

Emergency Department and Walk-in Clinic Use in Models of Primary Care Practice with Different After-Hours Accessibility in Ontario

Utilisation des services d'urgence et des cliniques
sans rendez-vous dans des modèles de soins
de santé primaires comportant différents
services d'accessibilité après les heures normales,
en Ontario



by MICHELLE HOWARD, MSC, PHD
Assistant Professor, Department of Family Medicine
McMaster University
Hamilton, ON

JAMES GOERTZEN, MD, CCFP, FCFP
Associate Clinical Professor, Department of Family Medicine
McMaster University
Hamilton, ON
Northern Ontario School of Medicine
Thunder Bay, ON

Michelle Howard et al.

JANUSZ KACZOROWSKI, BA, MA, PHD
*Associate Professor, Department of Family Medicine
McMaster University
Hamilton, ON*

BRIAN HUTCHISON, MD, MSC
*Professor Emeritus, Departments of Family Medicine and
Clinical Epidemiology and Biostatistics
Centre for Health Economics and Policy Analysis
McMaster University
Hamilton, ON*

KELLY MORRIS, MSC
*Research Coordinator, Department of Family Medicine
McMaster University
Hamilton, ON*

LEHANA THABANE, BSC, PHD
*Associate Professor, Department of Clinical Epidemiology and Biostatistics,
McMaster University
Centre for Evaluation of Medicines, St. Joseph's Healthcare
Hamilton, ON*

MITCH LEVINE, BSC, MD, MSC, FRCPC, FISPE
*Professor, Department of Clinical Epidemiology and Biostatistics
McMaster University
Centre for Evaluation of Medicine, St. Joseph's Healthcare
Hamilton, ON*

ALEXANDRA PAPAIOANNOU, MD, MSC, FRCPC(C), FACP
*Professor, Department of Medicine, McMaster University
Hamilton, ON*

Abstract

Introduction: New models of primary healthcare delivery recently implemented in Ontario are designed to improve after-hours accessibility. This study examined whether the six-month prevalence of emergency department and walk-in clinic use differed among patients of eight Family Health Network (FHN), 16 Family Health Group (FHG) and 12 fee-for-service (FFS) physicians in one city.

Methods: Patients over one year of age who had visited their family doctor in the previous 12 months (n=9,373) were randomly selected from computerized records. A mailed survey asked about urgent health problems in the previous six months and use of health services for those problems. A generalized estimating equation approach was used to compare the proportions of patients using the emergency department and walk-in clinic in the FHN versus other practice types, adjusting for clustering of patients within practices. Multiple imputation was used to impute data for non-respondents and missing items on the surveys.

Results: The response rate was 62.3% (5,884/9,373). Six-month prevalence of emergency department use was 11.4% (199/1,753) among the FHN practices, 15.7% (347/2,236) among the FHG practices (odds ratio [OR] = 1.47; 95% confidence interval [CI] = 1.21–1.80) and 14.3% (252/1,779) among the FFS practices (OR=1.33; 95% CI=1.12–1.59). Six-month prevalence of walk-in clinic use was 1.7% (30/1,723) among the FHN practices versus 1.9% (41/2,236) in the FHG practices (OR=1.07; 95% CI=0.68–1.68) and 3.4% (59/1,779) among the FFS practices (OR=2.08; 95% CI=1.41–3.08). The statistical significance of results was unchanged using multiple imputation.

Conclusions: Patients' use of the emergency department and walk-in clinics differs across primary care practice models with different after-hours accessibility arrangements and incentives.

Résumé

Introduction : Les nouveaux modèles de prestation de soins de santé primaires établis récemment en Ontario ont été conçus pour améliorer l'accessibilité après les heures normales de travail. Cette étude visait à savoir s'il y a des différences dans la prévalence, sur une période de six mois, de l'utilisation des services d'urgence et des cliniques sans rendez-vous, et ce, entre les patients de huit réseaux Santé familiale (RSF), de 16 groupes Santé familiale (GSF) et de 12 médecins fonctionnant selon le paiement à l'acte, dans une ville.

Méthodologie : Des patients âgés d'un an ou plus qui ont visité leur médecin de famille au cours des 12 derniers mois (n=9 373) ont été choisis de façon aléatoire à l'aide des dossiers informatisés. Ils ont reçu par la poste un sondage les questionnant sur leurs problèmes urgents de santé, ainsi que sur l'utilisation des services de santé à cet égard, au cours des six derniers mois. La méthode de l'équation d'estimation généralisée a été employée pour comparer la proportion de patients utilisant les services d'urgence et les cliniques sans rendez-vous dans les RSF, par rapport aux autres types de pratique, en ajustant la répartition en grappes au sein des pratiques. L'imputation multiple a servi à extrapoler les données des non-répondants et des items laissés en blanc dans le sondage.

