Does Continuity of Care Matter in a Universally Insured Population?

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Objective. To examine the relation between continuity of care and preventive health care and emergency department (ED) use in a universal health care system.

Data Sources/Study Setting. Administrative data that capture health care use of the entire population of a midwestern Canadian city.

Study Design. A population-based, retrospective study of all individuals who had a least one physician contact in 1998 or 1999 (total $N = 536{,}893$).

Methods. Logistic regressions were conducted to examine the relation between continuity of care, defined in terms of the proportion of total visits to family physicians (FPs) made to the same FP, and cervical cancer screening, breast cancer screening, influenza vaccination, pneumococcal vaccination, and ED visits, controlling for demographic variables, socioeconomic status (defined in terms of relative affluence of neighborhood of residence), and health status.

Principal Findings. Continuity of care was related to better preventive health care and reduced ED use. A consistent socioeconomic gradient also emerged. For instance, the odds of having a mammogram was double for individuals living in the wealthiest neighborhoods, relative to those in the poorest neighborhoods (adjusted odds ratio = 2.31, 99 percent CI 2.13–2.50).

Conclusions. Having a long-term relationship with a single physician makes a difference even in a universal health care system. Moreover, socioeconomic disparities remain, suggesting the need to target specifically individuals from lower socioeconomic strata for preventive health care.

Key Words. Continuity of care, socioeconomic status, preventive health care, emergency department use, administrative data

Continuity of care, which is often defined as a long-term relationship between a patient and a physician, regardless of the presence of any specific disease (Starfield 1980; Haggerty et al. 2003), has long been thought to be an essential aspect of primary care (Starfield 1998). The benefits of continuity of care have been documented extensively and include reduced likelihood of hospitalizations (Gill 1997; Mainous and Gill 1998; Christakis et al. 2001), fewer emergency department (ED) visits (Gill, Mainous, and Nsereko 2000; Cristakis et al. 2001), and better preventive care, including breast cancer and cervical cancer screening (Ettner 1996; Mandelblatt et al. 1999), and immunization (Mark and Paramore 1996; O'Connor et al. 1998; Christakis et al. 2000).

Although much has been written about the benefits of continuity of care, few studies have been conducted in a universal health care system. It has long been argued that universal medical services coverage is necessary to ensure equity of access (Siemiatycki, Richardson, and Pless 1980). However, research indicates that barriers to continuity of care remain even within universal health care systems (Mustard et al. 1996; Menec et al. 2001). This suggests that more research is needed to examine whether continuity of care affords benefits in a universally insured population where there are no user-fees and where people can seek care from any physician of their choosing. The objective of the present study was to investigate the relation between continuity of care and a range of health care correlates, including preventive health care and ED visits in a Canadian urban center.

METHODS

Data Source

The data source were administrative data for the years 1998 and 1999. These data have been validated extensively (Roos and Nicol 1999). Specific files used included physician claims data and the Manitoba Immunization Monitoring System (MIMS) database. Physician claims data are derived from health insurance claims routinely filed by physicians with the single payer agency (the Ministry of Health). Physicians are predominantly paid on a fee-for-service basis. The MIMS database contains complete records of all vaccinations covered by the health care system, which are administered by physicians and public health nurses. The Population Registry provides information on demographic characteristics. Canada Census data were used to determine neighborhood income.

Study Population

This study focused on the entire population of Winnipeg, a midsized, midwestern Canadian city, who made at least one ambulatory visit to a phy-

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sician in the city during the 2-year study period ($N = 536{,}893$). Given the varying inclusionary criteria for the different measures, the population included in each of the analyses varies, however.

Measures

Continuity of Care. Continuity of care has been defined in a variety of ways. Following previous research, we used a majority-of-care rule (Mustard et al. 1996; Gill 1997; Mainous and Gill 1998; Rosenblatt et al. 1998; Menec et al. 2001), whereby patients were classified as having high continuity of care if they made a specified proportion (>75 percent) of their total visits to family physicians (FPs) to the same FP in 1998–1999. For comparison purposes, a 50 percent cut-off was also used. Individuals below the cut-off were classified as having low continuity of care, and those above the cut-off as having high continuity of care. Our definition of continuity of care was generally based on ambulatory visits to FPs only; ED visits were not included, nor were visits to specialists. For children (ages 0–14), both FP and pediatrician visits were included, in recognition of the fact that much of the care of children in Winnipeg is provided by pediatricians.

