previous year (mean†, median) *	5.7/4	6.5/4	6.2/5
	Main reason for visit – Check up/Chronic problem/Recent problem ‡	43/19/38	33/29/38	36/34/30
	Chart audit patient profile **n**	741	2631	736
	Uninsured in Ontario (OHIP)*	98	99	100
	Sex (% women)	70	59	55

[1] In this column socio-economic factors and health status used for adjustment in the analyses are identified as SE and H, respectively.

[2] 13 chronic diseases assessed (self reported).

LICO = Low Income Cut off, a measure of household deprivation used by Statistics Canada.(33)

The following symbols reflect the significance level * $p<0.05$, † $p<0.01$, ‡ = $p<0.001$ compared by Pearson Chi Square or independent t-test.

Model comparison

To determine whether within-model age disparities were different across primary care models, we compared the effect size (absolute beta values) of the age variable derived from the regression models described above across models using the t-statistics. Where meaningful differences (larger than 5%) in the age disparities for the overall score of a dimension were observed between models, we used the regression analysis to provide an estimate of the performance level for the “typical” patient in each age group by model. This allowed the performance level of the age reference group to be represented along the disparity measures.

Results

Characteristics of the study population

Patient surveys were completed by 5,361 individuals (response rate: 79%), 5,111 of whom indicated their age. Age was known for all 4,108 charts reviewed. We observed significant differences in the socio-demographic and health profile of patients across age groups (Table 2).

There were more women overall, less so in the older age groups. Older individuals were significantly more likely to have chronic conditions and less likely to state that their health was “good” to “excellent”. However, older individuals reported significantly fewer days with poor mental health than younger people. There were some differences in the socio-demographic profile of patients across models (results not shown in tables): Individuals younger than 30 years of age were significantly more likely to be living below the poverty line than older individuals in CHCs only (40%, 34%, and 21% for ages <30, 30-64, and 65+, respectively). CHCs also had the highest proportion of individuals younger than 30 without a high school education (19% vs 7%-10%).

Age disparities

The duration of the index visit (overall average of 17 minutes) did not differ between age groups in any model. Individuals 30 years of age or older reported more yearly visits than younger individuals in FFS only (1.3 visits (95% Confidence Interval (CI): 0.3, 2.6, adjusted for socio-economic factors). In other models, the difference was smaller than one visit yearly.

Health service delivery scales

Older individuals reported better health service delivery across many dimensions in all models, with the largest differences observed in patients attending FHNs and HSOs (Table 3, adjusting for socio-economic factors). Adjusting for health status (Table 3) attenuates the age effect only slightly. Including the duration of the relationship with the practice in the analysis had no additional effect. The age effect for patients 65+ compared to those younger than 30 was larger in FHNs (5.6, 95% confidence interval (CI): 3.7, 7.6) and in HSOs (5.7, CI: 3.8, 7.6) than in CHCs (1.9, CI: -0.4, 4.2) or FFS (2.6, CI: 0.5, 4.7).

Table 3: Health Service Delivery across age groups showing individual dimensions

	Age group	CHC	FFS	FHN	HSO
Age effect for:					
Overall PCAT score	30 - 64	**2.1 (0.5, 3.6)**	**2.6 (1.1, 4.2)**	**3.3 (1.8, 4.8)**	**3.9 (2.5, 5.3)**
	65+	1.9 (-0.4, 4.2)	**2.6 (0.5, 4.7)**	**5.6 (3.7, 7.6)**	**5.7 (3.8, 7.6)**
First Contact Accessibility	30 - 64	0.7 (-2.1, 3.5)	**3.3 (0.5, 6.1)**	**3.9 (1.2, 6.6)**	**4.0 (1.8, 6.2)**
	65+	0.6 (-3.5, 4.6)	**5.2 (1.4, 9.0)**	**7.3 (3.8, 10.8)**	**6.9 (3.9, 9.9)**
First Contact Utilization	30 - 64	**3.0 (1.5, 4.5)**	**3.7 (2.4, 5.0)**	**4.7 (3.4, 6.0)**	**3.7 (2.5, 4.9)**
	65+	**5.0 (2.8, 7.2)**	**4.7 (3, 6.4)**	**5.5 (3.8, 7.2)**	**4.8 (3.2, 6.5)**
Cultural competency	30 - 64	**2.7 (0.1, 5.3)**	**3.5 (0.8, 6.3)**	**4.3 (1.6, 7.1)**	**4.7 (1.9, 7.5)**
	65+	-1.3 (-5.1, 2.5)	1.4 (-2.3, 5.1)	**4.7 (1.1, 8.3)**	**4.9 (1.1, 8.8)**
Family Centered Care	30 - 64	**2.1 (0.1, 4.2**)	1.8 (-0.5, 4.0)	**3.6 (1.5, 5.6)**	**4.4 (2.2, 6.6)**
	65+	0.0 (-3.0, 3.0)	-1.3 (-4.4, 1.7)	**4.2 (1.5, 6.9)**	**5.9 (3.0, 8.9)**
Relational Continuity	30 - 64	**3.3 (1.0, 5.6)**	**3.1 (1.0, 5.2)**	**2.2 (0.1, 4.3)**	**3.6 (1.7, 5.5)**
	65+	**3.8 (0.4, 7.1)**	**4.2 (1.4, 7.0)**	**6.5 (3.7, 9.2)**	**6.1 (3.5, 8.7)**
Humanism	30 - 64	**3.3 (1.3, 5.3)**	**4.9 (2.8, 6.9)**	**5.4 (3.3, 7.5)**	**5.0 (2.9, 7.1)**
	65+	**4.4 (1.4, 7.4)**	**7.2 (4.4, 10)**	**8.9 (6.2, 11.7)**	**9.5 (6.7, 12.4)**
Trust	30 - 64	**2.5 (0.6, 4.5)**	**4.1 (2.2, 6.1)**	**3.4 (1.4, 5.4)**	**4.4 (2.5, 6.3)**
	65+	**3.9 (1.1, 6.7)**	**5.9 (3.2, 8.5)**	**6.0 (3.4, 8.7)**	**7.3 (4.6, 9.9)**

Individuals less than 30 years of age make up the reference category.

Age effect (Beta value for the age group), adjusted for socioeconomic only (95% Confidence Intervals (CI)) are shown. Results from regressions in which health factors are included show a slightly attenuated effect: CHC, FFS, FHN and HSO for ages 30-64, betas = 1.6, 2.4, 3.1, and 3.6, respectively. For ages 65+, betas = 0.8, 2.2, 5.1, and 4.9, respectively.

The overall PCAT score was derived from all questions contained in the five scales.

Statistically significant ($p<0.05$) results are bolded

The difference in PCAT scores between patients 65+ and those younger than 30 was larger in FHNs (5.6, 95% confidence interval (CI): 3.7, 7.6) and in HSOs (5.7, CI: 3.8, 7.6) than in CHCs (1.9, CI: -0.4, 4.2) or FFS (2.6, CI: 0.5, 4.7).

Technical quality of care scales

Health promotion

Table 4 shows the odds ratio (OR) of having discussed at least one (and each) healthy lifestyle subject assessed at the index visit in each age group across models. Compared to the youngest group, the OR of having discussed at least one lifestyle subject was significantly lower in those ages 30-64 in CHC only (ages 30-64: OR: 0.65, CI: 0.45, 0.94, and ages 65+: OR 0.60, CI: 0.35, 1.04, adjusted for SE and H). The age effect size was larger for CHC than FFS and FHN. To represent the impact of this age effect on actual quality of care delivered, the estimated likelihood of discussing at least one subject is provided. Analyses in which the health variables are excluded from the equation show no statistically significant effect of age.

Preventive care

The overall preventive score showed a significant age-sex relationship (Table 5). There was no significant difference in the preventive score across age groups in men. However, women 50 years of age and older were less likely to have been up to date on their preventive care in all models. The age effect for those 50-64 was significantly larger in HSO (-22%, CI: -15%, -30%) than FHNs (-12%, CI -6%, -18%). To represent the impact of this age effect on actual quality of care delivered, the estimated prevention score is provided for men and women.

Colorectal cancer screening (for which there is no upper age limit) and cervical cancer screening were less likely to be performed in older individuals in most models. In contrast, influenza immunization, which, at the time, was indicated for individuals of any age considered at high risk of contracting it or experiencing complications from it as well as all individuals 65 years of age or older, was most likely to have been performed in the older age groups in all models.

Chronic disease management

Provider adherence to recommended guidelines for chronic disease management showed an inverted U shape relationship with age in FFS, FHN and HSO practices. The pattern was similar for the individual chronic conditions included in the chronic disease management score (Table 6). Scores were significantly higher in patients 60-69 compared to those younger than 60, then appeared to drop in individuals 70 years of age and older. The age effect size for those 60-69 was significantly larger in the HSOs (24.4, CI: 11.6, 37.2) compared to CHCs (5.7, CI: -9.1, 20.5). To represent the impact of this age effect on actual quality of care delivered, the estimated chronic disease management score is provided.

