Performance of an integrated network model
Evaluation of the first 4 years

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Abstract

Objective To evaluate the changes in accessibility, patients' care experiences, and quality-of-care indicators following a clinic's transformation into a fully integrated network clinic.

Design Mixed-methods study.

Setting Verdun, Que.

Participants Data on all patient visits were used, in addition to 2 distinct patient cohorts: 134 patients with chronic illness (ie, diabetes, arteriosclerotic heart disease, or both); and 450 women between the ages of 20 and 70 years.

Main outcome measures Accessibility was measured by the number of walk-in visits, scheduled visits, and new patient enrolments. With the first cohort, patients' care experiences were measured using validated serial questionnaires; and quality-of-care indicators were measured using biologic data. With the second cohort, quality of preventive care was measured using the number of Papanicolaou tests performed as a surrogate marker.

Results Despite a negligible increase in the number of physicians, there was an increase in accessibility after the clinic's transition to an integrated network model. During the first 4 years of operation, the number of scheduled visits more than doubled, nonscheduled visits (walk-in visits) increased by 29%, and enrolment of vulnerable patients (those with chronic illnesses) at the clinic remained high. Patient satisfaction with doctors was rated very highly at all points of time that were evaluated. While the number of Pap tests done did not increase with time, the proportion of patients meeting hemoglobin A_{1c} and low-density lipoprotein guideline target levels increased, as did the number of patients tested for microalbuminuria.

Conclusion Transformation to an integrated network model of care led to increased efficiency and enhanced accessibility with no negative effects on the doctor-patient relationship. Improvements in biologic data also suggested better quality of care.

EDITOR'S KEY POINTS

• One of the main objectives of creating a medical home with many professionals is improving patients' health. This study evaluates the performance of an integrated network model using primary data from patient records and patient surveys at 3 points in time to determine the effects of the model on accessibility, patients' care experiences, and quality-of-care indicators.

• After the clinic's transition to an integrated network model, accessibility improved and there was a statistically significant improvement in some of the biologic data. Patients' care experiences did not improve; however, satisfaction with physician care was already reported to be so high at the initial interviews that improvement would have been difficult to achieve.

• Despite the increased number of nurses, the proportion of patients who had contact with nurses increased only minimally; one reason for this might be that many nurses did not stay in the practice for more than a year, and it takes time for physicians to trust someone new. On the other hand, the proportion of patients seeing other allied health professionals quadrupled, from 9% to 35%; this might be explained by the fact that physicians more frequently referred patients to those professionals they came to know.

Performance d'un nouveau type de réseau intégré

Évaluation de 4 premières années

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Résumé

Objectif Évaluer les changements survenus dans l'accessibilité, l'opinion des patients et les indicateurs de qualité des soins à la suite de la transformation d'une clinique en un réseau entièrement intégré.

Type d'étude Étude à l'aide de méthodes mixtes.

Contexte Verdun (Québec)

Participants On s'est servi des données des visites de tous les patients, mais aussi de 2 autres cohortes : 150 patients souffrant de maladies chroniques (c.-à-d. diabète, maladie cardiaque athérosclérotique ou les deux); et 450 femmes entre 20 et 70 ans.

Principaux paramètres à l'étude L'accessibilité a été évaluée par le nombre de visites sans rendez-vous et de visites avec rendez-vous, et par le nombre de nouveaux patients recrutés. La première cohorte a servi à évaluer l'opinion des patients sur les soins à l'aide de questionnaires successifs validés ainsi que les indicateurs de la qualité des soins à partir des données biologiques. Avec la seconde cohorte, on a évalué la qualité des soins d'ordre préventif par le nombre de tests de Papanicolaou effectués, utilisé comme marqueur substitut.