Patient Characteristics

Income Quintiles. An aggregate-level measure of socioeconomic status was derived from the 1996 Canadian Census database. Census data were aggregated at the geographic unit of the enumeration area and, based on mean household income, ranked from poorest to wealthiest. Enumeration areas were grouped into five population quintiles, with each quintile containing 20 percent of the urban population. Each resident was linked to an enumeration area by residential postal code or municipal code, and assigned an income quintile rank, with Q1 being the poorest neighborhood. This ecologic measure has been shown to be a powerful predictor of health care use (Roos and Mustard 1997; Mustard et al. 1999).

Mobility. Patients who had the same postal code over the 2 years were classified as not having moved, while those with two or more postal codes were classified as having moved.

Health Status. The health status or "disease burden" of individuals was measured using the Ambulatory Diagnostic Groups (ADGs), a measure developed at Johns Hopkins University, which has been validated extensively (Starfield et al. 1991; Weiner et al. 1991; Weiner et al. 1996; Reid et al. 2001). The ICD-9/ICD-9-CM diagnosis codes, derived from physician claims and

hospital discharge abstracts, were grouped into 32 ADGs based on the expected consumption of health care resources and clinical outcomes. Patients were classified into one of three categories: healthiest (0–1 ADGs), moderately sick (2–3 ADGs), and the most sick (4+ ADGs).

Physician Utilization. In order to control for frequency of physician utilization, the total number of ambulatory visits made by patients was included in the analysis, and then categorized into three groups (1–3, 4–12, 13+ visits).

Patient Demographic Characteristics. Age was used as a dummy-coded variable in all analyses. As the age groups included in the analyses differed depending on the particular measure used; the specific age categories also varied, but generally we used either 5- or 10-year groupings. Gender and marital status of patients were also included where applicable.

Preventive Health Care. Two cancer-screening measures were used. Following the guidelines from the Canadian National Workshop on Screening for Cancer of the Cervix (Miller et al. 1991), women aged 18 years and older were identified who had one or more *Papaniculaou* (Pap) test within a 3-year period (1997–1999). Pap tests were examined in two ways: 0 versus 1+ and, among those who received at least one test, 1–2 versus 3+. The latter measure was included to get a sense of potential duplication of services. *Mammography Screening* was derived by identifying women between the ages of 50 and 69 years who had one or more mammograms within a 2-year period (1998–1999), consistent with guidelines of the Canadian breast screening program (Gaudette et al. 1996).

We further included two vaccination measures—*influenza and pneumococcal vaccination*—based on the MIMS data. Both vaccines are covered through the provincial health insurance system for individuals aged 65 or older, although coverage for pneumococcal vaccine was introduced only in 2000. Use of this vaccine was therefore virtually nil in the province prior to 2000. Moreover, adult vaccinations are being recorded in the MIMS system only since 2000; no reliable data are available for the years prior to that. Because of this, we determined receipt of influenza and pneumococcal vaccination for individuals aged 65+ for 2000, which means that vaccination was examined 1 year after our continuity of care measure was defined.

ED Visits. Based on physician claims data, we further determined *ED use* within a 2-year period (1998–1999). The administrative database contains

information from the two largest hospitals in the urban center, which receive approximately half of all ED visits in the city. This includes the only pediatric ED in the city, which draws patients from the entire city. Two measures were derived: 1+ versus 0 ED visits and 3+ versus 0–2 ED visits, the latter measure was used to identify specifically heavy ED users.

RESULTS

Descriptive information for preventive health care and ED visits is presented in Table 1. For example, overall, 63.6 percent of women had at least one Pap test. The proportion was slightly lower among those with high continuity of care (60.7 percent), relative to those with low continuity of care (67.2 percent); however, the proportion of those who had three or more Pap tests was lower among those with high continuity of care (14.9 versus 17.3 percent). Although it is important to keep in mind that these are unadjusted, descriptive statistics, the pattern is in the expected direction for most of the other measures, with the proportion of individuals who received a vaccination being higher among those with high continuity of care, but the proportion who had an ED visit lower. The low pneumococcal vaccination coverage (23.9 percent) is also noteworthy, and can be attributed to the fact that coverage is shown here for the first year in which this vaccine was provided free of charge in the province of Manitoba. Coverage will likely improve as public awareness of the vaccine increases.