Table 4: Health promotion across age groups

	Age group	CHC	FFS	FHN	HSO
Odds Ratios of discussing:					
At least one subject	30 - 64	**0.65 (0.45, 0.94)**	1.10 (0.76, 1.59)	0.97 (0.67, 1.41)	0.88 (0.60, 1.29)
	65+	0.60 (0.35, 1.04)	1.01 (0.60, 1.69)	0.96 (0.58, 1.58)	0.92 (0.54, 1.57)
Healthy Foods	30 - 64	**0.59 (0.41, 0.86)**	0.68 (0.43, 1.06)	1.08 (0.69, 1.71)	0.89 (0.56, 1.42)
	65+	**0.44 (0.25, 0.77)**	0.71 (0.36, 1.40)	1.10 (0.60, 2.02)	0.67 (0.34, 1.31)
Home safety	30 - 64	0.71 (0.37, 1.35)	0.67 (0.24, 1.91)	0.48 (0.17, 1.34)	**0.30 (0.11, 0.82)**
	65+	0.64 (0.24, 1.72)	1.86 (0.47, 7.30)	0.63 (0.14, 2.74)	0.97 (0.23, 4.03)
Family conflict	30 - 64	0.75 (0.49, 1.14)	1.78 (0.93, 3.40)	0.91 (0.52, 1.60)	0.59 (0.34, 1.04)
	65+	**0.26 (0.11, 0.60)**	0.66 (0.23, 1.88)	0.57 (0.24, 1.34)	0.75 (0.32, 1.76)
Exercise	30 - 64	0.95 (0.66, 1.35)	1.14 (0.77, 1.71)	1.06 (0.72, 1.58)	1.09 (0.72, 1.66)
	65+	0.95 (0.56, 1.62)	0.88 (0.50, 1.55)	1.13 (0.67, 1.93)	0.96 (0.54, 1.72)
Smoking	30 - 64	0.66 (0.43, 1.00)	0.78 (0.49, 1.26)	0.88 (0.56, 1.37)	0.80 (0.49, 1.30)
	65+	**0.11 (0.04, 0.29)**	**0.43 (0.20, 0.91)**	**0.44 (0.22, 0.87)**	0.64 (0.28, 1.42)
Alcohol	30 - 64	**0.45 (0.28, 0.71)**	0.73 (0.41, 1.31)	1.10 (0.63, 1.93)	0.68 (0.38, 1.22)
	65+	**0.16 (0.07, 0.36)**	0.48 (0.18, 1.27)	0.56 (0.25, 1.26)	**0.38 (0.15, 0.97)**
Estimated likelihood of discussing:					
At least one subject	< 30	56%	42%	42%	41%
	30 - <64	45%	45%	41%	38%
	65+	43%	43%	41%	39%

Individuals less than 30 years of age make up the reference category.

The Odds Ratios of having discussed at least one healthy lifestyle subject, and having discussed each individual lifestyle subjects at the index visit between age groups are shown. The estimate is adjusted for socio-economic information and health status (CI) using multi-level linear regressions are shown. Results of the regression analyses in which health status variables are not included eliminates the statistical significance of the effect in CHCs: CHC, FFS, FHN and HSO for ages 30-64, Odds ratios = 0.73, 1.11, 0.97, 0.89, respectively. For ages 65+, Odds ratios = 0.72, 0.99, 0.95, 0.92 respectively.

Statistically significant ($p<0.05$) results are bolded

The disparity between age groups 30-64 and younger than 30 years in the likelihood of discussing at least one subject was greater in CHCs (0.65, CI 0.45, 0.94) than FHN (0.97, 0.67, 1.41), while the disparity between age groups 65+ and younger than 30 years was larger in CHCs (0.60, CI: 0.35, 1.04) than FFSs (1.01 (0.60, 1.69) and FHNs 0.96 (0.58, 1.58).

The estimated likelihood of reporting at least one healthy lifestyle subject being discussed in each age group across model for the “typical” patient is derived from the multivariate logistic regression in which socio-economic information and health status are included. The typical individual is an individual with the most common features: woman, without disadvantaged feature (low education, income below low cut off, language barrier, aboriginal status, uninsured), travel distance less than 10 km, not rural, no limitations due to physical or mental health, or problem lasting more than one year, health good-excellent, and the presence of at least one chronic disease.

Table 5: Preventive care across age groups

Age groups		CHC	FFS	FHN	HSO
Age effect for Overall prevention score					
Men	50-64 vs 17-49	-7% (-24%, 9%)	7% (-7%, 21%)	8% (-8%, 25%)	4% (-10%, 18%)
	65+ vs 17-49	-5% (-24%, 14%)	5% (-10%, 21%)	5% (-12%, 22%)	9% (-4%, 23%)
Women	50-64 vs 17-49	**-18%** **(-11%, -24%)**	**-13%** **(-7%, -20%)**	**-12%** **(-6%, -18%)**	**-22%** **(-15%, -30%)**
	65+ vs 17-49	**-33%** **(-25%, -41%)**	**-32%** **(24%, -40%)**	**-30%** **(-22%, -37%)**	**-34%** **(-26%, -42%)**
Odds ratios for (women and men included):					
Breast cancer	60-69 vs 52-59	0.95 (0.41, 2.23)	1.15 (0.55, 2.41)	0.71 (0.32, 1.54)	0.79 (0.38, 1.67)
Cervical cancer	45-69 vs 19-44	**0.53** **(0.33, 0.86)**	0.90 (0.57, 1.40)	**0.58** **(0.36, 0.94)**	**0.41** **(0.25, 0.66)**
Colorectal ca	≥ 75 vs 52-74	0.85 (0.46, 1.56)	**0.46** **(0.25, 0.83)**	**0.42** **(0.25, 0.71)**	**0.56** **(0.33, 0.94)**
Influenza	≥ 65 vs 19-64	**2.76** **(1.62, 4.71)**	**3.16** **(1.89, 5.25)**	**4.54** **(2.58, 7.98)**	**6.59** **(3.91, 11.12)**
Vision	≥ 75 vs 67-74	1.18 (0.54, 2.62)	2.13 (0.91, 5.02)	**2.26** **(1.03, 4.96)**	0.99 (0.54, 1.83)
Hearing	≥ 75 vs 67-74	0.94 (0.30, 2.96)	1.28 (1.05, 1.50)	1.00 (0.35, 2.90)	1.44 (0.57, 3.60)
Estimated overall prevention score:					
Men	17-49	49%	32%	42%	31%
	50-64	42%	39%	50%	35%
	65+	44%	37%	47%	40%
Women	17-49	82%	75%	78%	74%
	50-64	64%	62%	66%	52%
	65+	49%	43%	48%	40%

Cervical cancer screening: women 17-69; Breast cancer screening: women 50-69 years; Influenza immunization: 65 years or older or any age with a chronic condition putting them at a higher risk for influenza; Colorectal cancer screening: 50 years or older; Visual impairment screening: 65 years or older; Auditory impairment screening: 65 years or older

For the overall prevention score, individuals younger than 50 years make up the reference category. For individual manoeuvres, the younger age group for which the manoveuvre is indicated make up the reference category.

Odds ratio (CI) for older individuals compared to younger individuals, adjusted for sex, rurality and insurance status are shown.

Statistically significant ($p<0.05$) results are bolded

For each of the six maneouvres making up the prevention score, we evaluated the presence of the manoeuvre being performed in the previous 24 months in those for whom the manoeuvre is recommended:

The age effect for those 50-64 was significantly larger in HSOs (-22%, CI: -15%, -30%) than FHNs (-12%, CI: -6%, -18%).

The estimated prevention score for the typical individual is shown. The typical individual is urban and has public health insurance.

Table 6: Chronic disease management across age groups – Difference in score of older age groups relative to those younger than 69 years of age

	Age group	**CHC**	**FFS**	**FHN**	**HSO**
Age effect (%) for score:					
Overall Chronic Disease Management	60-69	5.7 (-9.1, 20.5)	**17.4 (3.4, 31.3)**	**21.3 (8.3, 34.2)**	**24.4 (11.6, 37.2)**
	70+	5.0 (-7.5, 17.5)	11.6 (-0.4, 23.6)	8.0 (-3.0, 19.0)	8.6 (-2.3, 19.5)
Diabetes	60-69	-0.5 (-18.7, 17.6)	13.6 (-1.5, 28.6)	**17.0 (1.8, 32.3)**	15.8 (-0.2, 31.9)
	70+	2.3 (-13.8, 18.4)	9.2 (-6.7, 25.1)	3.1 (-10.4, 16.6)	3.4 (-10.0, 16.8)
CAD	60-69	-2.3 (-26.7, 22.2)	21.6 (-1.2, 44.3)	9.9 (-14.5, 34.3)	9.4 (-11.7, 30.5)
	70+	-3.6 (-26.1, 18.9)	-0.3 (-22.1, 22.3)	-5.7 (-27.2, 15.9)	-5.2 (-24.9, 14.4)
Estimated score					
Overall Chronic Disease Management	<60	64.0%	47.0%	49.8%	53.3%
	60-69	69.7%	64.3%	71.1%	77.7%
	70+	68.9%	58.5%	57.8%	61.9%

Individuals less younger than 60 years of age make up the reference category.