Résultats : Le taux de réponse était de 62,3 % (5 884/9 373). La prévalence, sur une

période de six mois, de l'utilisation des services d'urgence était de 11,4 % (199/1 753) au sein des RSF, de 15,7 % (347/2 236) au sein des GSF (rapport de cotes [RC] = 1,47; 95 % intervalle de confiance [IC] = 1,21–1,80) et de 14,3 % (252/1 779) pour la pratique du paiement à l'acte (RC=1,33; 95 % IC=1,12–1,59). La prévalence, sur une période de six mois, de l'utilisation des cliniques sans rendez-vous était de 1,7 % (30/1 723) au sein des RSF par rapport à 1,9 % (41/2 236) au sein des GSF (RC=1,07; 95 % IC=0,68–1,68) et 3,4 % (59/1 779) pour la pratique du paiement à l'acte (RC=2,08; 95 % IC=1,41–3,08). La signification statistique des résultats demeurait la même après l'application de l'imputation multiple.

Conclusions : Il existe des différences d'utilisation des services d'urgence et des cliniques sans rendez-vous au sein des modèles de soins de santé primaires organisés selon diverses mesures incitatives ou d'accessibilité après les heures normales.

P RIMARY CARE IN ONTARIO, AND ELSEWHERE IN CANADA, HAS BEEN UNDERgoing funding and organizational changes since the late 1990s. While provision of after-hours services to patients has not been formally required, a full spectrum of after-hours arrangements exists. Family Health Networks (FHNs) and Family Health Groups (FHGs) are among the new models introduced in Ontario since 2001. In these models, physicians are encouraged to form groups or networks but continue to practise independently, while sharing after-hours clinic and on-call responsibilities to a defined patient group. There is evidence from studies in the United States that improved continuity of primary care reduces emergency department use (Christakis et al. 2001; Gill et al. 2000) and hospitalization (Gill and Mainous 1998; Mainour and Gill 1998). Between 15% and 25% of Canadians use emergency department services at least once in a year (Brown and Goel 1994; Chan et al. 2001), and up to 30% of these visits are for non-urgent problems (Burnett and Grover 1996; Vertesi 2004). One Canadian study reported that fewer than half of patients with an urgent health problem reported using out-of-hours services of their family practice, and 20% used the practice's on-call service (Grad et al. 1998).

Difficulty (perceived or actual) in accessing family physicians for immediate care both during and out of regular hours is a major cause of emergency department use (Boushy and Dubinsky 1999; Burnett and Grover 1996). Emergency department costs for minor acute illnesses are much higher than in primary care settings (Campbell et al. 2005), and use of the emergency department may result in lack of continuity of care, duplication of tests and procedures, absence of proper follow-up and poor communication with the family physician (Dunnion and Kelly 2005; Jansen and Grant 2003).

In the Canadian healthcare setting, walk-in clinics provide primary care services to

patients without an appointment or prior relationship. Approximately one-quarter of patients with a family physician in Canada use a walk-in clinic in a six-month period (Bell and Szafran 1992). Patients often use these services during the business hours of their regular physician out of convenience, and frequently do not attempt to contact their family physician (Miller et al. 1989; Szafran and Bell 2000). Although some walk-in clinics provide care for a population of regular patients (Barnsley et al. 2002), they have been described as providing discontinuous care (Belle Brown et al. 2002), neglecting preventive and mental health (Barnsley et al. 2002) and increasing duplication of services or repeat visits to the family physician for the same episode (Bell and Szafran 1992; Campbell et al. 2005; Jones 2000).

Description of primary care in Ontario

In the province of Ontario, the FHN initiative began in March 2001, and in 2003 the FHG model was introduced. FHNs are required to roster their patients through a formal enrolment process and are paid by a blended funding model of capitation for a basket of services with quota-based incentives for preventive services. Health services outside the basket are reimbursed through a combination of fee-for-service and premium payments for prenatal and intrapartum care, specific mental health conditions, hospital care, palliative and home care and office procedures. FHGs are fee-for-service funded, with additional bonuses for achieving targets for specific services. There is no limit to fee-for-service billings, and they are encouraged but not required to roster patients. Physicians in FHNs receive an access bonus that is reduced by the cost of services provided to their rostered patients by non-FHN primary care physicians. FHG physicians receive fee premiums for services provided to rostered patients after hours and regular fees for services provided to non-rostered patients. Both models also provide back-up to a nurse-staffed 24/7 telephone health advisory service for rostered patients, and are contractually required to provide a minimum number of weekly after-hours clinics.

The other main practice model is fee-for-service (FFS). Patients are not rostered, and there are no maximums on services billed or the number of patients seen. There are no contractual obligations to provide after-hours or telephone coverage, although some FFS physicians choose to provide these services.