Table 2 shows the logistic regression results for preventive health care measures. Two findings are noteworthy. First, continuity of care—whether defined in terms of a 75 or a 50 percent majority-of-care definition—was consistently related to better preventive health care, with the exception of a non-significant finding for mammograms using a 75 percent continuity of care definition. In an additional analysis for Pap smears where we compared women who had three or more Pap smears with those who had one or two, we further found that the odds of having three or more Pap tests were reduced for women with high continuity of care (adjusted odds ratio = 0.94, CI 0.90–0.98 with a 75 percent majority-of-care definition; 0.95, CI 0.91–0.94 with a 50 percent definition). This suggests that continuity of care not only relates to better preventive health care, but also is also associated with less duplication of services.

A second noteworthy finding is the consistent relation between neighborhood income and preventive health care. A clear dose–response effect emerged, with the odds of preventive health care increasing for each income

Table 1: Descriptive Information for Measures

	COC 75%					
	Low		*High*		*Total*	
	N	*%*	*N*	*%*	*N*	*%*
Pap smears (women age 18+)						
None	31,023	32.8	46,279	39.3	77,302	36.4
1+	63,592	67.2	71,434	60.7	135,026	63.6
Pap smears (women age 18+)						
1–2	52,621	82.7	60,818	85.1	113,439	84.0
3+	10,971	17.3	10,616	14.9	21,587	16.0
Mammogram (women age 50–69)						
None	5,627	31.4	11,090	33.1	16,717	32.5
1+	12,280	68.6	22,421	66.9	34,701	67.5
Influenza vaccination (age 65+)						
None	9,999	43.0	21,034	40.2	31,033	41.1
1	13,269	57.0	31,225	59.8	44,494	58.9
Pneumococcal vaccination (age 65+)						
None	18,199	78.2	39,303	75.2	57,502	76.1
1	5,069	21.8	12,956	24.8	18,025	23.9
ED visits, children (age 0–14)						
None	41,461	71.3	40,719	77.6	82,180	74.3
1+	16,695	28.7	11,782	22.4	28,477	25.7
ED visits, youth and adults (age 15+)						
None	158,199	85.1	212,114	88.2	370,313	86.9
1+	27,627	14.9	28,296	11.8	55,923	13.1
ED visits, children (age 0–14)						
0–2	55,008	94.6	50,799	96.8	105,807	95.6
3+	3,148	5.4	1,702	3.2	4,850	4.4
ED visits, youth and adults (age 15+)						
0–2	180,996	97.4	236,196	98.2	417,192	97.9
3+	4,830	2.6	4,214	1.8	9,044	2.1

COC, continuity of care (75% majority of care definition); ED, emergency department.

quintile. The only exception was pneumococcal vaccination. That there was no significant income effect for this measure may be because of the relatively small number of individuals who received the vaccine.