The age effect adjusted for sex, rurality and public insurance (CI) are shown

Statistically significant ($p<0.05$) results are bolded

The age effect for those 60-69 was significantly larger in HSOs (24.4, CI: 11.6, 37.2) than CHCs (5.7, CI: -9.1, 20.5).

The estimated performance for different age groups in each model is shown for the “typical patient profile”, i.e., an individual with the most common features: urban women with public health insurance.

Discussion

This study is the first to assess disparities between age groups across several dimensions of primary care performance in primary care models. We observed disparities across age groups for health service delivery, preventive care, and chronic disease management, but found that the model had little meaningful impact on these disparities. In health promotion, we found the focus on younger individuals attending CHCs justifiable and therefore appropriate.

Individual findings:

Health service delivery

Relative to their younger counterparts, older individuals reported significantly better health service delivery. This relationship persisted after adjusting for health status, indicating that the effect was not related to the lower health status/higher needs of the elderly. These results are consistent with findings from other groups,(34-36) one of which attributed their results to a general effect: older generations value the services more.(35) Although the age effect was larger in both capitation based models compared to CHCs and FFS, the small difference in effect size suggests that any impact these models might have is negligible.

Health promotion

The likelihood of discussing a healthy lifestyle subject was considerably higher in individuals younger than 30 compared to those older in CHCs only. Because individuals attending CHCs in that age group are more likely to be living under the poverty line and less likely to have completed high school than other group, and because these socio-demographic factors are associated with higher risk of unhealthy behaviour, including smoking(37;38) and drinking,(39) this higher likelihood of receiving healthy lifestyle counselling in younger individuals attending CHCs is likely an appropriate response to higher needs. The observation that the CHC age effect size is attenuated when health variables are included in the equation suggests that CHCs may prioritize healthy lifestyle discussion to less ill individuals. It is noteworthy that, despite a large effect in CHCs, older individuals attending that model do not receive less healthy lifestyle counselling than those attending other models.

Preventive care

Preventive care was more likely to be experienced by younger women. This is principally because the manoeuvres for which younger women are eligible are more likely to be performed (breast (70%) and cervical cancer screening (78%)), whereas those for which older individuals are eligible are the least likely to have been documented as performed (vision (32%) and hearing screening (16%)). The drop in the prevention score from ages 17-49 to those 50-64 was significantly larger in one capitation-based model (HSO) than in the other (FHNs), suggesting that this effect is not driven by the remuneration structure.

There was some indication that an age effect was present within manoeuvres. At the time of the study, influenza immunization was recommended for all individuals 65 years of age and older, as well as younger individuals with chronic conditions.(40) Adherence to the guidelines for the latter group is significantly lower than that for seniors. Because individuals with the type of chronic conditions for which this is indicated are expected to visit the practice at least as often as those 65 and older, this finding is unlikely to represent less frequent opportunity to offer that care for younger individuals. Instead, this could represent a lack of adoption for this manoeuvre by the medical community in that population. Alternatively, because a significant proportion of influenza vaccination is given in immunization clinics, it may point to the fact that sensitization campaigns aimed at the target public are not as successful at reaching these individuals.

Older individuals were less likely to have had colorectal and cervical cancer screening. This may reflect competing medical priorities leaving less time for this preventive manoeuvre to be performed or the perception that benefits of these interventions are lesser in the older age groups.

Chronic disease management

In our study, adherence to recommended guidelines for care of diabetes, coronary heart disease, and congestive heart failure was greatest amongst patients aged 60-69 compared to those aged 70-79 in all models except CHCs where evidence based care was equivalent across age groups. Several studies have documented that the elderly are less likely to receive recommended drug management for chronic disease. (41-44) Our study evaluated the family physician's intent by measuring prescription/recommendations. The results therefore cannot reflect patient compliance. The commonly postulated reasons for this physician behaviour include: the lack of evidence for efficacy in that population because seniors were often excluded from clinical trials; patient medical complexity that would result in inappropriate polypharmacy; and lower life expectancy rendering aggressive treatment undesirable. (45;46) Given that we did not observe an age effect in CHCs, where visits are longer and nurse practitioners more available, suggests that competing demands in older patients and limited time may be responsible for lower adherence to recommended guidelines in older patients. This study also demonstrated that younger individuals are less likely to receive care according to recommended guidelines. Few studies have documented lower use of drug therapy in younger individuals with chronic diseases. (41) These results warrant further investigation.

Conclusion

This study evaluates whether disparities across age groups exist within models and assesses whether the primary care model affects the disparity. We observed considerable age effect across a number of dimensions studied. We found two differences in the age effect across models. First, the likelihood of discussing a healthy lifestyle subject was higher in younger individuals attending CHCs, a finding determined to likely be an appropriate response to differing patient needs. Secondly, quality of chronic disease management varied significantly with age in FFS and capitation models but not CHCs. We conclude that the salaried model may have an organizational structure that is more conducive to providing appropriate care across age groups and that the thrust towards adopting capitation-based payment is unlikely to have an impact on age disparities.

Key Points:

1. This study is the first to assess disparities between age groups across several dimensions of primary care performance in primary care models.

2. Older individuals report significantly better health service delivery and this was not explained by their lower health status or higher needs.

3. Age was a significant determinant of the likelihood of receiving chronic disease management according to recommended guidelines in all models except CHC.

Contributions of the authors*:*

SD conceptualised the current study, consulted on the statistical analysis, and wrote the initial draft of the manuscript. MT contributed towards methodological and statistical analysis. WH conceptualised the original study and was consulted on the analytical approach, critically reviewed and edited the manuscript. GR, RAD, PT and EK all critically reviewed and edited the manuscript. All authors have read and approved the final manuscript.

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Delivery of Primary Health Care to Persons who are Socio-Economically Disadvantaged: Does the Organizational Delivery Model Matter?

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Abstract

Background: Comprehensive primary health care produces better outcomes. The World Health Organization calls for a renewal of primary health care to improve effectiveness and fairness in access to primary health care. As health systems evolve, it is essential to evaluate the impact these changes on the equitable delivery of health services. We evaluated the impact of practice organizational models on the delivery of health services across socio-economic groups in Canada.

Methods: Cross sectional study of 5,361 patients receiving care from practices (n) in which primary care providers were remunerated by Fee For Service (FFS) (35), Salary (35), or Capitation (68). We assessed health status of patients, visit duration, number of visits per year, quality of health service delivery using the Primary Care Assessment Tool (PCAT), and quality of health promotion. We used multi-level regressions to determine disparities in services across socio-economic groups within each model. We compared these disparities across models using a t-test to determine the impact of service delivery model on equity.

Results: Socio-economically disadvantaged individuals reported lower health status. The number of visits was significantly higher for the socio-economically disadvantaged than those not disadvantaged. The total number of visits for socio-economically disadvantaged individuals was approximately 11-14 per year in the Salaried, 11 in the FFS, and 6-7 in the capitation models. There was no difference in the visit duration across socio-economic strata within each model. The overall PCAT score did not vary meaningfully across socio-economic groups. Health promotion was significantly higher for individuals with low income and low education compared to those with neither risk factor in the salaried model only (Odds Ratio (CI): 1.7 (1.0, 2.8)).

Discussion: The capitation system in primary care practices may not be conducive to responding to the higher accessibility needs of socio-economically disadvantaged individuals (vertical equity). Regions undertaking primary care reforms need to consider the potential impact of the changes on the more vulnerable populations.

Introduction

Comprehensive and accessible primary health care improves health outcomes and helps reduce health inequities.[1,2] Canadian[3] and international[4] policy recommendations emphasize the need for renewal of further investment in primary healthcare systems to improve effectiveness and fairness in access to health care and to reduce health inequities. Health inequities can be defined as preventable and unjust health inequalities. In health care services, equity is expressed as horizontal equity – similar care for similar needs, and vertical equity – more care for higher needs.[5,6] While the introduction of the universal healthcare system in Canada has gone a long way towards decreasing inequities in healthcare accessibility,[7] significant gaps remain,[8] some of which occur in primary care. For example, individuals with higher education are more likely to have undergone cancer screening[9] and influenza vaccination[10] than wealthier individuals.

Inequities in delivery and quality of health services for socio-economically disadvantaged individuals is especially concerning because these individuals are already more likely to have poor health [11,12] and premature mortality.[13,14] They have an elevated risk of chronic conditions,[15,16] are more likely to smoke, and have higher rates of obesity and alcohol consumption.[13,17] If primary care is to play a more effective role in reducing health inequities,[18] the presence of disparities in access and quality of these services must be assessed and, if present, addressed.

In Ontario, the majority of primary care is delivered in family practices that are organized under models of care delivery that vary in their structure, mandate, and approach to physician remuneration. However, we do not yet know which inequities exist across the breadth of the primary care service spectrum or whether one care delivery models is better at addressing the needs of those socio-economically disadvantaged.