A potential benefit of new models of primary care may be reduced use of other services, such as emergency departments and walk-in clinics (Christakis et al. 2001; Gill and Mainous 1998; Gill et al. 2000; Mainous and Gill 1998). The purpose of this study was to compare the patient-reported prevalence of emergency department and walk-in clinic use during the previous six months by patients receiving care in Family Health Networks, Family Health Groups and fee-for-service practices.

Methods

The study was conducted in Thunder Bay, Ontario, a city with a population of approximately 115,000 and one acute care hospital with a full-service emergency department. The hospital provides primary, secondary and tertiary care to Thunder Bay and acts as a referral centre for secondary and tertiary care for the region of Northwestern Ontario, consisting of 18 other communities spread over a large geographic area with a population of approximately 300,000.

Family physicians were deemed ineligible for the study if they provided only limited services (i.e., specialized clinics such as sexual health, sports medicine or walk-in clinic only [n=17] or practised in the emergency department only [n=22]). At the time of the study, services for urgent medical problems in the city included family physician services, after-hours clinics for family practice patients whose physicians were in an FHN or FHG, five walk-in clinics available to anyone and the city's full-service 24-hour hospital emergency department.

Recruitment of physicians and patients took place from December 2004 to February 2005.

Recruitment of physicians

One FHN, three FHGs and 12 FFS physicians were recruited. All eight physicians in the city's one FHN participated and were considered the index group. In order to make the three physician groups as similar as possible, physicians in the FHG and FFS groups were approached based on matching, as closely as possible, gender and year of graduation from medical school to the eight FHN physicians (37.5% female, median year of graduation 1986). Of the 23 eligible physicians from the three FHGs in the city, 18 were approached and 16 agreed to participate (37.5% female, median year of graduation 1985). Fifteen eligible FFS physicians were approached, and 12 agreed to participate (16.7% female, median year of graduation 1989). All physicians in the participating FHN practised in one building; however, not all FHG physicians were co-located. FHG and FFS physicians were dispersed across seven buildings. FHN and FHG physicians did not work in additional community walk-in clinics (WICs); four FFS physicians reported working in a WIC in addition to their own clinic.

Sampling frames and questionnaire

In this study, the patient roster was used as the sampling frame in the FHN practices because it was considered to be comprehensive and to represent the true patients of the physician. For the FHG and FFS practices, it was necessary to use electronic billing data from patient visits to create a sampling frame. The sampling frames for all models were restricted to patients seen in the past year to minimize the number of

surveys mailed to patients who were no longer with the practice. The lists were further restricted to patients over the age of one year and living in a community within a 25-km radius of the Thunder Bay hospital emergency department, as indicated by their home postal code.

The questionnaire asked about occurrence of an urgent health problem in the past six months and the healthcare services that were used, including the emergency department and walk-in clinics. If no response to the questionnaire was received within four weeks, a second modified letter and another questionnaire were mailed. The questionnaire was based on adaptations of questions used in a previous study of emergency department use in Canada (Grad et al. 1998) and previously validated surveys for socio-demographic and self-reported health questions (Ware and Sherbourne 1992; Statistics Canada 1999). The Hamilton Health Sciences and the Thunder Bay Regional Health Sciences Centre research ethics boards approved the study.

Sample size and statistical analyses

The primary outcome was the proportion of respondents that reported a visit to the emergency department in the previous six months in the FHN versus FHG and FFS practices. The secondary outcome was the proportion of patients that reported using a walk-in clinic in the past six months. The sample size was based on ability to detect a 3% absolute difference in proportions with a baseline of 10% emergency department use in a six-month period, with 80% power and a type 1 error of 5% (two-tailed). To account for clustering of the outcome within physicians, the sample size was inflated by a factor of 1.15, based on an intraclass correlation coefficient of .001 from a quality assurance project conducted in Hamilton (Department of Family Medicine, McMaster University, unpublished data).

Between-group comparisons of the proportion of patients that self-reported using the emergency department or a walk-in clinic in the past six months were made with the generalized estimating equation (GEE) approach assuming an exchangeable correlation structure (Liang and Zeger 1986; Zeger et al. 1986). The QIC (quasi-likelihood under the independence model criterion) statistic was used to confirm that the exchangeable correlation structure assumption was suitable (Pan 2001). Goodness-of-fit of the models for emergency department and walk-in clinic use was also tested (Horton et al. 1999). A non-significant p-value for the chi-square test indicates a suitable model fit. Separate multiple variable models with stepwise forward logistic regression (using $\alpha=0.05$ for inclusion and $\alpha=0.10$ for exclusion) were computed with emergency visit and walk-in clinic as the outcomes to examine the presence of potential socio-demographic and health status confounders. The variables that remained significantly associated with emergency department (ED) use were age, annual household income and self-rated health (excellent, very good, good, fair, poor).

