Inclusion of persons with mental illness in patient-centered medical homes: Cross-sectional findings from Ontario, Canada

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Abstract

Background: In Ontario, Canada, the patient-centered medical home is a model of primary care delivery that includes three model types: enhanced fee-for-service, blended capitation and team-based blended capitation. All three models roster patients and have similar practice requirements but differ in physician reimbursement. The blended capitation models are age-sex but not case-mix adjusted. We evaluated the extent to which persons with mental illness were included in physicians' total practices (rostered and non-rostered patients) and included on physicians' rosters across types of medical homes in Ontario.

Methods: Using population-based administrative data, we examined patients with psychotic-bipolar diagnoses, other mental health diagnoses, and no mental health diagnoses. We modeled the prevalence of mental health diagnoses and the proportion of patients with mental health diagnoses rostered across medical home model types controlling for demographics and case mix.

Results: Compared to enhanced fee-for-service, and in relation to patients without mental illness, proportions of patients with psychosis-bipolar disorders were not different in blended capitation and team-based blended capitation practices (RR=0.91, 95% CI:0.82-1.01; RR=1.06, 95% CI:0.96-1.17, respectively) but, there were fewer patients with other mental illness (RR=0.94, 95% CI:0.90-0.99; RR=0.89, 95% CI:0.85-0.94, respectively). Compared with expected proportions, both capitation models were significantly less likely than enhanced fee-for-service to roster psychotic-bipolar patients (blended capitation: RR=0.92, 95% CI: 0.90-0.93; team based capitation: RR=0.92, 95% CI:0.88-0.93) and also patients with other mental illness (blended capitation: RR=0.94, 95% CI:0.92-0.95; team based capitation: RR=0.93, 95% CI:0.92-0.94).

Interpretation: Persons with mental illness are under-represented in the rosters of Ontario's capitation based medical homes. Findings suggest a need to direct attention to the incentive structure for including patients with mental illness.

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INTRODUCTION

Background

The concept of the “patient-centered medical home” has been promoted by primary care organizations as a model for health service delivery that has the potential to improve the accessibility, affordability and quality of health care. [1,2] A “medical home” for patients includes a physician-led multidisciplinary clinic that provides comprehensive primary care, expanded hours, integrated evidence-based quality measurement and modern health information technology. In Ontario, Canada, several types of medical homes have been developed since 2002. [3] By August 2008, almost half of the province’s 13 million residents and 11,000 primary care physicians had voluntarily joined medical home models which included patient rostering, after-hours coverage, incentives for preventive health care, and payments for chronic disease management. Approximately four million patients had transitioned from fee-for-service models to blended capitation practices. Almost half of the capitation practices had multidisciplinary clinician teams, with many including mental health workers.

In North America, about one-third of primary care patients meet the criteria for a psychiatric disorder within any 12-month period, [4] however, less than one-half of people with mental health disorders actually receive treatment. [5-8] Primary care physicians are the most commonly consulted providers for mental health services [9] and often are the only providers contacted.[7,10] People with mental illness, however, experience more difficulty accessing primary care than the general population. [11,12] As such, increasing access to primary health services for people with mental illness is a priority for policy makers in Ontario and Canada. [13,15]

There are three broad types of medical homes in Ontario, distinguished primarily by physician remuneration: enhanced fee-for-service, blended capitation and team-based blended capitation.[15] In enhanced fee-for-service, claims are paid in full. In contrast, reimbursement in blended capitation models is based on the age and sex distribution of rostered patients with no

adjustment for case mix and fee-for-service claims are paid at 10% of their full value. [16] The major distinction between the two blended capitation models is that team-based models include inter-professional members, who often include mental health workers. [17,18] Patient rostering is part of all three models. Rostering is voluntary for patients and allows them to access to additional services such as physician-provided treatment or advice during evening and weekend hours and a 24-hour nurse-staffed telephone service. Primary care physicians are also eligible to receive financial incentives for providing specific services to rostered patients including preventive health care and chronic disease management. Physicians in every model are remunerated by fee-for-service when they provide care to non-rostered patients, however there is a cap on such income in blended capitation models. [19,20]