When Canada's universal health care system was established in the 1960s, all family physicians were paid on a fee-for-service (FFS) basis, where remuneration is directly tied to services rendered. In the early 1970s, to address the needs of socially disadvantaged populations, Ontario established Community Health Centres, a multidisciplinary care delivery model in which physicians are paid by salary (Salaried model).[19-21] During the same era, Ontario experimented with a capitation model, Health Service Organizations (Established capitation model), where provider compensation is based on the number (age and sex adjusted) of patients enrolled to them.[22] The majority of their patients were required to be enrolled under the capitation payment, but a small proportion of patients could be managed under the traditional FFS structure. In 2001, Ontario created and encouraged the adoption of a modified capitation model, the Family Health Networks (New capitation model), in which the majority of the remuneration was derived from capitation payment for enrolled, but where an additional 10% of the normal FFS schedule is paid for visits that are billed, principally as a means of tracking activity. Both capitation models also have access to pay for performance bonuses for achieving population target performance levels for enrolled patients. The move towards capitation models is based, in part, on the premise that separating compensation from the number of visits and services rendered will create more equitable care that is based on need.[22]

Today, capitation based models, FFS and Community Health Centres serve roughly 40%, 57% and 3%, respectively of the population of Ontario, Canada's largest province. The fact that these models of primary care service delivery co-exist under the same geo-political environment provides an ideal opportunity for comparing the impact of these models on the equity of service delivery within them. This study seeks to determine whether primary care models differ in terms of equitable delivery of quality health care to individuals who are socio-economically disadvantaged because of income and/or low education.

This study has three objectives: 1) Identify differing healthcare needs across income and education levels; 2) Assess equity of primary care service delivery in each model across socioeconomic groups by measuring the association between income and/or education levels and the quality of care delivered, and; 3) Determine the impact of model on equity by assessing whether this association differs by primary care model.

Methods

Design

This evaluation is a secondary analysis of data collected in the cross sectional study entitled: Comparison of Models in Primary Care (COMP-PC) conducted in 2005-6.[23] The study was approved by the Ottawa Hospital Research Ethics Board.

Sample

In the original study, all known and eligible (n) New capitation (94), Salaried (51) and Established capitation (65) practices and a randomly selected sample of 155 eligible FFS practices were invited to participate. Eligible practices were required to have belonged to their model for a minimum of one year. Recruitment efforts continued until 35 practices in each model agreed to participate or when time constraints required us to cease recruiting. We enrolled 32 Established capitation practices and 35 practices in all other models. The average length of time (years) practices had belonged to that model was: Salaried (17), FFS (15), Established capitation (16), and New capitation (2.3). Details of the study methodology and key features of the models are reported elsewhere.[23]

Data collection

We surveyed 30-50 sequential patients in the waiting room of each practice as they presented for their appointment. Patients were eligible if they were: under the care of one of the family physicians or nurse practitioners participating in the study; age 18 years or older; not severely ill or cognitively impaired; and able to communicate in English or French either directly or through a translator. The study group was determined to adequately represent the population in each model.[23]

Instruments

Patient surveys were adapted from the Primary Care Assessment Tool-Adult edition,[24,25] supplemented with a humanism and a trust scale,[26,27] and made available in French.[28] The first section of the survey was completed prior to the patient's visit with their provider, and captured detailed patient socio-demographic and economic information and elicited the patient's response on seven dimensions of service delivery. The second portion consisting of a single page was completed after that index visit and captured information related to the encounter, including the duration of the visit and a measure of health promotion.

Performance measures

We assessed the self reported duration of the index visit and number of visits to the practice in the previous year using these two questions: "How long did you meet with your provider today?" and "About how many times in total have you visited your provider's office over the past 12 months?" Health service delivery (5 dimensions) was measured using the Primary Care Assessment Tool scale. Each dimension contained three or four questions scored on a Likert scale of 1-4. We report an overall Primary Care Assessment Tool health service delivery score (derived from these five questions) and the five questions separately. We also included a Humanism scale consisting of 8 questions on a 7 point Likert scale, and a Trust scale, consisting of 10 questions on a 5 point Likert scale.[26,27] All scores are represented as a percentage of the maximum possible score for that scale.

Health promotion was assessed by evaluating whether one of six healthy lifestyle subjects was discussed at the index visit. The items were based on the recommendations of the Canadian Task Force on Preventive Health Care.[29,30] The question asked, "In today's visit to your clinic were any of the following subjects discussed with you? (yes/no/don't know)".

Analysis

Description of patient profile

Education level was captured from a question eliciting the highest level of education attained. Individuals having not completed a high school education were deemed to have "low education". All others were coded as "high education". Statistics Canada classifies individuals as living above or below the Low Income Cut Off (LICO) based on their household income before tax, number of individuals in the household and the size of the population in the region they reside (Box 1).[31] The first two measures were elicited in the patient survey. Because income was captured in ranges only, we used the upper value of the range as the income value; a conservative approach to identifying individuals living below LICO. Because we did not capture the patients' full postal code, we used that of the practice to determine region's population density. Box 2 shows the distribution of income ranges and the LICO classification, the study's measure of income.

We compared the profile of patients across educational and income group using chi square and Analysis of Variance, as appropriate, to help identify differing health and infer healthcare needs across patient groups (objective #1). The indicators of health status are identified in Table 1.

Disparities in measures of performance

To evaluate equity (objective #2), we compared the quality of care for individuals with higher education and higher income to those with low income and/or education in each model separately. We performed multi-level linear or logistic regressions, as appropriate, using the SPSS 18 mixed model procedure and the Glimmix procedure in SAS to account for the clustered nature of the data.

Based on current knowledge, we anticipated that socio-economically disadvantaged individuals would have poorer health and therefore greater healthcare needs. Our principal

Box 1: Statistics Canada Low income before tax cut-offs

	Size of area of residence (population size)				
Family size (#individuals)	**Rural (farm and non-farm)**	**Small urban regions**	**30,000 to 99,999 individuals**	**100,000 to 499,999 individuals**	**500,000 or more individuals**
1	$14,303	$16,273	$17,784	$17,895	$20,778
2	$17,807	$20,257	$22,139	$22,276	$25,867
3	$21,891	$24,904	$27,217	$27,386	$31,801
4	$26,579	$30,238	$33,046	$33,251	$38,610
5	$30,145	$34,295	$37,480	$37,711	$43,791
6	$33,999	$38,679	$42,271	$42,533	$49,389
7+	$37,853	$43,063	$47,063	$47,354	$54,987

Source: http://www12.statcan.ca/census-recensement/2006/ref/dict/tables/table-tableau-18-eng.cfm
Categorization of Low Income Cut Off (LICO) based on size of community in which the household resides, the number of individuals in the household, and the total income for the household.

Box 2: Self reported income ranges before tax and resulting Low Income Cut Off classification

	Number of participants living above or below the Low Income Cut Off (LICO) (2005 classification)	
Before tax income range	**Above LICO**	**Below LICO**
$0-$4,999	0	91
$5,000-$9,999	0	141
$10,000-$14,999	1	267
$15,000-$24,999	244	147
$25,000-$34,999	427	41
$35,000,$49,999	579	0
$50,000-$64,999	565	0
$65,000-$79,999	504	0
$80,000 and over	1159	0
Total	3,479	687

analysis therefore consisted of assessing whether these individuals received greater care (vertical equity). In these analyses, the quality of care measures (shown in Tables 2 and 3) were, in turn, the dependent variables, and the independent variables of interest were those coding for the combination of LICO and education status. In the principal analysis, we adjusted for the following socio-demographic factors: patient age, sex, living in a rural area, and travel distance to the practice (identified as SD1 in Table 1).

To determine whether observed disparities in the outcome measures across socio-economic groups can be explained by differences in other socio-demographic factors (that are frequently also considered measures of social disadvantage; identified as SD2 in Table 1) or due to differing health status between the groups (identified as H in Table 1), we conducted a second and third analysis in which, alternately, these factors were added to the equation.

Model comparison

To determine whether the observed disparities across socio-economic groups differed across primary care models (objective #3), we compared the effect size (absolute beta values) of the income and education variables derived from the regression models described above across models using the t-statistics. We use the t-statistics to compare statistically two point estimates (the effect size derived from the regression equation in two different models), accounting for variances.

Results

Characteristics of the study population

Seventy nine percent (5,361) of patients approached completed the survey. Amongst these, 4,166 and 5,113 provided sufficient information to determine income and education levels, respectively, and 4,055 (76%) provided both. Individuals having not reported their income had a profile that was more consistent with higher income individuals (*data not shown)*. Compared to individuals with high income and education, those living below the LICO were more likely to be women, unemployed, recent immigrants, and in poorer health than individuals without a risk factor (Table 1). Those without a high school education were more likely to be men, older, and report lower health status on some indicators than those without a risk factor. On most health indicators, individuals with both risk factors had the lowest health status.