The only variable significantly associated with walk-in clinic use was age. These variables were included as covariates in the final models that adjusted for covariates.

To address the possibility that non-response may have biased the results, data on the outcomes and covariates were imputed for all surveyed patients, including non-respondents and respondents with incomplete surveys. Data on age and sex were available for all patients sampled, and these were used to impute the other covariates in the model: household income and self-reported health, and the outcome variables: use of the emergency department or a walk-in clinic. The multiple imputation approach was used to create 10 complete imputed data sets (Rubin 1987). The Genmod procedure was used to calculate the GEE parameter estimates for the 10 imputed data sets; the MIAnalyze procedure in SAS, which takes account of the reduced variance from imputation, was then used to calculate the overall combined GEE estimates.

Analyses were done with SAS version 9.1 (Cary, NC, USA). The criterion of statistical significance was set at $\alpha=0.05$ (two-sided).

Results

Response rate

Questionnaires were mailed to 9,612 patients from 36 practices. Two hundred fifteen patients were subsequently deemed ineligible because they had left the practice or were deceased. The overall response rate was 62.3% (5,884/9,373). The mean response rate was 65.4% (minimum to maximum: 54.1% to 75.4%) among the FHN practices, 59.8% (minimum to maximum: 39.5% to 66.5%) among the FHG practices and 63.6% (minimum to maximum: 52.5% to 71.9%) among the FFS practices. Only 1.1% (66/5,884) of respondents did not consider themselves a patient of the physician whose list we sampled, and 31 respondents did not answer the question. These patients were removed from the analysis.

Patient characteristics

The mean age of respondents was 43.8 years (standard deviation [SD] = 22.2) compared to 36.3 years (SD=20.3) among non-respondents ($p<0.001$). Over half (60.3%; 3,549/5,884) of respondents were female, compared to 57.5% (2,021/3,513) of non-respondents ($p=0.008$). Table 1 shows the demographic characteristics of respondents in the three models.

Sixty-five respondents did not answer the question about the occurrence of an urgent health problem. Of those who responded, the prevalence of a self-reported urgent health problem in the past six months was 20.6% (346/1,772) among the FHN respondents, 25.5% (569/2,236) among FHG respondents and 23.0% (409/1,779) among FFS respondents.

Emergency Department and Walk-in Clinic Use in Models of Primary Care Practice

TABLE 1. Demographic characteristics and self-reported health of questionnaire respondents in the three practice models

	FHN* (n=1,772) n (%)	FHG† (n=2,236) n (%)	FFS‡ (n=1,779) n (%)
Female	1,062 (59.9)	1,412 (63.1)	1,012 (56.9)
Age: mean years, standard deviation	42.2, 22.7	44.1, 21.4	44.7, 22.0
Highest education (among respondents aged 20 and older) (n=4,580)			
Current student	36 (2.7)	50 (2.8)	35 (2.4)
Some or completed elementary school	105 (7.8)	153 (8.5)	117 (8.2)
Some or completed high school	558 (41.2)	666 (36.8)	591 (41.3)
Some or completed college or some university	456 (33.7)	612 (33.8)	459 (32.1)
Completed university (any degree)	198 (14.6)	328 (18.1)	230 (16.1)
English main language spoken at home (n=5,787)	1,718 (97.0)	2,135 (95.5)	1,715 (96.4)
Household income in 2004 (n=5,069)			
<\$14,999	124 (7.9)	183 (9.5)	145 (9.3)
\$15,000–\$29,999	207 (13.2)	250 (12.9)	217 (13.9)
\$30,000–\$44,999	238 (15.2)	271 (14.0)	240 (15.3)
\$45,000–\$59,999	241 (15.4)	288 (14.9)	209 (13.4)
\$60,000–\$79,999	247 (15.8)	340 (17.6)	290 (18.5)
\$80,000–99,999	219 (14.0)	266 (13.7)	223 (14.2)
\$100,000 or higher	292 (18.6)	338 (17.5)	241 (15.4)
Own the current home (n=5,718)	1,572 (89.8)	1,935 (87.5)	1,529 (87.0)
Working at a paying job (among adults aged 18 to 64 years) (n=3,667)	800 (74.1)	1,093 (74.7)	826 (73.5)
Self-reported health status (n=5,724)			
Excellent	426 (24.3)	410 (18.5)	345 (19.6)
Very good	636 (36.3)	824 (37.2)	673 (38.3)
Good	502 (28.6)	677 (30.6)	502 (28.6)
Fair	148 (8.4)	237 (10.7)	185 (10.5)
Poor	41 (2.3)	65 (2.9)	53 (3.0)

* Family Health Network.

† Family Health Group.

‡ Fee-for-service.