Physicians in all three types of medical homes can receive financial incentives for rostering persons with severe mental illness. Primary care practitioners are offered $1,000 for rostering five patients with bipolar disorder or schizophrenia, and an additional $1,000 (maximum of $2,000) for rostering another five such patients.[21] Despite these incentives, we hypothesized that physicians would be less likely to roster patients with mental illness into capitation models due to their greater expected needs for care. The tendency for capitation physicians to selectively roster healthier patients because of the financial risks associated with treating patients with higher morbidity has been termed “cream-skimming” or “cherry-picking.” [22,25]

Objectives

The inclusion of patients with mental illness in Ontario medical homes has not been explored. Accordingly, two research questions were addressed: 1) Is there evidence that the prevalence of mental illness varies by model type? 2) Is there evidence that capitation models are less likely to roster patients with mental health needs relative to enhanced fee-for-service?

METHODS

Study Design

This cross-sectional study used administrative claims data to examine rostered and non-rostered patients with and without mental illness in different medical home models. Non-nominal data with encrypted unique identifiers were accessed through a comprehensive research agreement with the Ontario Ministry of Health and Long-Term Care.

Setting

This study was conducted at the Institute for Clinical Evaluative Sciences in Toronto, Ontario and was approved by the Research Ethics Board of Sunnybrook Health Sciences Centre in Toronto, Ontario.

Participants

The study population was comprised of Ontario residents who had valid Ontario Health Insurance Program coverage and were 18 years or older as of August 31, 2008. This program covers all medically necessary physician and hospital services without co-payments or deductibles and is available to all permanent residents. Patients were excluded if they did not have at least one visit with a primary care practitioner between September 1, 2006 and August 31, 2008 or if the physician deemed to be the patient's most responsible physician was not in a medical home model. Primary care physicians belonging to medical home models and patients rostered to these physicians were identified using Client Agency Program Enrolment tables as of August 31, 2008. A "virtual roster" of non-rostered patients for whom the physician was deemed to be the most responsible physician was also identified for each physician using the maximum dollar value of 21 comprehensive primary care billing codes. [26]

Variables & Data Sources

Model Types

All Ontario medical homes that were registered as of August 31, 2008 were categorized into one of three types based on their designation by the Ontario Ministry of Health and Long-Term Care: enhanced fee-for-service models included Family Health Groups; blended capitation included Family Health Networks and Family Health Organizations; and team based blended

capitation included Family Health Teams.

Mental health categories

The study population was divided into three mental health categories using ambulatory diagnostic codes from the Ontario Health Insurance Plan between September 1, 2006 and August 31, 2008 (See Appendix A). Patients were assigned to a group if they had one or more billings for: 1) psychotic or bipolar diagnoses; 2) other mental health diagnoses (e.g., anxiety or depression); or 3) no mental health diagnoses. Persons were assigned to mental health groups in a hierarchical fashion; psychotic-bipolar diagnosis was assigned to all individuals with a related billing even if they also had billings for other mental health diagnoses. A previous study reported that ambulatory claims from primary care physicians had a sensitivity of 81% and a specificity of 97% for identifying mental health visits to primary care physicians. [27]

Patient characteristics

Patient information was obtained from Ontario's Registered Persons Database which holds information on age, sex and place of residence for all persons covered by the Ontario Health Insurance Plan. We also used the Registered Persons Database to identify those with first-time registration after April 1, 1998 as probable immigrants to Canada. [28] While that group includes some inter-provincial migrants, more than 80% are expected to be international migrants. Statistics Canada's Postal Code Conversion File was used to link patients' postal code to census data. Census subdivisions in 2006 were used to assign a rurality score to patients' residences using the Ontario Medical Association's Rurality Index of Ontario.[29] The Rurality Index of Ontario was categorized into one of three categories: major urban areas (0 to 9), non-major urban areas (10 to 44) and rural areas (45 and higher). Household income quintile was assigned by linking postal codes with 2006 census dissemination areas after accounting for average household size and community of residence. Comorbidity was measured using the Johns Hopkins Adjusted Clinical Groups Case-Mix System. [30] Aggregated Diagnosis Group counts indicate comorbidity and range from 0 (no diagnosis) to 24 distinct diagnosis groups.