Résultats Même si le nombre de médecins avait très peu augmenté, on a observé une augmentation de l'accessibilité après que la clinique eut adopté la forme d'un réseau intégré. Durant les 4 premières années d'opération, le nombre de visites avec rendez-vous à la clinique a plus que doublé, celui des visites sans rendez-vous a augmenté de 29 % et le recrutement de patients vulnérables (avec maladies chroniques) est demeuré élevé. La satisfaction des patients à l'égard des médecins a été jugée très élevée à chaque fois qu'elle a été évaluée. Même si le nombre de Pap tests effectués n'a pas augmenté avec le temps, la proportion de patients atteignant les niveaux cibles recommandés pour l'hémoglobine A_{1c} et pour les lipoprotéines de basse densité a augmenté, de même que le nombre de patients testés pour une microalbuminurie.

Conclusion Après que la clinique eut adopté la forme d'un réseau intégré, on a observé une augmentation de l'efficacité et une meilleure accessibilité, sans effet négatif sur la relation médecin-patient. Une amélioration des données biologiques laisse aussi entendre une meilleure qualité des soins.

POINTS DE REPÈRE DU RÉDACTEUR

- Lorsqu'on met sur pied un centre de médecine familiale (*Medical Home*) réunissant plusieurs professionnels, un des principaux objectifs est d'améliorer la santé des patients. Cette étude a évalué la performance d'un nouveau type de réseau intégré à l'aide des données primaires des dossiers des patients et d'enquêtes effectuées auprès des patients à 3 moments différents, et ce, afin de déterminer les effets du modèle sur l'accessibilité, l'opinion des patients sur les soins et les indicateurs de qualité des soins.

- Après la transformation de la clinique en réseau intégré, on a observé une amélioration de l'accessibilité ainsi qu'une amélioration statistiquement significative dans certaines données biologiques. L'opinion des patients sur les soins ne s'était pas améliorée; toutefois, la satisfaction à l'égard des soins des médecins était déjà si haute lors des entrevues initiales qu'elle pouvait difficilement s'améliorer.

- Malgré l'augmentation du nombre d'infirmières, la proportion des patients qui ont été vus par une infirmière a très peu augmenté; cela pourrait être dû au fait que plusieurs infirmières ne sont pas restées à la clinique pendant plus d'un an, alors qu'il faut un certain temps pour qu'un médecin fasse confiance à un nouvel employé. Par contre, la proportion de patients qui ont été vus par un autre professionnel de la santé a quadruplé, passant de 9 à 35 %, un changement qui pourrait s'expliquer par le fait que les médecins dirigeaient plus souvent des patients vers des professionnels qu'ils avaient appris à connaître.

I n Canada, most patients enter the medical care system through primary care, either in emergency departments (EDs) or in family medicine practices. Since the early 2000s, efforts have been invested in strengthening primary health care in Canada. Key initiatives have included encouraging patient enrolment with a primary care provider. The development of family medicine clinics promotes enhanced accessibility and is driven by evidence of improved quality of care[1] and lower rates of ED visits and admissions to hospital.[2]

In Alberta and Ontario, a large percentage of family physicians participate in new primary care models that include many allied health professionals.[3] Since 2000, Quebec has also pursued this initiative with the creation of 219 family medicine groups consisting of 6 to 10 full-time equivalent physicians working with nurses. Between 2008 and 2009, the Montreal regional health agency extended this initiative to create true interprofessional integrated network clinics.

Comparable clinics exist in the United States and the United Kingdom. Evaluations of their performance have been generally positive in terms of patient satisfaction, decreased ED visits, and improved biologic measures of health status.[4-6] In Canada there have been evaluations using large administrative databases.[7] However, to our knowledge, no evaluation of this new model of interprofessional family practice has been conducted in a Canadian setting using primary data from patient records and patient surveys at 3 points in time. Specifically, the goal of this study was to evaluate the effects of an integrated network model of care on accessibility, patients' care experiences, and quality-of-care indicators.

METHODS

Clinic description

The clinic in this study is a teaching unit for family physicians at the University of Montreal in Quebec. It is situated in a low-income sector of Montreal and is integrated with a community hospital. The physicians are all family doctors or family medicine residents, except for 1 pediatric consultant who attends 1 day a month.