Emergency department and walk-in clinic use

The self-reported six-month prevalence of emergency department use was 11.4% (199/1,753) among the FHN respondents, 15.7% (347/2,236) among FHG respondents and 14.3% (252/1,779) among FFS respondents. The proportion of respondents who reported visiting a walk-in clinic was 1.7% (30/1,723) among FHN respondents, 1.9% (41/2,236) among FHG respondents and 3.4% (59/1,779) among FFS respondents.

With the FHN patients as the reference category, the adjusted odds ratio (OR) for emergency department use for the FHG patients was 1.5 (95% confidence interval

[CI] = 1.2–1.8) and for the FFS patients was 1.3 (95% CI=1.1–1.6) (Table 2). The adjusted OR for walk-in clinic use for the FHG patients was 1.07 (95% CI=0.7–1.7); for the FFS patients the OR was 2.1 (95% CI=1.4–3.1) (Table 3). The adjusted ORs for emergency department use, with missing data imputed for the comparison of FHG and FFS versus the FHN model, were 1.3 (95% CI=1.03–1.5, $p=0.02$) and 1.3 (95% CI=1.06–1.5, $p=0.008$), respectively. For walk-in clinic use, the ORs were 1.2 (95% CI=0.8–1.8, $p=0.42$) and 2.0 (95% CI=1.4–2.9, $p=0.001$), respectively.

TABLE 2. Odds ratios for unadjusted and adjusted emergency department use

	Odds Ratio (95% confidence interval) Excluding missing data*			
	Unadjusted	p-value	Adjusted [†]	p-value
FHN [†]	—			
FHG [‡]	1.45 (1.22–1.74)	<0.001	1.47 (1.21–1.80)	<0.001
FFS [§]	1.31 (1.10–1.55)	0.003	1.33 (1.12–1.59)	0.001
Age (years)	—	—	0.99 (0.987–0.995)	<0.001
Self-reported health status	—	—	0.92 (0.88–0.97)	<0.001
Household income	—	—	1.28 (1.05–1.17)	<0.001

* Odds ratios (OR) for adjusted model coefficients using multiple imputation of missing data – OR FHN versus FHG=1.26 (95% confidence interval 1.03–1.54), OR FHN versus FFS=1.27 (95% confidence interval 1.06–1.51).

† Family Health Network.

‡ Family Health Group.

§ Fee-for-service.

|| Self-reported health status ranges from 1=excellent, through 5=poor.

¶ Goodness-of-fit chi-square = 13.9 (df=9), $p=0.12$.

TABLE 3. Odds ratios for unadjusted and adjusted walk-in clinic use

	Odds Ratio (95% confidence interval) Excluding missing data*			
	Unadjusted	p-value	Adjusted	p-value
FHN [†]	—		—	
FHG [‡]	1.03 (0.65–1.64)	0.89	1.07 (0.68–1.68)	0.78
FFS [§]	1.31 (1.10–1.55)	0.0007	2.08 (1.41–3.08)	<0.001
Age (years)	—	—	0.987 (0.979–0.995)	0.0016

* Odds ratios (OR) for adjusted model coefficients using multiple imputation of missing data – OR FHN versus FHG=1.19 (95% confidence interval 0.77–1.83), OR FHN versus FFS=2.03 (95% confidence interval 1.42–2.92).

† Family Health Network.

‡ Family Health Group.

§ Fee-for-service.

|| Goodness-of-fit chi-square = 5.7 (df=9), $p=0.77$.

The intraclass correlation coefficient (ICC) among physicians for ED use was 0.004 and for WIC use was 0.002. The ICC among the eight distinct clinics in which physicians were located was 0.003 for ED use and 0.0002 for WIC use.

Discussion and Conclusions

The results of this study suggest that characteristics of the family practice are associated with patients' use of the emergency department for self-defined urgent health problems. Patients whose physicians were in an FHG or FFS practice were 45% and 31% more likely than patients in the FHN model to visit the emergency department in a six-month period, and patients in an FFS practice were twice as likely as FHN patients to use a walk-in clinic.

Previous studies have shown associations between improved primary care access and reduced emergency department use. Studies in the United States have shown reductions in emergency department use after improved access to and addition of after-hours primary care (Piehl et al. 2000; Lowe et al. 2005). In the United Kingdom

and the Netherlands, general practitioner (GP) cooperatives involving large numbers of GPs and patients have been formed to reduce the burden of after-hours care on GPs and the emergency department (van Uden et al. 2003; Pickin et al. 2004; van Uden and Crebolder 2004). A control-

... characteristics of the family practice are associated with patients' use of the emergency department for self-defined urgent health problems.

led before-and-after study comparing emergency department use before and after the introduction of a general practice cooperative with after-hours clinics in the United Kingdom found no difference in emergency department use rates (Pickin et al. 2004). However, studies in the Netherlands have shown reductions in emergency department use after introduction of GP cooperatives (van Uden et al. 2003, 2005; van Uden and Crebolder 2004).