Table 1: Profile of patients by socio-demographic group

			High income and education	Low income	Low education	Low income and education
Factor[a]	**Survey patient profile**	**n**	3,010	444	386	215
	Community Health Centres – Salaried		509 (58%)	194 (22%)	75 (9%)	93 (11%)
	Fee For Service – Fee For Service		824 (79%)	88 (8%)	92 (9%)	43 (4%)
	Family Health Teams – New capitation		920 (79%)	85 (7%)	108 (9%)	46 (4%)
	Health Service Organizations – Established capitation		757 (77%)	77 (8%)	111 (11%)	33 (3%)
	Socio-demographic profile	**n**	3010	444	386	215
SD1	Sex (women)*		64%	75%	54%	72%
SD1	Age (mean)*		48 years	44 years	60 years	63 years
SD2	Not speaking English or French at home *		0.8%	4.5%	1.6%	3.3%
SD2	Aboriginal *		1.1%	3.2%	1.0%	1.9%
SD2	Uninsured (in Canada) *		0.9%	4.5%	1.6%	3.7%
SD2	Unemployed *		2.1%	16.9%	3.6%	15.8%
SD2	Recent immigrant (< 5 years) *		1.1%	6.2%	0.5%	3.8%
SD1	Rurality index (mean)*		13	12	16	16
SD1	Distance from home to practice > 10 km *		26%	20%	22%	20%
	Health status					
H	Average number of days with poor mental health in past 30 days*		3.9 days	7.8 days	4.0 days	7.0 days
H	Average number of days with poor physical health in past 30 days*		4.6 days	7.9 days	6.8 days	9.4 days
H	Average number of days limited by poor mental or physical health in past 30 day*		3.3 days	6.9 days	5.4 days	7.5 days
H	Self perceived health very good-excellent *		88%	64%	73%	60%
H	Presence of at least one chronic disease*/Average number of chronic diseases *[b]		69%/1.6	77%/2.2	84%/2.6	88%/2.9

Low education = less than high school degree; LICO = Individuals living under the Low Income Cut off, a measure of household deprivation used by Statistics Canada.

[a] In this column socio-demographic factors and health status used for adjustment in the analyses are identified as SD1 (basic factors)/SD2 (risk factors), and H, respectively.

[b] 13 chronic diseases assessed (self reported).

Statistically significant differences ($p < 0.05$) across models are identified by “*”

Disparities in performance measures

The average duration of the index visit reported by the patients was 24 minutes in the Salaried and 15 minutes in all other models, and this did not significantly differ across socio-economic groups within a model. Compared to individuals with high income and education, socio-economically disadvantaged patients reported significantly more visits in the previous year in all models (except one group in the New capitation model) (Table 2). The number of additional visits ranged from 3.6-7.0, 3.5-4.2, and 0.9-1.7 in the Salaried, FFS and two capitation models, respectively. The difference in the number of visits across socio-economic groups was significantly larger in the Salaried and FFS models than in the capitation models. The estimated total number of visits for individuals socio-economically disadvantaged is approximately 11-14 per year in the Salaried, 11 in FFS, and 6-7 in the two capitation models. Adjusting for other social disadvantage features (SD2 in Table 1) had little impact on the effect size, and adjusting for health status (H in Table 1) attenuated the effect size only slightly, potentially attributable to the fact that our health status indicators do not capture all the nuances of illnesses.

Health service delivery scales

The overall Primary Care Assessment Tool score (based on first contact accessibility, first contact utilization, cultural competency, family centered care, and ongoing care/relational continuity) showed small differences (<5%) across groups. Adjusting for health or other social risk factors features did not have an apparent impact on the size effect. An analysis of the seven individual scales showed that socio-economically disadvantaged individuals do not report lower performance levels, and in some instances, reported higher scores than those with neither risk factor. Relational continuity (relationship between patients and their provider(s) that spans separate health care episodes and delivers care that is consistent with the patient's needs) was higher for these at risk individuals in the Salaried, FFS, and New capitation models. The first contact accessibility (the ability to obtain patient-initiated needed care from the provider of choice within a time frame appropriate to the urgency of the problem) score was higher only in those attending FFS practices.

Table 2: Health Service Delivery across socio-economic groups

	Group	Salaried	Fee For Service	New Capitation	Established Capitation
Duration of visit (min)					
Overall average		24	15	15	15
Effect of risk factors (Beta from regression) ✷	LICO	3.1 (-0.7, 7.0)	1.1 (-1.3, 3.4)	0.5 (-1.8, 2.8)	-0.3 (-2.6, 2.0)
	Low Education	-1.3 (-7.1, 4.5)	-0.8 (-3.1, 1.5)	0.1 (-2.0, 2.3)	-0.1 (-2.1, 1.9)
	Both	0.2 (-4.9, 5.3)	0.7 (-2.7, 4.2)	1.0 (-2.1, 4.1)	0.1 (-3.4, 3.6)
Number of visits per year					
Overall average		8.3	7.2	5.3	4.8
Effect of risk factors (Beta from regression) ⌘	LICO	**7.0 (4.8, 9.2)**	**3.5 (1.6, 5.3)**	**1.4 (0.2, 2.6)**	**1.6 (0.5, 2.6)**
	Low Education	**3.6 (0.3, 6.9)**	**4.2 (2.3, 6.0)**	**1.1 (0.0, 2.3)**	**1.2 (0.3, 2.2)**
	Both	**5.4 (2.4, 8.4)**	**3.7 (1.0, 6.3)**	0.9 (-0.7, 2.5)	**1.7 (0.1, 3.3)**
Estimated number of visits for the "typical patient" (Beta from regression) ♦	No risk factor	7.0	7.3	5.8	4.9
	LICO	14.0	10.7	7.2	6.5
	Low Education	10.6	11.4	7.0	6.2
	Both	12.4	10.9	6.7	6.6
Health Service Delivery Scales					
Overall PCAT score **(%)**					
Overall average		86%	86%	86%	88%
Effect of risk factors (Beta from regression)◎	LICO	-0.6% (-2.2%, 1.1%)	0.0% (-2.0%, 2.0%)	-0.8% (-2.8%, 1.2%)	1.0% (-1.0%, 2.9%)
	Low Education	0.5% (-1.9%, 2.9%)	1.8% (-0.2%, 3.8%)	-0.5% (-2.3%, 1.4%)	0.6% (-1.1%, 2.3%)
	Both	1.5% (-0.6%, 3.7%)	**3.9% (1.0%, 6.7%)**	**3.0% (0.4%, 5.7%)**	2.1% (-0.8%, 4.9%)
Individual scales◈					
PCAT scales					
First Contact Accessibility	Effect of LICO and Low education (beta from regression)	-2.3% (-6.1%, 1.6%)	**8.7% (3.7%, 13.8%)**	1.7% (-3.0%, 6.5%)	3.1% (-1.3%, 7.4%)
First Contact Utilization		-1.2% (-3.1%, 0.6%)	-1.1% (-3.2%, 1.0%)	0.3% (-2.0%, 2.6%)	0.6% (-1.7%, 2.9%)
Cultural competency		2.2% (-1.3%, 5.8%)	2.4% (-2.6%, 7.4%)	3.4% (-1.5%, 8.2%)	1.3% (-4.6%, 7.1%)
Family Centered Care		2.5% (-0.3%, 5.2%)	2.9% (-1.1%, 6.9%)	**4.4% (0.8%, 7.9%)**	2.3% (-2.0%, 6.5%)
Relational Continuity		**5.1% (1.8%, 8.5%)**	**5.1% (1.3%, 9.0%)**	**5.3% (1.5%, 9.2%)**	2.0% (-1.9%, 5.9%)
Humanism		-0.5% (-3.3%, 2.3%)	1.8% (-1.9%, 5.5%)	**4.9% (1.1%, 8.7%)**	1.8% (-2.6%, 6.2%)
Trust		-0.1% (-2.8%, 2.7%)	1.7% (-2.0%, 5.5%)	2.3% (-1.3%, 5.9%)	-0.2% (-4.1%, 3.8%)

Bolded effect sizes indicate a statistically significant difference between that socio-economic stratum and those with high income and high education.

PCAT = Primary Care Assessment Tool

Where the effects of risk factors (Beta from regression) are reported, the individuals living above the LICO and with at least a high school education make up the reference category. The analyses adjusted for SD1 only (95% Confidence Intervals (CI)) are shown.

Effect sizes (compared to the reference category) that are statistically significantly different are **bolded**

✷ The differences in the duration of visit between socio-economic groups were not statistically significantly different across models.

⌘ The difference in the number of visits for individuals living below LICO compared to those without socio-economic risk factor is significantly larger in Community Health Centres (7.0, 95% CI: 4.8, 9.2) than in the Fee for Service (3.5, 95% CI: 1.6, 5.3) or either capitation model (1,4, 95% CI: 0.2, 2.6 and 1.6, 95% CI: 0.5, 2.6). For individuals with low education, the difference in the number of visits is significantly larger in Fee For Service (4.2, 95% CI: 2.3, 6.0) than in either capitation model (1.1 95% CI: 0.0, 2.3 and 1.2, 95% CI: 0.3, 2.2). For individuals living below LICO and having low education, it is higher in Community Health Centres (5.4, 95% CI: 2.4, 8.4) than either capitation model (0.9, 95% CI: -0.7, 2.5 and 1.7, 95% CI: 0.1, 3.3).

♦ A typical patient is one with the most common features: women, ages 30-65, living in a non rural region, where travel distance to the nearest hospital is less than 10 kilometres.

◎ The overall PCAT score was derived from all questions contained in the five scales. The differences in the PCAT scores between socio-economic groups were not statistically significantly different across models.