Before the clinic became an integrated network clinic in April 2009, the only allied health professionals were 2 nurse clinicians. Integrated health clinics were new structures in Quebec at that time. They involved having an expanded team including nonphysician health professionals, so the team was enlarged progressively to include 3 additional nurses, 2 social workers, a nursing assistant, a psychologist, 2 dietitians, a kinesiologist, and a nurse practitioner; additionally, on a part-time basis (1 or 2 days a week), there was a respiratory therapist, a sexologist, and a pharmacist. The only official

government mandate associated with this change was to serve an expanded population (more visits, more hours of availability). The nonphysician professionals relied exclusively on referrals from the clinic's physicians. Although the role of nurse clinicians varied somewhat over time, they were always involved in helping to modify lifestyle habits for patients with diabetes and those with heart disease, as well as measure blood glucose levels and adjust medications according to protocols approved by the physicians for patients with diabetes.

Clinic hours (8:30 AM to 8:30 PM on weekdays and 9:00 AM to 5:00 PM on weekends and holidays) and access to diagnostic testing (laboratory and imaging services) remained unchanged after the addition of allied health professionals.

Data collection and patient recruitment

To evaluate the clinic's performance, we looked at general indicators of accessibility such as changes in the numbers of walk-in visits, scheduled visits, and new patient enrolments over the study period. We also studied 2 different patient populations, using different methodologies and with different objectives. The first population consisted of patients with 1 or both of 2 chronic illnesses (ie, diabetes and arteriosclerotic heart disease); our objective was to determine whether the new interprofessional clinic model had any positive effects on certain quality-of-care indicators and on patients' care experiences. The second population consisted of women between the ages of 20 and 70; here, our objective was to assess the quality of preventive care using the number of Papanicolaou tests performed.

Accessibility. Data on the number of visits for the entire clinic population were retrieved from the clinic's computerized database that registers each visit, as were demographic data and diagnoses. We also monitored changes in the enrolment of patients considered vulnerable according to the list produced by Quebec's health insurance board, the Régie de l'assurance maladie du Québec. This list comprises 18 categories of chronic conditions.[8]

Patients with chronic illness. We recruited 194 subjects between April 2009 and November 2010 from the clinic's computerized database of diagnoses. At the time of this study, there were no electronic medical records; diagnoses were recorded by physicians on dedicated forms at each visit and then entered into the computerized database. Patients with a diagnosis of diabetes (N = 415) or arteriosclerotic heart disease (N = 156) (46 had both diagnoses) who had visited the clinic between January 30, 2008, and January 29, 2009, were assigned a randomly selected number; from that pool of 571 potential patients, 200 were chosen from a random numbers table generated by the randomization function of

Microsoft Excel (version 2007) and invited to participate in the study. Participation involved patients completing 3 questionnaires at different points in time and giving the research team permission to extract biologic data from their medical charts. If a patient refused, the next patient with 1 of the 2 target diagnoses whose name followed alphabetically was recruited.

Women between 20 and 70 years of age. The charts of 250 women aged 20 to 35 years (N = 3215) and another 250 women aged 36 to 70 years (N = 3417) who consulted in the same time period as above were chosen randomly from the computerized registry in the same way as for patients with a chronic illness. Patients 20 to 35 years of age who had not consulted the clinic for 3 years before 2008 were excluded based on the assumption that, given the length of time elapsed, they did not consider the clinic their medical home (n = 50).

Outcome measures

Accessibility. Accessibility for the entire clinic population was measured by calculating increases in the number of scheduled visits, number of patients (both enrolled and not enrolled) seen without an appointment, and number of patient enrolments from April 2009 to April 2013, as well as in the number of new vulnerable patients enrolled. Waiting time between a patient requesting an appointment and being seen was not considered because those data were not available.