The FHN model features a package of services and incentives, including the after-hours clinics, 24/7 physician back-up to telephone triage for rostered patients and the financial negation if rostered patients visit another family physician, which together may affect use of services outside the practice. Although both FHN and FHG models provide after-hours services and 24/7 physician back-up to the telephone triage for rostered patients, emergency department use was different in the two models. In addition, significantly more patients in the FFS model reported a visit to a walk-in

clinic compared to patients in the FHN model, but the difference between the FHN and FHG patients was not statistically significant. It is possible that physicians in the FHN advertised and educated patients regarding the after-hours clinics and the 24/7 physician back-up to a greater extent than FHG physicians to attempt to limit patients' use of walk-in clinics and avoid negation of the access bonus in that model. Emergency department use may also have been similarly affected.

Reduction of unnecessary emergency department use and visits for minor complaints has been of interest in many jurisdictions; however, there are concerns about

the safety and effectiveness of these efforts. A Canadian study has reported that even among emergency department attendees triaged as non-urgent, 7% were subsequently admitted to hospital (Vertesi 2004). On the other hand, a study in which patients with complaints that could be deferred to

Reduction of unnecessary emergency department use and visits for minor complaints has been of interest in many jurisdictions ...

next-day care were randomized to immediate emergency department care or next-day care in a primary care clinic found no adverse effects on patient safety in the deferred group (Washington et al. 2002). There are reasons to pursue the safe diversion of non-urgent patients from the emergency department to primary care, relating to continuity of care, duplication of services and costs. For example, one study in Canada has shown that patients who attended the emergency department for a minor acute illness were 6.5 times more likely to use healthcare for the same complaint again within three days and 4.9 times more likely to use healthcare for the same problem 3–14 days later, and that costs of treating minor ailments in primary care are lower than in the emergency department (Campbell et al. 2005). On the other hand, in smaller communities where family physicians often staff the ED (Haggerty et al. 2007), patients may experience continuity through use of the ED.

Younger age, lower income and poorer self-reported health status were significantly associated with emergency department use in the multiple-variable model. Previous studies have also found that young children (Chan et al. 2001), those with lower socio-economic status (Mustard et al. 1998; Menec et al. 2005; Li et al. 2006; Hong et al. 2007) and poorer self-reported health (Zuckerman and Shen 2004) are more likely to use the emergency department. Inclusion of these variables in the model for emergency department use and age in the walk-in clinic use model changed the results very little, suggesting they were not confounders. Since the conversion to the new prac-

tice models in Ontario was very recent at the time of this study, most patients would already have had a family physician and would not have chosen their practice model. Consequently, we would not expect different types of patients in the different models.

There were several limitations in this study. We were unable, using a self-report questionnaire, to determine the severity of the urgent health problem or appropriateness of the emergency department visit. If patients in the FHN model experienced a lower severity of urgent health problem compared to patients in the other models, this factor may have biased the results. An additional limitation may arise from the different lists used to create the sampling frames in the different models. The patient sampling frame was based on rostered patients in the FHN model and billing data in the other models. FHN physicians may see patients who are not rostered on a fee-for-service basis. Although there are financial incentives in the model to roster, and premiums for care of patients with chronic disease and selected mental health conditions, it is possible that the FHN group was healthier than the patients sampled in the other models because of selection of patients into the roster for capitated payment. There may be differences between physicians who choose to enter reformed practice models, and this study did not have sufficient sample size to address the potential influence of these characteristics on the effects found.

The response rate obtained in this study was typical of mailed health-related survey response rates (Rimm et al. 1999). Analysis with multiple imputation to create complete data sets did not change the conclusions for emergency department or walk-in clinic use, but the effect sizes for the comparisons between groups on emergency department use were reduced slightly.

This study was conducted in one medium-sized Ontario city with a single emergency department. Further research should compare patterns of healthcare utilization in larger urban settings with greater choice of hospital emergency departments. It would also be useful to determine which aspects of reforms may be beneficial and cost-saving if patient encounters with more costly healthcare services are reduced.

This study found that patients whose family physicians practised in a model based on capitation, with a contractual agreement to provide some after-hours services and to roster patients, used the emergency department less often than patients whose physicians practised in other models. This study contributes to knowledge about the effects of Canadian reforms in primary care.

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Correspondence may be directed to: Michelle Howard, Department of Family Medicine, McMaster University, 75 Frid St., Hamilton, ON L8P 4M3; tel.: 905-525-9140, ext. 28502; e-mail: mhoward@mcmaster.ca.