Table 2: Factors Associated with Preventive Health Care

	Pap Smears (Women Age 18+)		*Mammograms (Women Age 50–69)*		*Influenza Vaccination (Age 65+)*		*Pneumococcal Vaccination (Age 65+)*	
	Adj OR	*99% CI*	*Adj OR*	*99% CI*	*Adj OR*	*99% CI*	*Adj OR*	*99% CI*
Income								
Q1, poorest (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Q2	1.29	1.23–1.34	1.33	1.22–1.44	1.06	1.00–1.13	1.03	0.96–1.10
Q3	1.44	1.39–1.50	1.62	1.50–1.76	1.07	1.01–1.13	0.99	0.92–1.06
Q4	1.61	1.55–1.68	1.86	1.72–2.01	1.10	1.03–1.17	0.92	0.86–0.99
Q5, wealthiest	1.82	1.75–1.90	2.31	2.13–2.50	1.12	1.05–1.19	0.86	0.80–0.93
Mobility								
Did not move (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Moved	1.12	1.08–1.17	0.86	0.79–0.95	0.76	0.71–0.82	1.00	0.92–1.08
Utilization (visits)								
1–3	0.83	0.80–0.86	0.71	0.66–0.76	0.62	0.58–0.65	0.61	0.56–0.66
4–12 (ref)	1.00	–	1.00	–	1.00	–	1.00	–
13+	0.79	0.77–0.82	0.84	0.79–0.90	1.28	1.23–1.34	1.41	1.34–1.48
Marital status								
Not married (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Married	1.43	1.40–1.48	1.32	1.25–1.39	1.30	1.25–1.36	1.06	1.01–1.11
Health status (ADGs)								
ADG 0–1, healthiest (ref)	1.00	–	1.00	–	1.00	–	1.00	–
ADG 2–3	2.41	2.32–2.51	1.92	1.77–2.07	1.69	1.58–1.81	1.40	1.28–1.54
ADG 4+, sickest	3.83	3.68–4.00	2.88	2.66–3.13	2.08	1.95–2.23	1.64	1.50–1.79
COC 75%								
Low (ref)	1.00	–	1.00	–	1.00	–	1.00	–
High	1.03	1.01–1.06	1.01	0.96–1.06	1.19	1.14–1.24	1.25	1.19–1.31
COC 50%*								
Low (ref)	1.00	–	1.00	–	1.00	–	1.00	–
High	1.13	1.10–1.17	1.16	1.08–1.24	1.22	1.15–1.30	1.32	1.22–1.42

COC, continuity of care using either a 75% or 50% majority-of-care definition; CI, confidence interval; ADG, ambulatory diagnostic groups; OR, odds ratio.

*ORs derived from a separate analysis.

Age was included as an additional variable in all analyses; as the age categories differed, results are not shown here. Gender was also included for vaccination measures.

Table 3 shows that continuity of care was consistently related to reduced odds of ED visits. This relation was stronger for heavy ED use (three or more visits), and is consistent with previous research (Gill et al. 2000). Neighborhood income was also strongly related to ED use, with the odds of ED visits being lower among individuals from wealthier neighborhoods, relative to those in the poorest neighborhoods.

Table 3: Factors Associated with Emergency Department Visits

	0 versus 1+ ED Visits				*0–2 versus 3+ ED Visits*			
	Children (Age 0–14)		*Youth/Adults (Age 15+)*		*Children (Age 0–14)*		*Youth/Adults (Age 15+)*	
	Adj OR	*99% CI*	*Adj OR*	*99% CI*	*Adj OR*	*99% CI*	*Adj OR*	*99% CI*
Gender								
Female (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Male	1.20	1.15–1.24	1.40	1.37–1.44	1.16	1.07–1.26	1.61	1.52–1.70
Income								
Q1, poorest (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Q2	0.80	0.75–0.85	0.67	0.64–0.69	0.77	0.68–0.86	0.56	0.52–0.61
Q3	0.69	0.65–0.73	0.57	0.55–0.59	0.59	0.53–0.67	0.44	0.41–0.48
Q4	0.57	0.53–0.60	0.45	0.44–0.47	0.45	0.39–0.50	0.31	0.28–0.34
Q5, wealthiest	0.53	0.50–0.56	0.41	0.40–0.43	0.39	0.34–0.44	0.27	0.24–0.30
Mobility								
Did not move (ref)	1.00	–	1.00	–	1.00	–	1.00	–
Moved	1.33	1.27–1.40	1.56	1.51–1.61	1.55	1.42–1.69	2.06	1.93–2.19
Utilization (visits)								
1–3	1.02	0.97–1.08	1.17	1.13–1.22	0.99	0.84–1.17	1.56	1.42–1.72
4–12 (ref)	1.00	–	1.00	–	1.00	–	1.00	–
13+	1.50	1.42–1.57	1.53	1.49–1.58	1.95	1.79–2.13	1.93	1.81–2.06
Marital status								
Not married (ref)	–	–	1.00	–	–	–	1.00	–
Married	–	–	0.78	0.76–0.81	–	–	0.63	0.59–0.67
Health status (ADGs)								
ADG 0–1, healthiest (ref)	1.00	–	1.00	–	1.00	–	1.00	–
ADG 2–3	2.07	1.94–2.21	2.01	1.92–2.10	2.72	2.15–3.44	2.81	2.39–3.31
ADG 4+, sickest	4.61	4.30–4.95	4.68	4.47–4.90	9.94	7.86–12.58	12.01	10.27–14.05
COC 75%								
Low (ref)	1.00	–	1.00	–	1.00	–	1.00	–
High	0.91	0.88–0.95	0.94	0.92–0.97	0.85	0.78–0.92	0.85	0.80–0.90
COC 50%*								
Low (ref)	1.00	–	1.00	–	1.00	–	1.00	–
High	0.91	0.87–0.94	0.90	0.87–0.92	0.86	0.79–0.94	0.78	0.73–0.83