Patients with chronic illness. To evaluate patients' care experiences, we used a patient questionnaire based on the work of Beaulieu et al conducted in Quebec.[1] In addition to questions about sociodemographic characteristics and the use of medical services in the previous 6 months, the questionnaire included measurements of patients' care experiences based on the 3 core functions of primary care from the Primary Care Assessment Tool[9] and the Primary Care Assessment Survey (PCAS).[10] These core functions include contextual knowledge of the patient (Primary Care Assessment Tool), which measures relational continuity; respectfulness (PCAS); and interpersonal communication (PCAS). Demographic characteristics and contact with allied health professionals were also measured. These instruments had been adapted to the Canadian context and validated in both French and English in previous works.[11-14] To assess changes, patients with chronic illnesses completed the patient questionnaire at times 0, 12, and 24 months. Patients completed the questionnaires either by means of an interview when they came to the clinic or by a telephone interview. Biologic data—including hemoglobin A_{1c} (HbA_{1c}) and low-density lipoprotein (LDL) levels, presence of microalbuminuria, blood pressure levels, and the use of acetylsalicylic acid (ASA),

angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and β-blockers—were collected at times 0, 6, 12, 18, and 24 months after recruitment. Guidelines from the Canadian Diabetes Association,[15] the Canadian Cardiovascular Society,[16] and the American Heart Association[17] were used to identify targets. All tests were done in the hospital's routine laboratory.

Papanicolaou tests. The Society of Obstetricians and Gynaecologists of Canada 2007 guidelines recommend that Pap tests be performed every 2 years after age 20.[18] We measured the percentage of patients reaching that goal over the 2-year study period. Biologic data were collected from patients' charts at times 0, 6, 12, 18, and 24 months after recruitment. All the Pap tests were done in the hospital's routine pathology laboratory.

Statistical analysis

We estimated that 200 patients with chronic illness would be needed to show a 5% difference (based on a 5% chance of a type I error and a 20% chance of a type II error) in the number of patients attaining the target values proposed in the Canadian Diabetes Association[15] guidelines: glycated HbA_{1c} level of 7% or lower, LDL level of 2 mmol/L or lower, and a blood pressure level of 130/85 mm Hg or lower. The 2-sided asymptotic calculation of the Cochran-Armitage trend test was used to evaluate the significance of the changes over the 2-year period studied for each patient.

For the PCAS primary care functions, 3 main variables relating to contact with the physician were evaluated: contextual knowledge, interpersonal communication, and respectfulness. Significant relationships between these variables and the presence of family medicine residents, contact with nurses, and the patient's sex were assessed using the Mann-Whitney *U* test. Relationship with the patients' education level was assessed using the Kruskal-Wallis test. The statistical power was evaluated minimally to be 0.80.

Ethics approval

The project was approved by the research ethics committee of the Verdun General Hospital in Quebec, where the study was conducted.

All interviewed patients signed a consent form. Collecting data on Pap tests did not involve interviewing patients and so did not require patient consent.

RESULTS

Evaluation of the clinic's performance identified the following key findings.

Accessibility. After the change in clinic structure, with the clinic open the same number of hours, the number of

walk-in visits in a year increased from 12794 to 16495; that is a 29% increase in volume over the first 4 years of operation. The annual number of scheduled visits more than doubled (**Table 1**). This improvement in accessibility occurred despite only a very modest increase in physician manpower from 10.6 to 11.7 full-time equivalent (35 hours per week) physicians. Of the 45 staff physicians who worked in the clinic, 23 were present only 1 or 2 half-days per week to supervise residents, and only 4 spent 3 days or more in the clinic.

as their doctors reported significantly poorer care experiences at times 0 and 12 months, but not at 24 months ($P < .05$). The proportion of patients with no visits to the ED in the previous year decreased from 76% to 61%. Contact with non–allied health professionals increased from 9% to 35%. However, at 12 months only 34% of participants had had contact with a nurse in the previous year, and at 24 months, only 32% had had contact with a nurse in the previous year (**Table 3**).