REFERENCES

- Barnsley, J., A.P. Williams, J. Kaczorowski, E. Vayda, E. Vingilis, A. Campbell and K. Atkin. 2002. "Who Provides Walk-in Services? Survey of Primary Care Practices in Ontario." *Canadian Family Physician* 48: 519–26.
- Bell, N.R. and O. Szafran. 1992. "Use of Walk-in Clinics by Family Practice Patients." *Canadian Family Physician* 38: 507–13.
- Belle Brown, J., L.M. Sangster, T. Bouck, J.M. Ostbye, J.M. Barnsley, M. Matthews and G. Ogilvie. 2002. "Walk-in Clinics in Ontario. An Atmosphere of Tension." *Canadian Family Physician* 48: 531–36.
- Boushy, D. and I. Dubinsky. 1999. "Primary Care Physician and Patient Factors That Result in Patients Seeking Emergency Care in a Hospital Setting: The Patient's Perspective." *Journal of Emergency Medicine* 17(3): 405–15.
- Brown, E.M. and V. Goel. 1994. "Factors Related to Emergency Department Use: Results From the Ontario Health Survey 1990." *Annals of Emergency Medicine* 24: 1083–91.
- Burnett, M.H. and S.A. Grover. 1996. "Use of the Emergency Department for Non-Urgent Care During Regular Business Hours." *Canadian Medical Association Journal* 154: 1345–51.
- Campbell, M.K., R.W. Silver, J.S. Hoch, T. Ostbye, M. Stewart, J. Barnsley, B. Hutchison, M. Mathews and C. Tyrell. 2005. "Re-utilization Outcomes and Costs of Minor Illness Treated at Family Physician Offices, Walk-in Clinics, and Emergency Departments." *Canadian Family Physician* 51: 82–83.
- Chan, B.T.B., M.J. Schull and S.E. Schultz. 2001. *Emergency Department Services in Ontario: Research Atlas*. Toronto: Institute for Clinical Evaluative Sciences.
- Christakis, D.A., L. Mell, T.D. Keopsell, F.J. Zummerman and F.A. Connell. 2001. "Association of Lower Continuity of Care with Greater Risk of Emergency Department Use and Hospitalization in Children." *Pediatrics* 107: 524–29.
- Dunnion, M.E. and B. Kelly. 2005. "From the Emergency Department to Home." *Journal of Clinical Nursing* 14: 776–85.
- Gill, J.M. and A.G. Mainous III. 1998. "The Role of Provider Continuity in Preventing Hospitalizations." *Archives of Family Medicine* 7: 352–57.
- Gill, J.M., A.G. Mainous III and M. Nsereko. 2000. "The Effect of Continuity of Care on Emergency Department Use." *Archives of Family Medicine* 9: 333–38.
- Grad, R., J. Kaczorowski, Y. Singer, C. Levitt and J. Mandelcorn. 1998. "Where Do Family Practice Patients Go in Case of Emergency?" *Canadian Family Physician* 44: 2666–72.
- Haggerty, J.L., D. Roberge, R. Pineault, D. Larouche and N. Touati. 2007. "Features of Primary Healthcare Clinics Associated with Patients' Utilization of Emergency Rooms: Urban–Rural Differences." *Healthcare Policy* 3(2): 72–85.