◈ The effect sizes for individuals living below LICO and with low education only are shown. The effect sizes for individuals living below LICO only and those with low education only did not exceed 3% in either direction.

Definitions: *First contact accessibility*: The ability to obtain patient-initiated needed care from the provider of choice within a time frame appropriate to the urgency of the problem; *First contact utilization*: The extent to which the provider/practice is first used for various types of problems; *Cultural competency*: The extent to which providers integrate cultural considerations into communication, assessment, diagnosis and treatment planning; *Family centered care*: The extent to which providers consider the family (in all its expressions), understand its influence on a person’s health and engage it as a partner in ongoing health care; *Relational continuity*: A therapeutic relationship between a patient or client and one or more identified providers that spans separate health care episodes and delivers care that is consistent with the patient’s or client’s biopsychosocial needs; *Humanism*: An approach to medicine that emphasizes the relationship between caregiver and patient; *Trust*: The degree to which patients or clients believe that their provider will care for patients’ or clients’ best interests (adapted from Haggerty et al.) [32]

Health Promotion

In the salaried model only, the odds of having discussed at least one healthy lifestyle subject were higher only for individuals with both low income and low education compared to those with neither risk factor (Odds Ratio (95% CI): 1.7 (1.0, 2.8)) (Table 3). This effect was lost when other social disadvantage factors were included in the question (Odds Ratio (CI): 1.0 (0.7, 1.5). The odds ratio of having discussed each individual lifestyle subject is also shown in Table 3. Home safety and family conflict were more likely to be discussed in some risk groups in most models.

Table 3: Health promotion across socio-economic group

	Socio-economic group	Salaried	Fee For Service	New Capitation	Established Capitation
Odds Ratios of discussing:					
At least one subject	Low income	1.3 (0.6, 1.8)	1.1 (0.7, 1.8)	1.3 (0. 8, 2.1)	1.2 (0.6, 1.8)
	Low education	0.7 (0.4, 1.2)	0.9 (0.6, 1.5)	1.1 (0.7, 1.7)	0.9 (0.6, 0.4)
	Both	**1.7 (1.0, 2.8)**	0.8 (0.4, 1.7)	1.2 (0.6, 2.2)	0.9 (0.4, 2.0)
Healthy Foods	Low income	1.3 (0.9, 1.9)	0.8 (0.4, 1.5)	1.0 (0.5, 1.8)	0.8 (0.4, 1.6)
	Low education	0.7 (0.4, 1.4)	0.7 (0.4, 1.4)	0.8 (0.5, 1.5)	1.1 (0.6, 1.9)
	Both	1.4 (0.8, 2.3)	1.0 (0.4, 2.5)	1.1 (0.5, 2.3)	0.5 (0.1, 1.7)
Home safety	Low income	1.3 (0.6, 2.7)	3.9 (1.4, 10.5)	**6.7 (2.1, 21.2)**	1.0 (0.2, 4.4)
	Low education	1.0 (0.3, 3.5)	**4.9 (1.9, 12.7)**	2.8 (0.8, 10.2)	0.9 (0.3, 3.2)
	Both	**2.4 (1.1, 5.5)**	2.2 (0.5, 10.7)	1.9 (0.2, 16.3)	2.0 (0.4, 9.8)
Family conflict	Low income	1.2 (0.8, 2.0)	**2.7 (1.3, 5.4)**	1.7 (0.9, 3.3)	**2.1 (1.1, 4.2)**
	Low education	1.0 (0.5, 2.3)	1.6 (0.7, 3.5)	1.0 (0.4, 2.4)	0.6 (0.3, 1.5)
	Both	1.4 (0.7, 2.7)	1.7 (0.5, 5.2)	**2.3 (1.0, 5.4)**	0.7 (0.2, 3)
Exercise	Low income	1.2 (0.8, 1.7)	0.9 (0.6, 1.6)	1.0 (0.6, 1.8)	0.7 (0.4, 1.3)
	Low education	0.5 (0.3, 1.0)	0.7 (0.4, 1.2)	0.9 (0.6, 1.5)	0.7 (0.4, 1.3)
	Both	0.7 (0.4, 1.2)	1.2 (0.6, 2.3)	0.9 (0.4, 2.1)	1.0 (0.5, 2.1)
Smoking	Low income	0.8 (0.5, 1.3)	1.8 (1.0, 3.2)	1.0 (0.5, 2.0)	1.3 (0.7, 2.4)
	Low education	1.2 (0.5, 2.5)	1.3 (0.7, 2.5)	1.6 (0.9, 2.9)	0.7 (0.3, 1.4)
	Both	1.7 (0.9, 3.0)	1.4 (0.6, 3.5)	2.1 (1.0, 4.6)	1.2 (0.5, 3.4)
Alcohol	Low income	0.8 (0.5, 1.4)	0.3 (0.1, 1.3)	0.4 (0.1, 1.1)	1.3 (0.6, 2.9)
	Low education	0.4 (0.1, 1.1)	0.6 (0.2, 1.6)	0.9 (0.5, 1.9)	0.6 (0.2, 1.5)
	Both	0.7 (0.3, 1.5)	2.1 (0.7, 6.4)	0.8 (0.3, 2.4)	2.5 (0.9, 7.4)

Individuals living above the LICO and with at least a high school education make up the reference category.

The Odds Ratios of having discussed at least one healthy lifestyle subject, and the difference in having discussed each individual lifestyle subjects at the index visit between socio-economic groups are shown. The estimates are adjusted for basic socio-demographic profile only (age, sex, rurality and distance to hospital) (95% confidence intervals) using multi-level linear regressions.

The odds ratio for the likelihood of having at least one subject discussed was compared across models and found not statistically significantly different.

Bolded effect sizes indicate a statistically significant difference between that socio-economic stratum and those with high income and high education.

Discussion

Individuals of low socio-economic status have poorer health and generally require greater healthcare. In this study, we find that they make fewer additional visits to their family practitioner each year in capitation models than in other models, and the duration of their visits is equivalent to those patients who are not socio-economically disadvantaged. In addition, the self reported measure of first contact accessibility is significantly higher amongst socio-economically disadvantaged individuals compared to those without these risk factors in FFS practices only. This study suggests that the capitation system in primary care practices may not be responding to the higher accessibility needs of socio-economically disadvantaged individuals - vertical equity.

Several Canadian studies had previously documented that amongst individuals who do access primary care services, like the participants in this study. those with low education or low income make significantly greater use of these services.[8,33-35] Each of these studies used data dating from 2003 or earlier, at which time the great majority (>90%) of family physicians were funded under the fee for service structure. Today in Ontario, 40% of family practitioners are remunerated principally by capitation. Considering the equitable delivery of care in each model separately, we documented that, relative to individuals who do not have a low education or low income, those with either or both risk factors had more frequent visits, and this difference was often larger in Community Health Centre (range: 3.6-7.0) or FFS (range 3.5-4.2) practices compared to the two capitation models (range: 0.9-1.7). Because the question asked the number of times the participant visited their provider's office over the previous 12 months, the difference in additional visits between capitation and FFS models cannot be explained by the possibility that physician visits in the capitation models were substituted by visits to other health professionals. Consistent with these results, individuals with low income and low education attending FFS but not capitation models reported significantly better first contact accessibility than those without these risk factors.

Physician behaviour is known to be affected by remuneration.[36] Because FFS remuneration increases with the number of services provided and is likely to decrease with longer visit duration (because of opportunity costs), we would expect, as this study documents, that the greater needs of the disadvantaged population would be addressed by increasing visit frequency rather than duration. In capitation models, remuneration is directly related to the number of patients under the care of a provider, and is largely dissociated from the number or duration of encounters. Physicians working under that structure could address the greater needs of their disadvantaged patients by either increasing visit duration or frequency. Our study finds that capitation models do not provide considerably greater access for socio-economically disadvantaged individuals. This finding raises the concern that the dissociation between payment and services could result in reduced accessibility. A recent study conducted in Ontario found that capitation based practices provided lower accessibility to their population than FFS practices.[37]

Socio-economically disadvantaged individuals are more likely to have behavioural health risk factors such as smoking, excessive alcohol consumption, and poor eating habits.[13,17] Improved accessibility to health promotion could reduce these risks.[38-40] However, we found no consistent evidence that these individuals are more likely to receive healthy lifestyle counselling addressing these factors in any of the models studied. Primary care counselling can improve healthy lifestyle habits. A meta-analysis found that adding a nurse/coordinator to a family practice to help patients quit smoking was effective.[41] Another meta-analysis found that adding a physical activity counsellor in a family practice can help reduce obesity.[42] However, the extent to which these interventions reach those socio-economically disadvantaged may not be optimal.[43]

This study has some limitations. While the patient participation rate was good (79%), a considerable proportion (22%) did not provide the information required to determine their income status. If these individuals differ in their experience of primary care from the respondents, this study would not be accurately representing the disparities across socio-economical groups. The study was conducted only four years after the Family Health Networks (the new capitation model) were introduced. While all practices were required to have operated in that model for at least one year, perhaps providers take longer to adapt their behaviour to new circumstances, and the results pertaining to this new capitation model do not reflect all of the changes that could result.