Table 1. Indicators of accessibility

INDICATORS	2006–2007	2007–2008	2008–2009	2009–2010*	2010–2011	2011–2012	2012–2013
Walk-in visits	NA	9572	12794	13365	14218	15916	16495
Scheduled visits	NA	17972	18185	18609	21569	28563	36387
Enrolled patients	6196	7506	9365	10326	11059	11651	12635
Vulnerable patients newly enrolled	273	337	606	322	266	379	628
FTE doctors[†]	NA	NA	NA	10.6	NA	NA	11.7
Full-time nurse practitioners[†]	0	0	0	0	1	1	1
Family medicine residents[†]	24	24	24	24	24	24	24

FTE—full-time equivalent, NA—not available.

*Data for each time period are from April 1 to March 31. In April 2009 the clinic became an integrated network clinic, so 2009 to 2010 represents the first year in the new model.

[†]An FTE doctor or nurse practitioner is defined as having 35 hours of patient contact (direct or via residents) per week.

[†]Each resident is present in the clinic the equivalent of 4.5 months full time per year.

Vulnerable patients continued to be enrolled after the transition, with an all-time high of 628 such patients enrolled in 2012 to 2013.

Patients with chronic illness. We were able to recruit 194 participants with 1 or both of the chronic illnesses targeted. Of those, 60 did not complete the study: some had died (n=11), others stopped coming to the clinic for care (n=24), and the remainder refused to complete or could not be reached to complete all the questionnaires (n=25), leaving 134 participants with completed questionnaires (**Table 2**).

Only participants who completed all 3 interviews were included in the analysis. Over a 2-year period, nearly all had used this clinic exclusively. In terms of education, 26% had not completed high school. Financial status was determined by patients' responses to a question asking them to describe their perceived financial status as good, adequate, poor, or very poor (**Table 2**). Doctors' relationships with patients were generally evaluated as positive. This did not change significantly with patients' level of education nor with whether they had seen a nurse. Regarding their doctors' knowledge about them, at 12 months women had significantly lower scores ($P < .05$) than men did, but at 24 months, men's and women's scores were similar. With regard to the 3 core primary care functions, patients who had residents

Table 2. Characteristics of patients with diabetes, patients with arteriosclerotic heart disease, and patients with both chronic illnesses completing the primary care assessment questionnaire: *Mean (SD) age was 62 (9) years (range 38-85; median 64 years).*

PATIENT CHARACTERISTICS	N/N (%)*
Sex	
• Male	78/134 (58)
• Female	56/134 (42)
Chronic illnesses	
• Diabetes only	70/134 (52)
• Heart disease only	27/134 (20)
• Both illnesses	37/134 (28)
Education	
• High school not completed	34/130 (26)
• Completed high school only	64/130 (49)
• College or university completed	32/130 (25)
Perceived financial status	
• Good	14/129 (11)
• Adequate	90/129 (70)
• Poor	21/129 (16)
• Very poor	1/129 (1)
• Does not know	3/129 (2)

*Not all patients answered all questions.

With regard to patients with diabetes, the increase in the proportion of patients with HbA_{1c} levels at or below 7% (P=.0003) and the increase in testing for microalbuminuria (P=.003) were statistically significant (**Table 4**), as was the decrease in the proportion of patients taking ASA (P=.019). The decrease in the proportion of patients with arteriosclerotic heart disease taking or being recommended ASA (P=.04) or β-blockers (P=.02) was statistically significant, as was the improvement in the proportion of patients meeting LDL targets (P=.04) (**Table 5**).

Papanicolaou tests. With regard to Pap tests, 74% of the younger cohort and 62% of the older cohort had undergone at least 1 test (**Table 6**). For the younger cohort, Pap tests decreased by 33% in the second period and for the older cohort by 22%. The younger cohort consisted of 200 patients rather than 250 because 50 patients who had not consulted at the clinic for 3 years before 2008 were excluded, as we believed this indicated that the clinic was not their medical home.