COC, continuity of care using either a 75% or 50% majority-of-care definition; CI, confidence interval; ADG, ambulatory diagnostic groups; OR, odds ratio.

*ORs derived from a separate analysis.

Age was included as an additional variable in all analyses; as the age categories differed, results are not shown here.

DISCUSSION

The present study shows a small, but consistent relation between continuity of care and better preventive health care and reduced likelihood of ED visits,

suggesting that, despite the free access to health care services afforded by a universal health care system, having an ongoing relationship with a single FP nevertheless makes a difference. These findings are consistent with results from other health care systems, notably studies from the United States (e.g., Christakis et al. 2000; Gill et al. 2000). While all preventive health care services examined here are promoted through the health care system in the province of Manitoba—through cancer screening programs and a yearly influenza and pneumococcal vaccination strategy designed to increase vaccination coverage—uptake is at the discretion of patients. Thus, FPs plays an important role in promoting and monitoring uptake. Only the breast cancer-screening program provided active monitoring for the years studied here, with women within the target age group being sent reminder letters to get a mammogram. This may explain the relatively weaker relation between continuity of care and mammogram use found here; indeed, the relation was not significant using a 75 percent continuity of care definition.

What cannot be determined from the present study is whether continuity of care *causes* better preventive health and reduced ED use or whether a common underlying factor is related to both continuity of care and these measures. Previous research indicates that there are systematic differences between individuals with high versus low continuity of care in terms of age, socioeconomic status, and health status (Menec et al. 2001). These same factors were also related to preventive health care and ED visits in the present study. Indeed, health status (ADGs) was consistently related to all preventive health measures. This finding may, in part, be because of visit rates to FPs; individuals with more health problems are more likely to have repeat visits, which then affords greater opportunity for providing preventive health care services. At the same time, health status is in and of itself an indication for vaccination. Recommended target groups for influenza and pneumococcal vaccination include older adults as well as individuals with various chronic conditions (e.g., asthma, diabetes, and cancer) (National Advisory Committee on Immunization 2004). Thus, older adults who also have chronic conditions may be the most likely to be vaccinated. Health status was also strongly related to ED use, both for children and for youth and adults, suggesting that ED visits were not necessarily inappropriate, but rather may have been made because of acute problems that required immediate attention.

The income effects are also noteworthy. Individuals living in more affluent neighborhoods were more likely to be screened for breast and cervical cancer, were more likely to be vaccinated against influenza, and were less likely to use an ED than individuals living in the poorest neighborhoods. Thus,

while previous research shows that publicly funded breast and cervical cancer screening programs have reduced some of the socioeconomic disparities that existed before the programs were in place (Roos, Traverse, and Turner 1999), they have not eliminated them completely. Indeed, the socioeconomic gap is still quite substantial; for example, individuals living in the wealthiest neighborhoods had twice the odds of having a mammogram than those living in the poorest neighborhoods. Given the low continuity of care among individuals of low socioeconomic status (e.g., Menec et al. 2001), and the challenges of increasing continuity of care in this population, this highlights the importance of having a systematic recall system to ensure that this vulnerable group receives adequate preventive health care. Similar income gradients also emerged for the other measures. The odds of an ED visit, for instance, were more than double for children and adults who lived in the poorest neighborhoods, relative to those in the wealthiest neighborhoods.

In sum, the present, population-based study indicates that continuity of care is related to quality of health care indicators even in a universal health care system that eliminates certain barriers to access, particularly user-fees. Moreover, socioeconomic disparities remain, suggesting the need to target specifically individuals from low socioeconomic strata for preventive health care.

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