In its most recent report, the World Health Organization describes its efforts to promote the universality of care around the world.[44] The introduction of universal care under the Canadian Act has reduced disparities[7] but as the system continues to evolve, policy makers need to be vigilant about the impact of new transformations on the equitable delivery of care. This study provides the first account of the experience of socio-economically disadvantaged individuals across different primary care organizational models in Canada. The results suggest that the remuneration structure may affect provider behaviour in a way that could reduce their accessibility to those who are most vulnerable. Further assessment of the impact of primary care reforms on equity in Canada is clearly required.

Contributions of the authors:

SD conceived the current study, consulted on the statistical analysis, and wrote the initial draft of the manuscript. MT contributed towards methodological and statistical analysis. WH conceptualised the original study and was consulted on the analytical approach, critically reviewed and edited the manuscript. RAD, EK, KP, MT, PT, and NW all critically reviewed and edited the manuscript. All authors have read and approved the final manuscript.

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Conclusions

In health care services, equity is the delivery of similar care for similar needs (horizontal equity), and the delivery of more care for higher needs (vertical equity).[1,2] This study assessed the extent to which primary care provision is equitable across gender, age and socioeconomic groups, and whether any observed disparity is associated with the type of primary care organizational model to which a family practice belongs. Organizational models vary in the way they are structured, in their mandate, and in the way providers are remunerated, factors that can contribute to the perpetuation of, or mitigate, health inequities. The analyses considered a broad set of primary care dimensions that cover the quality of health service delivery parameters (such as accessibility, relational continuity and cultural competence) and the technical quality of care (such as health promotion, preventive care and chronic disease management). They assessed whether similar care was delivered to individuals with similar conditions such as adherence to recommended guidelines for men and women with chronic conditions (horizontal equity), and whether more care was provided to those in greater needs such as enhanced accessibility to individuals of low socio-economic status as they have greater health care needs (vertical equity).

Significant inequalities in the care of patients were found across groups. In some cases, these inequalities were deemed appropriate, as a justifiable response to differing health care needs. In other cases, these were deemed inappropriate and representing inequities in the delivery of care. Some of the observed disparities were present in one model but not others, suggesting that its organizational attributes may be contributing to these differences. The findings are summarized in Table 1. The discussion is grounded in the organizational remuneration structure as the comparator because it is the one consistent feature across practices of the same model and other organizational characteristics that are associated with one model are not always exclusively, while persistently found in practices that model. The capitation and salaried models are compared to the long standing fee for service model.

Table 1: Summary of the findings

	Remuneration	**Salaried**	**Fee For Service**	**New Capitation**	**Established Capitation**
	Model name	*Community Health Centre*	*Fee For Service and Family Health Groups*	*Family Health Networks*	*Health Service Organizations*
Health Service Delivery (HSD)		Women have more visits than men. Otherwise, no meaningful gender effect			
		Older individuals report slightly (Community Health Centre)/somewhat (Fee For Service) better HSD (vertical equity or age groups differ in their expectations)		Older individuals report better HSD (vertical equity or age groups differ in their expectations)	
		Number of visits higher for disadvantaged	Accessibility better for disadvantaged	No consistent effect across socio-economic groups	
Technical Quality of Care	**Health Promotion**	No gender differences	Gender differences likely reflect differential needs		
		Younger individuals more likely to receive advice (likely responsive to needs of their population)	No age difference		
		No consistent evidence for better health promotion for disadvantaged			
	Preventive Care	Women specific manoeuvres more likely to be performed in all models			
		Cervical cancer screening and/or colorectal cancer screening less likely to have been performed in older individuals			
	Chronic Disease care	Adherence to recommended guidelines lower in women		No significant gender gap	
		No significant age gap	Individuals younger than 60 less likely to receive care according to recommended guidelines		

Capitation

There was one instance where the gap observed in the technical delivery of care was smaller in the capitation models than in the Fee For Service model. Adherence to recommended guidelines for chronic disease management, which has frequently been reported to be lower for women,[3-8] was indeed inferior to men in women attending Fee For Service practices but not capitation practices. There was otherwise no evidence of a model effect on equity in the technical delivery of care. Although individuals with low socio-economic status are more likely to have unhealthy lifestyle habits, neither Fee For Service nor capitation providers were more likely to provide healthy lifestyle counselling to these individuals. The gender and age gap that was recorded in the extent to which patients were up to date on their preventive care, and the age gap that was measured in chronic disease management were observed in both Fee For Service practices and capitation practices.

The evidence around the effect of model on the equity of health service delivery was mixed. Older patients reported better health service delivery (higher scores on the Primary Care Assessment Tool - PCAT) than younger ones mainly if they attended capitation models. While differences in expectations or availability can account for the differential in PCAT scores across age groups, it does not account for differences between models. Rather, this data suggests from the patient's perspective, that providers working in capitation models deliver somewhat better health service delivery for older individuals. Older individuals have poorer health and require more care. However, the effect size across age groups was only slightly attenuated when health variables were included in the analysis, indicating that, either the health measures recorded didn't adequately or fully capture health status, or the differential in care isn't related to differential in health needs. The difference in scores between individuals 65 years of age and older and those younger than 30 years in capitation (5.6%-5.7%) and in Fee For Service (2.6%) practices was small (approximately 3%), but it was rather consistent across the different dimensions of health service delivery (such as accessibility, continuity and humanism), suggesting that the observed difference likely reflects a true underlying difference in how health services are delivered (or received) across age groups in capitation models.

In contrast, individuals of low socio-economic status (low income and/or low education), who were documented to have greater health care needs, reported better accessibility than those who are not socio-economically disadvantaged in Fee For Service only. First Contact Accessibility (the ability to obtain patient-initiated needed care from the provider of choice within a time frame appropriate to the urgency of the problem) was significantly higher in individuals of low income and education compared to those without these socio-economic risk factors in Fee For Service but not in either capitation model. In keeping with this, individuals of low socio-economic status have considerably more visits compared to those without these risk factors in Fee For Service but not capitation models. While the self reported duration of visit is similar in Fee For Service and capitation practices and across patient socio-economic groups, the estimated total number of visits to the practice for individuals socio-economically disadvantaged is approximately 11 in Fee For Service but only and 6 or 7 in the two capitation models. Compared to individuals who are not socio-economically disadvantaged, those with low income and/or low education have approximately 4 additional visits in Fee For Service and only 1-2 additional visits in capitation models. Capitation practices were somewhat more likely to have had other health professionals working in the practice. However, the question surrounding the number of visits elicited information about all visits to the practice, not only with their principal provider, and therefore is expected to have captured visits with the family physician as well as other health professionals. These findings raise the concern that the lack of meaningful financial incentive for visits under the capitation structure might compromise the scheduling of required visits.

Salary

Young individuals were significantly more likely to have discussed a healthy lifestyle subject than older individuals in Community Health Centres only. In addition, the age disparity favouring individuals ages 60-69, observed in the chronic disease management in Fee For Service and capitation models was not found in Community Health Centres. In these practices chronic disease care was similar across age groups. One possible reason for this apparent focus on younger individuals in Community Health Centres is that these clients were more likely to have at least one social risk factor such as low education, low income, be immigrants, a language barrier, or be of aboriginal origin than young individuals in other models. Forty nine percent of Community Health Centre patients younger than 30 had at least one of these social risk factor while only 20%-21% did in the other models. However, the likelihood of having discussed a healthy lifestyle subject was similar whether or not the regressions were adjusted for these socio-demographic and economic factors, suggesting that this age effect is independent of the socio-demographic and economic factors measured in this study. It is possible that risk factors not measured in this study, such as smoking, eating behaviour, drug use, or inappropriate housing, are more likely present in Community Health Centre patients of that age group and contribute to the enhanced likelihood receiving healthy lifestyle advice.

The study found that individuals of low socio-economic status have significantly enhanced accessibility in Community Health Centres and Fee For Service practices. There was some indication that individuals with low socio-economic status were more likely to have discussed a lifestyle subject than those not disadvantaged, but this evidence was not consistent across all low socio-economic strata. However, the enhanced frequency of visits to the practice by that group will result in more frequent opportunities for healthy lifestyle counselling. Together, these results support the notion that Community Health Centres provide appropriate delivery of care to their vulnerable population that is responsive to patient needs.

The observed gender and age gap in preventive care and gender gap in chronic disease management observed in Fee For Service were not meaningfully reduced in Community Health Centres. Women were more likely to be up to date on their required preventive care, but less likely to have received care according to recommended guidelines for chronic disease management in Community Health Centres and Fee For Service Practices.

Strengths and Limitations

This thesis contributes to the Canadian body of literature on the equitable delivery of primary care by adding substantially to the understanding of the experience of individuals of low socio-economic status, men and women, and age groups in family practice. The study allowed a broad facet of primary care performance to be assessed within the same population.

Study participants

Data collection was limited to practice attendants, so that individuals not receiving care from a primary care practice were not captured. As such, the study did not assess the experience of the general population, and interpretation of the results must be limited to practice attendants.