Table 3. Care experiences of patients with diabetes, patients with arteriosclerotic heart disease, and patients with both chronic illnesses at 3 points in time

CARE EXPERIENCES	TIMING OF QUESTIONNAIRE, N/N (%)*		
	0 MO	12 MO	24 MO
Usual care in clinic	133/134 (99)	134/134 (100)	130/133 (98)
Usual care in another clinic	1/134 (1)	0/134 (0)	3/133 (2)
Contact with nurse	38/134 (28)	46 /134 (34)	42/133 (32)
Contact with other allied health professionals in the clinic	12/134 (9)	35/134 (26)	47/133 (35)
No ED visit in the past year	101/133 (76)	111/134 (83)	81/132 (61)
No hospitalization in the past year	110/133 (83)	121/134 (90)	110/132 (83)
Doctor has good to excellent knowledge of patient's health concerns	124/131 (95)	131/133 (98)	118/133 (89)
Doctor is empathetic and kind	130/131 (99)	134/134 (100)	130/131 (99)

ED—emergency department.
*Not all patients answered all questions.

DISCUSSION

The results of this study show that accessibility improved after the transition to an integrated network clinic, as walk-in visits increased by 29% and scheduled visits more than doubled. It should be noted that this improvement occurred even though the number of full-time equivalent doctors increased only by 1. Theoretically, in an integrated network model, improved accessibility should be due to doctors' delegating authority and some clinical work they used to do themselves to nurses and other allied health professionals. In fact, it could well be that accessibility would have improved to an even greater degree if more patients had been referred to the allied health professionals, especially nurses. Causal inference about this improved accessibility is limited by the observational nature of our data. For example, the improved accessibility could also reflect greater physician efficiency (ie, more patients seen per day) spurred by incentive bonuses introduced by the government in 2009 for enrolment of new patients, with higher incentives being offered for vulnerable patients.

Patients reported positive care experiences with the clinic and especially in their relationship with their doctors. The proportion of subjects seeing nurses did not change significantly over the period studied; this might reflect an initial reluctance on the part of physicians to share clinical responsibilities. It could also reflect the fact that more than half of the nurses did not stay for more than a year, and it takes time for physicians to get to know and trust someone new. On the other hand, the proportion of patients seeing other allied health professionals quadrupled, from 9% to 35%, and could partially be explained by the fact that as the physicians came to know those professionals who were new to the clinic, they referred to them more frequently. Nearly all patients consulted exclusively with the clinic, but in spite of this, ED visits increased. It is not known whether these visits were appropriate or could have been prevented by easier access to the clinic. Much of the biologic data showed improvement over time, while only 2 (the use of β-blockers and ASA) went in the wrong direction. The evidence on the role of both of these in primary prevention has come under increased scrutiny.

In the United States, a clinic such as the one in this study would be called a *medical home*. Of the few evaluations of such clinics, one study[2] comparing the medical home to standard clinics found that patient satisfaction, employee satisfaction, and some objective health criteria improved. In a review of published outcomes of medical home evaluations, Grumbach and Grundy[5] reported that hospitalizations and ED visits decreased. McMurchy's data[2] suggest that accessible primary care is associated with lower rates of ED visits and admissions to hospital.