Finally we used the validated Ontario Diabetes Database to identify study patients who had diabetes mellitus. This algorithm has a sensitivity of 86% and a specificity of over 97% in identifying patients with confirmed diabetes. [31]

Physician characteristics

Physician characteristics including age, sex, years since medical graduation, and country of graduation were obtained from the Corporate Provider Database and the Institute for Clinical Evaluative Sciences Physician Database. The number of rostered patients for physicians, the number of months in the model and the enrollment model size were derived from the Client Agency Program Enrolment database. Rurality of physician practice was designated by the Rurality Index of Ontario score of the practice location.

Study Size

Because our study was population-based and used administrative data from our single-payer health system, we did not use a sampling technique. Our study included 7,334,408 people which comprised the entire group of eligible residents of Ontario.

Analysis

Statistical Methods

To determine if there was evidence of physicians self-selecting into specific model types based on their practice make-up, we first conducted a bivariate analysis comparing the average prevalence of mental health diagnoses across model types. We then used Poisson regression to adjust for potentially confounding variables. We modeled the number of people with a mental diagnosis, offset by the total number of people, which was determined using the entire study population. All analyses were conducted at the level of the physician and used generalized estimating equations to account for the clustering of patients within physicians, and physicians within practice groups. Covariates included mean patient age, proportion of patients that were female, rurality of office location, proportion of patients in the lowest income quintile, median patient comorbidity score, physician years since graduation, physician months in group, foreign

graduation and mean number of rostered patients. Physicians with missing data were excluded from the adjusted analyses.

To determine if there was preferential rostering of patients without mental health diagnoses, and if it differed by model type, we conducted a bivariate analysis of the proportion of rostered patients {rostered patients/(rostered patients + patients on virtual roster)} across the mental health categories for each enrollment model. We then used Poisson regression as described above to adjust these analyses for potential confounding. In this case, we modeled the observed likelihood of rostering for patients in each mental health category by patient enrollment model type. We used the expected proportion rostered (the overall proportion rostered for each model type) to offset the observed proportion. Proportions were calculated at the level of the physician and then compared across model types. Physicians with missing data were excluded from the adjusted analysis. Rate ratios were developed to compare the likelihood of inclusion of patients with mental illness or rostering of these patients in capitation based models compared to enhanced fee for service models. Separate rate ratios were calculated for patients with two types of mental illness – psychotic and non-psychotic disorders.

To check the validity of our models' assumptions, we examined residual-by-predicted plots for continuous predictor variables. Assumptions of independence, normality, equality of variance and linearity did not appear to be violated.

RESULTS

Participants

There were 10,006,856 adult Ontarians registered with Ontario Health Insurance Program on August 31, 2008. We excluded 2,672,448 patients who did not have contact with one of the 6,033 primary care practitioners belonging to a medical home model in the two year study period; this left 7,334,408 patients who were linked to a primary care practitioner. Of these, 6,259,718 patients (85.3%) were rostered in their physician's medical home and 1,074,690 of these patients (14.7%) were not rostered (i.e. on the "virtual roster"). The majority

of patients (65.9%) were affiliated with physicians in enhanced fee-for-service models, 19.4% of patients were affiliated with physicians in blended capitation models and 14.7% of patients were affiliated with physicians in team-based blended capitation models. Unadjusted rostering rates of 82.4%, 91.7% and 90.5%, were found for enhanced fee-for-service, blended capitation and team-based capitation models, respectively. The unadjusted rostering rate for all models combined was 85.3%.