Within the practice, because individuals were invited to participate sequentially, as they arrived for their appointment, individuals who attended the practice frequently were more likely to have been surveyed. The experience of these individuals is likely different from those who visit the practice less frequently. Because this bias is likely to have been cross-cutting across the models studied, it is unlikely to have had an impact on size of the differences across strata.

Data collection tool

While much of the literature assessing equity across social groups is based on health administrative data, this study uses primary data collection, and allows a more thorough understanding of the patient experience and its context. Patient surveys were based on a validated tool. (the Primary Care Assessment Tool)[9,10] That tool measures the patient's experience in primary care practices by eliciting their response to rather objective questions rather than asking for their satisfaction level which is more subjective and subject to bias resulting from the individual's past experience and expectation. For example, one question on the "First Contact Accessibility" scale asks: *When your provider's office is open and you get sick, would someone from this office see you the same day?*. When measuring "Health Promotion", the question asks: *In today's visit to your Clinic were any of the following subjects discussed with you?*. The likelihood that past experience and expectation would influence these rather subjective questions is low. For that reason, while we cannot exclude that differences measured across social strata may be due to differences in their social history, this seems less likely.

The Primary Care Assessment Tool is widely recognized as an appropriate tool for measuring primary care performance.[11-14] However, as with any other approach, this tool has its limitations. It is now known how it performs across different populations. It was developed over 10 years ago, and it is not clear whether the items in the scales are as relevant in assessing today's primary structure.

Attributing patients to their social strata

The majority of individuals identified their sex (99%), and could be attributed to the correct group. Similarly, most patients provided their age (95%) which could then be grouped into strata. Groupings were selected to reflect similarities in their responses to questions. These groupings (<30; 30-64, ≥65) have face validity because they reflect age groups that represent differences in stages of life.

Socio-economic groups were based on the Low Income Cut Off (LICO) and Educational status. LICO is itself based on three parameters, the household income, the number of individuals living in the household and the size of the population in the area of residence. The ability to attribute patients to LICO was limited by two factors. First, because we did not have postal codes for patients, the population size of their region could not be ascertained. Instead we used their practice postal code to assign population size. In doing this, we assumed that patients lived within the same region as their practice. Our data shows that 75% of patients lived within 10 kilometres of the practice. The second limitation stems from the fact that only 78% of individuals provided the household income. Individuals having not reported their income had a profile that was more consistent with higher income than lower income individuals, but there was not sufficient information to allow adequate attribution of these individuals to a stratum, and these individuals which made 22% of the respondents were excluded from that analysis. As a result, the differences between strata may be may not be fully representative. Observed differences may inflate or under-estimate true differences across strata.

The education variable was more consistently reported (95%). That variable captured educational attainment along seven levels. For the purpose of the analysis, the variable was dichotomized into those having not achieved high school and those achieving high school or higher degree. This cut off was selected because individuals within these groups reported similar scores on the quality measures. While a more granular categorization might have allowed a more in depth understanding of equity across educational groups, the resulting number of categories in combination with LICO would have made the analysis cumbersome and more difficult to interpret.

Despite these shortcoming, the fact that these variables were self reported rather than ascertained by the profile of the population within the region where the individual lives (as is usually the case with studies relying on health administrative data) strengthens the results.

Measuring quality of preventive care and chronic disease management

We relied on chart abstraction to ascertain whether preventive care and management of chronic condition was done according to recommended guidelines. This approach relies on the assumption that these processes of care are adequately documented. However, because the main objective of this thesis was to identify differences across groups within one model, any incomplete documentation would have had a similar effect on the measures in the different groups, and would likely have little impact on the study conclusions.

Because the measures of socio-economic status were captured through the surveys, and surveys were not linked to the chart abstraction, the study could not assess whether inequities in preventive care and chronic disease management were present across socio-economic groups. This is unfortunate because Canadian studies have documented such inequities. For example, individuals of low socio-economic status were less likely to be up to date on their preventive care, such as cancer screening or flu vaccination,[15-18] findings that are in keeping with the international literature.[19-23] In addition, individuals of low socio-economic status documented barriers to medication therapy in chronic disease management.[24-26] This study could not confirm these findings, and more importantly, was not able to assess whether reform efforts had an impact on these disparities.

Primary Care

The term primary care refers to the services delivered in a family practice, usually by a family physician, and sometimes a nurse practitioner, while the term primary health care refers to a broader set of services that encompass primary care, but also includes population based initiatives that target communities or groups of individuals.[27] The scope of this thesis was limited to the assessment of equity in primary care. It evaluated whether disparities were present across individuals of different social strata in their encounter with their family practice. As such, it did not consider whether additional services were available to complement that care and which might have been targeted specifically to the population in need. For example, our study found that individuals attending Community Health Centres were not more likely to have discussed a healthy lifestyle subject at their primary care encounter. However, Community Health Centres offer population based services that target the specific needs of their population and as such could have responded to the greater needs of certain members of their population.

More recently, the Ontario government introduced a multidisciplinary care model within primary care practices, the Family Health Teams which is intended to provide more primary health care type of services to their population. Future evaluations should assess the extent to which that structure is better able to respond to the needs of special populations within these practices.

Recommendations

The role of primary care in reducing inequities

Investments in primary care are essential because these services form the backbone of the health care sector.[28-30] While health is influenced by a number of factors, investments in primary health care are key to mitigating inequities. Studies have shown that a greater primary care orientation is associated with reduced effect of socio-economic status[31,32] and racial disparities on health status[33] as measured by various indicators of health, including stroke mortality, self reported health, and overall risk of mortality. As a result, primary care is viewed as a viable option for counteracting increases in the risk of health inequities from upstream sources such as education and environment.[34-36]

Primary care organization

This study concludes that Community Health Centres provide enhanced accessibility to individuals with socio-economic risks, and adapt their services in response to the needs of their patients, resulting in more targeted care to their younger and at risk patient population. This study provides some evidence, although weak, that the Community Health Centre, as a primary care delivery model, is an appropriate care strategy for at risk population, and may help reduce inequities in health across risk groups.

The study found no consistent evidence that capitation improves the delivery of care in response to needs. The reduction in the gap for quality chronic disease management across gender needs to be confirmed in other studies. This improvement may be related to other changes in the organizational structure of these models such as the higher usage of electronic medical records and reminder systems. This study raises serious concerns about the observed association between capitation and lack of enhanced accessibility for the vulnerable population.

There is some literature identifying the risk for reduced accessibility under the capitation system. One type of access risk under capitation is for diminished accessibility to the practice for needed care for patients enrolled to the practice. Several Canadian studies have documented a reduction in the number of visits or quantity of services provided under the capitation scheme,[37-41] but none used indicators that could distinguish between an appropriate reduction in utilization for non required visits provided under FFS and a compromise in accessibility. This is the first study to suggest that accessibility may not be optimal for socio-economically disadvantaged individuals in capitation models. We found significantly better accessibility for these individuals in FFS practices but not capitation practices. These findings raise the concern that the lack of meaningful financial incentive for visits under the capitation structure might compromise access to needed visits. Understanding the impact of in practice accessibility when changing to a capitation based payment is best addressed in a longitudinal evaluation.

There is a second type of risk for accessibility that was not addressed in this study, but that is worth raising. Because capitation relies on a fixed monthly payment per patient, if the monthly payment amount is not adequately adjusted for the needs of the patients, the payment structure may lead to behaviour that results in reduced accessibility to the population. If the risk adjustment method used to establish the base capitation payment does not accurately reflect the extent of services anticipated, the danger is that providers might refuse patients expected to be frequent visitors to the practice in an effort to maximize income.[42,43] It is important that the capitation amount be adjusted so that providers are paid more for complex patients that take more time per visit and need to be seen more often. In reality this has been difficult to achieve and in many jurisdictions the capitation rate is only age and sex adjusted. In this context, one of capitation's greatest potential shortcomings is that physician's financial interests are best served by only accepting healthy patients who require little care, a practice known as cream-skimming.[44] To address this problem, some countries (e.g. Norway) use a blended payment system based principally on FFS (70%) with a relatively small capitation payment.[45]

Monitoring the effect of reforms

In response to calls for reform to strengthen this sector, governments introduce initiatives intended to address its deficiency. Many would suggest that these reforms should directly aim to address the inequities present in our society. At a minimum, the impact of these changes on the more vulnerable in our society should be considered so as to ensure that no unintended harm is caused.[46] Because primary care has a pivotal role in reducing disparities, reforms in that sector should be undertaken only after careful consideration of their impact on the vulnerable. This study raises the question of whether capitation may be compromising accessibility to the vulnerable. Ontario is currently conducting an evaluation of its primary care structure which will hopefully shed more light into this.

The Canadian primary care organizational landscape is very varied and remains in flux, as jurisdictions struggle to identify the best structure for their population. Canada requires an ongoing monitoring strategy that would allow continuous assessment of its performance and permit researchers to evaluate the impact of various reform strategies on the quality of care delivered, the efficiency of its investment and the equity of the system. This monitoring strategy would not only permit jurisdictions to understand the effect of their investments on their population, but would also allow cross jurisdictional sharing of essential information.

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