Table 4. Biologic data for patients with diabetes

QUALITY INDICATOR	BASELINE, N/N (%)*	6-MO FOLLOW-UP, N/N (%)*	12-MO FOLLOW-UP, N/N (%)*	18-MO FOLLOW-UP, N/N (%)*	24-MO FOLLOW-UP, N/N (%)*	P VALUE
HbA$_{1c}$ ≤7%	73/136 (54)	67/111 (60)	69/106 (65)	78/109 (72)	62/84 (74)	.0003
LDL ≤2.0 mmol/L	57/112 (51)	44/82 (54)	45/89 (51)	55/85 (65)	41/72 (57)	.15
Test for microalbuminuria done in past 6 mo or ordered at the visit	44/145 (30)	49/142 (35)	52/130 (40)	54/126 (43)	47/102 (46)	.003
BP <130/80 mm Hg in patients for whom microalbuminuria was absent (ACR <2.0 mg/mmol in men or <2.8 mg/mmol in women) or unreported†	21/69 (30) (microalbuminuria absent or unreported, N = 107)	26/80 (33) (microalbuminuria absent or unreported, N = 111)	30/83 (36) (microalbuminuria absent or unreported, N = 105)	33/84 (39) (microalbuminuria absent or unreported, N = 93)	20/55 (36) (microalbuminuria absent or unreported, N = 71)	.27
BP <125/75 mm Hg in patients for whom microalbuminuria was present†	4/30 (13) (microalbuminuria present, N = 38)	5/24 (21) (microalbuminuria present, N = 31)	5/21 (24) (microalbuminuria present, N = 25)	8/32 (25) (microalbuminuria present, N = 33)	6/29 (21) (microalbuminuria present, N = 31)	.4
Currently taking ASA or ASA use was recommended at the visit	114/145 (79)	104/142 (73)	89/130 (68)	86/126 (68)	68/102 (67)	.019
Currently taking an ACEI or ARB, or ACEI or ARB use was recommended, in patients with BP ≥130 mm Hg or where microalbuminuria was present	68/86 (79)	68/85 (80)	64/78 (82)	59/84 (70)	47/66 (71)	.09

ACEI—angiotensin-converting enzyme inhibitor, ACR—albumin-creatinine ratio, ARB—angiotensin receptor blocker, ASA—acetylsalicylic acid, BP—blood pressure, HbA$_{1c}$—hemoglobin A$_{1c}$, LDL—low-density lipoprotein.

*Of the participants initially recruited, data were available for all 145 participants at baseline, 142 participants at 6 mo, 130 participants at 12 mo, 126 participants at 18 mo, and 102 participants at 24 mo. Some patients had no data available, some died during the study, and some stopped attending the practice.

†Denominators reflect the number of patients for whom both measures were available.

In the present study, ED visits increased. It could be that the clinic evening hours were too short, but it might also be because it was often difficult for patients to be seen within 24 hours for an emergent problem. The clinic has since implemented an open-access program to correct that situation. The number of hospitalizations remained the same. However, the proportion of patients who had not been hospitalized in the past year remained very high (between 83% and 90%). The small sample size precludes formulating any hypothesis about the lack of effect of the new model on that variable. In this study, experience of care did not improve, nor did it decline, but reported experience of care with the physician was already so high at the first interview that improvement would have been difficult to achieve.

Studies on the effects of medical home models have reported better control of glucose, cholesterol, and blood pressure levels. In the United Kingdom, where such clinics have existed for at least 10 years, Ismail et al[19] studied the care of patients with diabetes followed in a primary care clinic as compared with care of those followed in a diabetes-dedicated clinic, both run

Table 5. Biologic data for patients with arteriosclerotic heart disease

QUALITY INDICATOR	BASELINE, N/N (%)*	6-MO FOLLOW-UP, N/N (%)*	12-MO FOLLOW-UP, N/N (%)*	18-MO FOLLOW-UP, N/N (%)*	24-MO FOLLOW-UP, N/N (%)*	P VALUE
Currently taking ASA or ASA was recommended at the visit	92/97 (95)	78/88 (89)	67/77 (87)	61/73 (84)	54/62 (87)	.04
LDL ≤2.5 mmol/L	66/82 (80)	46/55 (84)	48/55 (87)	47/49 (96)	34/39 (87)	.04
BP <140/90 mm Hg	59/75 (79)	50/68 (74)	42/60 (70)	46/65 (71)	45/54 (83)	.86
Currently taking a β-blocker, or a β-blocker was recommended at the visit	77/97 (79)	61/88 (69)	59/77 (77)	48/73 (66)	39/62 (63)	.02

ASA—acetylsalicylic acid, BP—blood pressure, LDL—low-density lipoprotein.