- Hong, R., B.M. Baumann and E.D. Boudreaux. 2007. "The Emergency Department for Routine Healthcare: Race/Ethnicity, Socioeconomic Status, and Perceptual Factors." *Emergency Medicine* 32: 149–58.
- Horton, N.J., J.D. Bebhuk, C.L. Jones, S.R. Lipsitz, P.J. Catalano, G.E.P. Zahner and G.M. Fitzmaurice. 1999. "Goodness-of-Fit for GEE: An Example with Mental Health Service Utilization." *Statistics in Medicine* 18: 213–22.
- Jansen, J.O. and I.C. Grant. 2003. "Communication with General Practitioners After Accident and Emergency Attendance: Computer Generated Letters Are Often Deficient." *Emergency Medicine Journal* 20: 256–57.
- Jones, M. 2000. "Walk-in Primary Medical Care Centres: Lessons from Canada." *British Medical Journal* 321: 928-31.
- Li, G., M.J. Schull, M.L. McCarthy, M. Vermeulen, J.T. Lau and G.D. Kelen. 2006. "Comparison of Emergency Department Utilization in Canada and the United States." *Academic Emergency Medicine* 13(5, Suppl. 1): S62.
- Liang, K.Y. and S.I. Zeger. 1986. "Longitudinal Data Analysis Using Generalized Linear Models." *Biometrika* 73: 13–22.
- Lowe, R.A., A.R. Localio, D.F. Schwarz, S. Williams, L. Wolf Tuton, S. Maroney, D. Nicklin, N. Goldfarb, D.D. Vojta and H.I. Feldman. 2005. "Association between Primary Care Practice Characteristics and Emergency Department Use in a Medicaid Managed Care Organization." *Medical Care* 43: 792–800.
- Mainous III, A.G. and J.M. Gill. 1998. "The Importance of Continuity of Care in the Likelihood of Future Hospitalizations: Is Site of Care Equivalent to a Primary Care Clinician?" *American Journal of Public Health* 88: 1539–41.
- Menec, V.H., M. Sirski and D. Attawar. 2005. "Does Continuity of Care Matter in a Universally Insured Population?" *Health Services Research* 40: 389–400.
- Miller, G.B., Z. Mah, S. Nantes, W. Brynat, T. Kayler and K. McKinnon. 1989. "Walk-in Clinics: A Preliminary Descriptive Study." *Canadian Family Physician* 35: 2013–15.
- Mustard, C.A., A.L. Kozyrskj, M.L. Barer and S. Sheps. 1998. "Emergency Department Use as a Component of Total Ambulatory Care: A Population Perspective." *Canadian Medical Association Journal* 158(1): 49–55.
- Pan, W. 2001. "Akaike's Information Criterion in Generalized Estimating Equations." *Biometrics* 57: 120–25.
- Pickin, D.M., A. O'Cathain, M. Fall, A.B. Morgan, A. Howe and J.P. Nicholl. 2004. "The Impact of a General Practice Co-operative on Accident and Emergency Services, Patient Satisfaction and GP Satisfaction." *Family Practice* 21(2): 180–82.
- Piehl, M.D., C.J. Clemens and J.D. Joines. 2000. "'Narrowing the Gap': Decreasing Emergency Department Use by Children Enrolled in the Medicaid Program by Improving Access to Primary Care." *Archives of Pediatric and Adolescent Medicine* 154: 791–95.
- Rimm, E.B., M.J. Stampfer, G.A. Colditz, E. Giovannucci and W.C. Willett. 1999. "Effectiveness of Various Mailing Strategies among Nonrespondents in a Prospective Cohort Study." *American Journal of Epidemiology* 131: 1068–71.

- Rubin, D.B. 1987. *Multiple Imputation for Nonresponse in Surveys*. New York: Wiley.
- Sinharay, S., H.S. Stern and D. Russell. 2001. "The Use of Multiple Imputation for the Analysis of Missing Data." *Psychological Methods* 6: 317–29.
- Statistics Canada. 1999. National Population Health Survey – Household Component – Cycle 2 (1996–1997) Questionnaire. Retrieved June 19, 2008. <http://www.statcan.ca/english/sdds/instrument/3236_Q1_V2_E.pdf>.
- Szafran, O. and N.R. Bell. 2000. "Use of Walk-in Clinics by Rural and Urban Patients." *Canadian Family Physician* 46: 114–19.
- van Uden, C.J. and H.F. Crebolder. 2004. "Does Setting Up Out-of-Hours Primary Care Cooperatives Outside a Hospital Reduce Demand for Emergency Care?" *Emergency Medicine Journal* 21: 722–23.
- van Uden, C.J.T., R.A.G. Winkens, G. Wesseling, H.F. Crebolder and C.P. van Schayck. 2003. "Use of Out-of-Hours Services: A Comparison between Two Organisations." *Emergency Medicine Journal* 20: 184–87.
- van Uden, C.J.T., R.A.G. Winkens, G. Wesseling, H.F.B.M. Fiolet, C.P. van Schayck and H.F. Crebolder. 2005. "The Impact of a Primary Care Physician Cooperative on the Caseload of an Emergency Department: The Maastricht-Integrated Out-of-Hours Service." *Journal of General Internal Medicine* 20: 612–17.
- Vertesi, L. 2004. "Does the Canadian Emergency Department Triage and Acuity Scale Identify Non-Urgent Patients Who Can Be Triage Away from the Emergency Department?" *Canadian Journal of Emergency Medicine* 6: 337–42.
- Ware, J.E. and C.D. Sherbourne. 1992. "The MOS 36-Item Short Form Health Survey (SF-36): Conceptual Framework and Item Selection." *Medical Care* 30: 473–83.
- Washington, D.L., C.D. Stevens, P.G. Shekelle, P.L. Henneman and R.H. Brook. 2002. "Next-Day Care for Emergency Department Users with Nonacute Conditions. A Randomized Controlled Trial." *Annals of Internal Medicine* 137: 707–14.
- Zeger, S., K. Liang and P. Albert. 1986. "Models for Longitudinal Data: A Generalized Estimating Equation Approach." *Biometrics* 44: 1049–60.
- Zuckerman, S. and Y.C. Shen. 2004. "Characteristics of Occasional and Frequent Emergency Department Users: Do Insurance Coverage and Access to Care Matter?" *Medical Care* 42: 176–78.