Descriptive Data

Patients with mental health diagnoses were more likely to live in urban areas, have higher comorbidity scores and be in a lower income quintile than patients with no mental health diagnosis (Table 1). Differences were most marked for individuals with psychotic-bipolar diagnoses. Individuals with mental health diagnoses were most likely to be female.

Physicians in blended capitation models were more likely to be Canadian medical graduates and more likely to have joined their groups within the previous 12 months (Table 2). Physicians in team-based blended capitation models were less likely to have practices with over 2,000 patients relative to physicians in the other two models.

Main Results

A) The prevalence of mental health diagnoses in physicians' total practices across types of medical homes.

Before adjustment, there were small differences in the proportion of patients with psychotic-bipolar diagnoses among physicians' total practices (Table 3). Enhanced fee-for-service models had the highest proportion of persons with other mental health diagnoses. The two blended capitation models had the largest proportion of patients with no mental illness (Table 3). After adjustment, there were no significant differences in the prevalence of psychotic-bipolar diagnoses among the three model types (Table 4). However, physicians in both blended capitation model types had significantly lower proportions of patients with other mental health disorders relative to physicians in enhanced fee-for-service models (blended capitation

RR=0.94, 95% CI 0.90-0.99; team-based blended capitation RR=0.89, 95% CI 0.85-0.94) (Table 4).

B) The likelihood of rostering a patient with a mental health diagnosis relative to a patient with no mental health diagnosis across medical home type.

In our bivariate analyses, physicians in enhanced fee-for-service models were more likely to roster patients with mental health diagnoses, compared to patients with no mental health diagnoses. This trend was not observed for blended capitation or team based blended capitation models (Table 3). After adjustment, significant differences remained in the likelihood that physicians in different medical home models rostered patients with mental illness relative to patients with no mental illness. Physicians in blended capitation models and team-based blended capitation were significantly less likely than physicians in enhanced fee-for-service models to roster patients in the psychotic-bipolar group (blended capitation RR=0.92, 95% CI 0.90-0.93; team-based blended capitation RR=0.92, 95% CI 0.88-0.93) and patients in the other mental illness group (blended capitation RR=0.94, 95% CI 0.92-0.95; team-based blended capitation RR=0.93, 95% CI 0.92-0.94) (Table 5).

DISCUSSION

Key Results

The proportions of patients with psychosis-bipolar disorders were similar across models. However, compared to enhanced fee-for-service models, blended capitation and team-based blended capitation practices had lower proportions of patients with other mental illness and larger proportions of patients with no mental illness. After the prevalence of mental illness in physicians' total practices and the overall rate of rostering were accounted for, physicians in blended capitation models were less likely to roster patients with psychotic-bipolar and with other mental illness diagnoses, compared to physicians in enhanced fee-for-service models. Glazier and colleagues previously found that patients in capitation practices in Ontario had lower morbidity and comorbidity indices relative to those in the enhanced fee for service models.

[16] It was not clear if these patterns were pre-existing or developed after physicians joined capitation based models. This is the first Canadian study that demonstrated selective rostering specifically for patients with mental illness, after accounting for differences in the proportion of mental illness in physicians' total practices. This occurred despite the existence of financial incentives in Ontario for enrolling patients with schizophrenia or bipolar disorder.

Limitations

The present analyses have some limitations. The health administrative data used in this study were developed for purposes other than research and the accuracy of individual administrative diagnostic codes for identifying the true existence of a mental health diagnosis remains unknown. However, we employed an administrative measure that has been validated in a primary care setting and appears to accurately identify health services provided for mental health reasons. [27,32,33] There is a potential for misclassification bias in this study. Capitation physicians were paid 10% of fee-for-service fees for each claim submitted during the study period, consequently they had less incentive than enhanced fee-for-service physicians to fully document provided services. Since we use billing data to define our mental health groups, this may result in an underestimation of the proportion of rostered patients with mental disorders in capitation practices.