*Of the participants initially recruited, data were available for all 97 participants at baseline, 88 participants at 6 mo, 77 participants at 12 mo, 73 participants at 18 mo, and 62 participants at 24 mo. Some patients had no data available, some died during the study, and some stopped attending the practice.

Table 6. Papanicolaou tests performed in the 2 age cohorts

AGE GROUP, Y	NO. OF PATIENTS WITH PAP TEST DONE IN 2008–2009 ONLY	NO. OF PATIENTS WITH PAP TEST DONE IN 2009–2011 ONLY	NO. OF PATIENTS WITH PAP TEST DONE IN BOTH PERIODS	NO. OF PATIENTS WITH NO PAP TEST IN EITHER PERIOD
20–35 (N = 200)*	61	19	67	53
36–70 (N = 250)†	59	32	65	94

*Of those in this age group, 60 had no visits to the clinic in 2010-2011.

†Of those in this age group, 47 had no visits to the clinic in 2010-2011.

by family doctors, and found no differences in quality of care. Savage et al,[6] who evaluated a medical home for the military, reported improvement in the number of patients with glycated HbA_{1c} levels less than 9%. The proportion of patients meeting targets for some of the biologic data in this study—glycated hemoglobin levels, presence of microalbuminuria, LDL levels, and blood pressure measurements for patients with arteriosclerotic heart disease—had statistically significant improvement over time. On the other hand, some of the data (eg, taking ASA) did not have significant improvement.

A disappointment was that adherence to the Pap guidelines decreased in the second time period, while other studies have shown positive results.[20,21] This decrease might be explained in part by the fact that Quebec's guideline for the interval between Pap tests increased from 2 to 3 years[22] during the data collection period, and some physicians might have followed that guideline. It could also indicate that patients without a chronic illness do not consult frequently and are less inclined to remember when it is time for another Pap test. No reminders were sent.

Beaulieu et al[1] found that the presence of allied health professionals on site was also positively associated with improved quality of care. The present study did not assess overall quality.

An important finding of this study is that, despite the increased number of nurses, who theoretically could have

positively influenced quality, the proportion of patients who had contact with nurses increased only minimally. This could seem paradoxical considering the improved results in many of the biologic data we monitored. One hypothesis is that the work done to integrate the new professionals, including the development of treatment protocols, affected not only the patients who were followed in collaboration with nurses but also all of the patients who were followed. It is possible that some physicians were reluctant to refer their patients to nurses or that new patients were referred more frequently to nurses than were patients in the cohort already being followed by physicians.

Limitations

Because the number of recruited patients and the number of patients in the final sample was lower than planned, and because not all data were found for all patients, it is possible that certain improvements were not detected owing to a lack of statistical power. Also, the generalizability of the results might be limited by the fact that the study was done in an academic setting. On the other hand, the clinic has 2 entrances directly off a busy street and accepts anyone, with no geographic constraints. The fact that some of the population served was of low income could also affect generalizability.

Conclusion

In this study, a clinic's transition to a multidisciplinary

team appears to have greatly increased accessibility to care with no negative effect on patients' relationship with physicians. Patients' care experiences were very positive even before the change and remained so throughout the study period.

One of the main objectives of creating a medical home with many professionals is to improve patients' health. Even though the biologic data measured are only surrogates for a person's health status, their improvement suggests better quality of care. Because the proportion of patients seeing nurses increased only minimally, it is possible the improvements would have been greater if there had been more referrals to nurses.

It is also possible that the integrated network model would benefit from more direct pairings between nurses and physicians to encourage the development of closer clinical partnerships and promote increased interprofessional referrals. Further research is needed to investigate that question.

The clinic's transition to an integrated network clinic was associated with an increase in ED visits, despite the greater accessibility suggested by the increased number of walk-in visits. Open-access programs might be the answer. ❦

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