INTERPRETATION

Economic theory and empirical evidence affirm that physician remuneration influences physician behavior. [25,34,35] One view is that physicians in capitation models may select low-needs patients in order to maximize their income relative to the volume of service provision required ('cream skimming'). [25, 36] Patients with mental illness belong to a high needs population. [10,37,38] In Ontario, where capitation compensation in patient-centered medical homes is determined by rostered patients' age and sex, and not by health status, physicians could suffer negative financial repercussions for rostering mentally ill patients. Even with the

additional financial incentives provided by the government for rostering patients with severe mental illness (the maximum possible amount is $2000 per year), it may still be financially advantageous for Ontario physicians to selectively roster healthier patients. This may reduce access for persons with mental illness in capitation based models.[25,39]

There is limited research on enrolment of patients with mental illness in capitation models relative to fee-for-service models. In managed care or prepaid plans in the USA, purchasers arrange with selected providers to deliver a defined set of services at an agreed per-capita price.[40] These plans are similar to the capitation based models included in the present study. Findings from these US studies are mixed. McFarland *et al* examined the length of enrolment in a health maintenance organization (a type of managed care organization) for patients with severe mental illness, compared to two control groups: patients with diabetes mellitus and patients without diabetes mellitus, who did not have severe mental illness. There was no evidence of exclusion of persons with chronic mental illness from health maintenance organizations. [41] In contrast, a later study [42] reported that among employed individuals, patients with more severe types of mental disorders (e.g., schizophrenia, bipolar depressive disorder) or substance abuse disorders were significantly more likely to be derostered than patients with less severe mental health problems (anxiety disorder, adjustment disorder). The inconsistency in evidence of cream-skimming among limited studies highlights the need for future Canadian and American research on this topic.

Although financial incentive payments are provided by the Ontario government to minimize the financial disincentive of rostering persons with severe mental illness, our findings suggest that incentive payments may be insufficient to offset the financial cost of rostering patients with mental illness for physicians in capitation models. If this is the case, policy options would include higher payment amounts, different incentives for enrolment and care of these patients, and/or the inclusion of a case-mix adjustment calculation to physician remuneration. Dewa and colleagues [43] accentuated the importance of financial incentives for increasing

collaborative, coordinated mental health care, and emphasized the need for future research on this topic.

Present findings suggest that persons with mental illness are under-represented among patients enrolled in Ontario's blended capitation-based medical homes. It is unclear how exclusion from enrolment in medical home models affects access to care and quality of care for patients with mental illness in Canada. It is possible that capitation physicians are able to provide intensive care for higher needs patients without suffering a financial insult by keeping mentally ill patients off their rosters, which ensures fee-for-service remuneration. When patients are not enrolled, however, physicians do not receive incentive payments for preventive health care or chronic disease management, two areas in which people with mental illness are already vulnerable to receiving worse care than other individuals.[44-47] Non-enrolled patients would also be less likely to be included in quality improvement initiatives that generate reports or reminders, nor would they be eligible for incentives for after-hours care. Further analyses using a longitudinal approach and comparing the service patterns and outcomes of patients with mental illness who are rostered and not rostered across model types will help understand these issues in more depth. There is consensus about a need to measure the long term effects of membership in capitation (or managed care) models on mental health service use. [22,48]

Our study evaluates models of the patient-centered medical home that are unique to Ontario. However, aspects of these models, such as physician-led multidisciplinary teams, expanded hours, and incentives to enhance evidence-based quality care, are common to primary care reform efforts in other settings. [2] Our evaluation of the Ontario experience for serving patients with mental illness could inform primary care reform efforts in the US and other countries with similar resident populations. [49]

We conclude that people with mental illness are under-represented in Ontario's capitation based medical homes. Determining appropriate payment structures and getting incentives right for mental health care in capitation-based medical homes may be challenging.

This highlights the importance of monitoring health care use and outcomes for patients with mental illness in medical home models in order to inform payment and incentive structures that optimize access to care and improve health outcomes.

Table 1. Characteristics of patients* (on the roster and virtual roster†) in Ontario over 18 years by mental health category, August 2008

	Psychosis - Bipolar diagnoses	Other mental diagnoses	No mental diagnoses	Total	P-value
	N=136,405	N=1,830,470	N=5,367,533	N=7,334,408	
Age, mean (SD)	47.76 (17.01)	47.78 (17.20)	47.33 (18.03)	47.45 (17.81)	<.001
Age, median (IQR)	47 (35-58)	47 (35-59)	46 (33-60)	46 (33-60)	<.001
Age categories					
18-39 years	45,473 (33.3%)	624,875 (34.1%)	1,955,407 (36.4%)	2,625,755 (35.8%)	<.001
40-64 years	68,875 (50.5%)	887,377 (48.5%)	2,405,557 (44.8%)	3,361,809 (45.8%)	
65+ years	22,057 (16.2%)	318,218 (17.4%)	1,006,569 (18.8%)	1,346,844 (18.4%)	
Diabetes	19,619 (14.4%)	184,578 (10.1%)	522,455 (9.7%)	726,652 (9.9%)	<.001
Immigrants ‡	7,721 (5.7%)	150,007 (8.2%)	555,228 (10.3%)	712,956 (9.7%)	<.001
Income quintile (missing)	481 (0.4%)	4,117 (0.2%)	11,211 (0.2%)	15,809 (0.2%)	<.001
Quintile 1 (low)	37,455 (27.5%)	348,968 (19.1%)	930,760 (17.3%)	1,317,183 (18.0%)	
Quintile 2	28,539 (20.9%)	358,093 (19.6%)	1,038,996 (19.4%)	1,425,628 (19.4%)	
Quintile 3	24,627 (18.1%)	363,600 (19.9%)	1,090,805 (20.3%)	1,479,032 (20.2%)	
Quintile 4	23,281 (17.1%)	377,641 (20.6%)	1,151,995 (21.5%)	1,552,917 (21.2%)	
Quintile 5 (high)	22,022 (16.1%)	378,051 (20.7%)	1,143,766 (21.3%)	1,543,839 (21.0%)	
Female	76,385 (56.0%)	1,138,946 (62.2%)	2,733,871 (50.9%)	3,949,202 (53.8%)	<.001
Male	60,020 (44.0%)	691,524 (37.8%)	2,633,662 (49.1%)	3,385,206 (46.2%)	
Comorbidity score					
Aggregated Diagnosis Groups (ADGs), Mean (SD)	7.74 (3.63)	6.97 (3.20	4.49 (2.85)	5.17 (3.17)	<.001
Rurality score					
Missing	703 (0.5%)	11,621 (0.6%)	39,518 (0.7%)	51,842 (0.7%)	<.001
Major urban	96,416 (70.7%)	1,246,914 (68.1%)	3,514,494 (65.5%)	4,857,824 (66.2%)	
Non major urban	27,664 (20.3%)	404,507 (22.1%)	1,218,012 (22.7%)	1,650,183 (22.5%)	
Rural	11,622 (8.5%)	167,428 (9.1%)	595,509 (11.1%)	774,559 (10.6%)	
Resource Utilization Bands (RUBs)					
RUB, mean (SD)	3.73 (0.78)	3.32 (0.68)	2.69 (1.02)	2.87 (0.99)	<.001

* The study population was comprised of Ontario residents who had a valid Ontario Health Insurance Plan (OHIP) number who were 18 years or older as of August 31, 2008.

† The virtual roster included patients who were not rostered to a physician but were cared for by a physician who belonged to a patient --centered medical home model.

‡ Patients with OHIP registration after April 1, 1998 (excluding newborns) were defined as immigrants

Table 2. Characteristics of Ontario physicians*in enhanced fee-for-service, blended capitation and team based capitation models, as of August 31, 2008 †

	Enhanced fee-for-service		Blended Capitation		Team Based Capitation		Total	
	N= 3,870		N=1,074		N=1,089		N=6,033	
	N	% (SD)	N	% (SD)	N	% (SD)	N	% (SD)
Groups	289		152		113		554	
Physician age, mean (SD)	50.51	(10.42)	49.56	(10.05)	48.53	(10.18)	49.98	(10.40)
Physicians who are females	1,490	38.5%	415	38.6%	429	39.4%	2,334	38.7%
Canadian Medical graduate	2,822	72.9%	916	85.3%	936	86.0%	4,674	77.5%
Years since graduation								
Less than 5 years	124	3.2%	22	2.1%	37	3.4%	183	3.0%
5 to 9 years	241	6.2%	106	9.9%	131	12.0%	478	7.9%
10 to 19 years	970	25.1%	281	26.2%	279	25.6%	1,530	25.4%
20 to 29 years	1,279	33.1%	351	32.7%	362	33.2%	1,992	33.0%
30 years or more	1,256	32.5%	314	29.2%	280	25.7%	1,850	30.7%
Physician Months in Group								
Less than 12 months	337	8.7%	593	55.2%	622	57.1%	1,552	25.7%
12 to 23 months	677	17.5%	138	12.9%	207	19.0%	1,022	16.9%
24 to 35 months	634	16.4%	31	2.9%	83	7.6%	748	12.4%
36 to 47 months	1,102	28.5%	121	11.3%	92	8.5%	1,315	21.80%
48+ months	1,120	28.9%	191	17.8%	85	7.8%	1,396	23.14%
Number of rostered patients								
Less than 650 patients	470	12.1%	85	7.9%	178	16.4%	733	12.15%
650 to 999 patients	560	14.5%	159	14.8%	166	15.2%	885	14.67%
1000 to 1999 patients	1,862	48.1%	552	51.4%	574	52.7%	2,988	49.53%
2000 to more patients	978	25.3%	278	25.9%	171	15.7%	1,427	23.65%

* Primary care physicians belonging to medical home models in Ontario as of August 31, 2008

† The unit of analysis was the physician

Table 3. Percent of Ontario patients on primary care physicians' virtual roster and rosters (total practice) in each medical home type by patient mental health **c**ategory, August 2008* (unadjusted)

		Psychosis--Bipolar diagnoses	Other mental diagnoses	No mental diagnoses	**Total**
Rostered patients, N		115,030	1,596,903	4,547,785	6,259,718
Total practice†, N		136,405	1,830,470	5,367,534	7,334,408
Enhanced fee for service	Rostered (%)	1.9%	27.5%	70.6%	3,984,105
	Total Practice (%)	1.9%	26.5%	71.7%	4,834,179
	Ratio	**1.01**	**1.04**	**0.98**	
Blended capitation	Rostered (%)	1.6%	23.1%	75.4%	986,619
	Total Practice (%)	1.7%	23.1%	75.3%	1,076,338
	Ratio	**0.96**	**1.00**	**1.00**	
Team Based capitation	Rostered (%)	1.8%	21.1%	77.1%	1,288,994
	Total Practice (%)	1.9%	21.3%	76.8%	1,423,891
	Ratio	**0.95**	**0.99**	**1.00**	
Total	Rostered (%)	1.8%	25.5%	72.7%	6,259,718
	Total Practice (%)	1.9%	25.0%	73.2%	7,334,408

Ratio	**0.99**	**1.02**	**0.99**

* The study population included Ontario residents with a valid Ontario Health Insurance Plan (OHIP) number who were 18 years or older as of August 31, 2008.

† The total practice included patients on physicians' rosters and virtual roster. Virtual rosters included patients who were not rostered to a physician but were cared for by a physician in a patient enrollment model included in the study. To link patients to the caring physician we identified the physician who had billed the most claims over the two year study period from a basket of 18 fee schedule codes comprising primary care services. That patient was assigned to the physician's "virtual roster" and included in the study as one of that physician's "non-rostered" patients.

Table 5. Poisson regression using general estimating equations to assess the association between enrollment model type and the likelihood of rostering* patients† with mental health diagnoses‡, August 2008.

	Psychosis-- Bipolar diagnoses				Other mental diagnoses			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	Rate Ratio	(95% CI§)	Rate Ratio	(95% CI§)	Rate Ratio	(95% CI§)	Rate Ratio	(95% CI§)
Group type								
Blended capitation	0.94	(0.92-0.95)	0.92	(0.90-0.93)	0.98	(0.96-0.99)	0.94	(0.92-0.95)
Team based capitation	0.93	(0.92-0.94)	0.92	(0.88-0.93)	0.97	(0.96-0.99)	0.93	(0.92-0.94)
Enhanced fee-for-service	1.00		1.00		1.00		1.00	
Mean patient age			1.00	(0.99-1.00)			1.00	(1.00-1.00)
% female patients in practice			0.99	(0.95-1.03)			0.97	(0.94-0.99)
% lowest income quintile patients			0.94	(0.89-0.98)			0.99	(0.96-1.03)
Practice location—rurality score‖			1.00	(1.00-1.00)			1.00	(1.00-1.00)
Median comorbidity score			1.00	(0.99-1.00)			0.98	(0.98-1.99)
Physician years since graduation								
Less than 5 years			1.00				1.00	
5 to 9 years			1.00	(0.97-1.04)			1.00	(0.97-1.02)
10 to 19 years			1.02	(0.99-1.05)			1.00	(0.98-1.02)
20 to 29 years			1.01	(0.98-1.05)			0.99	(0.97-1.01)
30 years or more			1.02	(0.99-1.05)			0.99	(0.97-1.01)
Physician time in group								

Less than 12 months	1.05	(1.03, 1.07)	1.05	(1.03, 1.06)
12 to 23 months	1.03	(1.01, 1.05)	1.03	(1.01, 1.05)
24 to 35 months	1.02	(1.00, 1.04)	1.02	(1.01, 1.04)
36 to 47 months	1.02	(1.00, 1.03)	1.01	(1.01, 1.02)
48+ months	1.00		1.00	
Medical Graduation				
Canadian medical graduate	1.00		1.00	
Non- Canadian medical graduate	1.01	(1.00-1.02)	1.01	(1.01-1.02)
Number of rostered patients				
Less than 650 patients	1.00		1.00	
650 to 999 patients	0.97	(0.95-1.00)	0.99	(0.97-1.00)
1000 to 1999 patients	0.95	(0.93-0.98)	0.97	(0.96-0.98)
2000 to more patients	0.95	(0.92-0.97)	0.96	(0.95-0.98)

* Rostered patients include patients on physicians' rosters, not virtual rosters. The unit of analysis is the physician.

† The study population included Ontario residents with a valid OHIP number who were 18 years or older as of August 31, 2008.

‡ The analysis was offset by the proportion of individuals with no mental illness who were rostered.

§ Confidence interval

‖ Rurality Index of Ontario

APPENDIX A:

Ontario Health Insurance Progarm Diagnostic Codes (ICD-9) For Psychotic and Non Psychotic Disorders

Psychosis/Bipolar:

295 schizophrenia, 296 manic depressive psychosis, involutional melancholia, 297 other paranoid states, 298 other psychoses

Other mental illness:

300 anxiety neurosis, hysteria, neurasthenia, obsessive – compulsive neurosis, reactive depression, 301 personality disorders, 302 sexual deviations, 303 alcoholism, 304 drug dependence, 306 psychosomatic illness, 307 tics, anorexia nervosa 309 adjustment reaction, 311 depressive disorder, 897 economic problems, 898 marital difficulties, 899 parent- child problems 900 problems with aged parents or in-laws, 901 family disruption/ divorce, 902 education problems, 903 illegitimacy, 904 social maladjustment, 905 occupational problems, 906 legal problems ,909 other problems of social adjustment