

Primary care bonus payments and patient-reported access in urban Ontario: a cross-sectional study

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Abstract

Background: Rurality strongly correlates with higher pay-for-performance access bonuses, despite higher emergency department use and fewer primary care services than in urban settings. We sought to evaluate the relation between patient-reported access to primary care and access bonus payments in urban settings.

Methods: We conducted a cross-sectional, secondary data analysis using Ontario survey and health administrative data from 2013 to 2017. We used administrative data to calculate annual access bonuses for eligible urban family physicians. We linked this payment data to adult (≥ 16 yr) patient data from the Health Care Experiences Survey to examine the relation between access bonus achievement (in quintiles of the proportion of bonus achieved, from lowest [Q1, reference category] to highest [Q5]) and 4 patient-reported access outcomes. The average survey response rate to the patient survey during the study period was 51%. We stratified urban geography into large, medium and small settings. In a multilevel regression model, we adjusted for patient-, physician- and practice-level covariates. We tested linear trends, adjusted for clustering, for each outcome.

Results: We linked 18893 respondents to 3940 physicians in 414 bonus-eligible practices. Physicians in small urban settings earned the highest proportion of their maximum potential access bonuses. Access bonus achievement was positively associated with telephone access (Q2 odds ratio [OR] 1.18, 95% confidence interval [CI] 0.98–1.42; Q3 OR 1.34, 95% CI 1.10–1.63; Q4 OR 1.46, 95% CI 1.19–1.79; Q5 OR 1.87, 95% CI 1.50–2.33), after hours access (Q2 OR 1.26, 95% CI 1.09–1.47; Q3 OR 1.46, 95% CI 1.23–1.74; Q4 OR 1.77, 95% CI 1.46–2.15; Q5 OR 1.88, 95% CI 1.52–2.32), wait time for care (Q2 OR 1.01, 95% CI 0.85–1.20; Q3 OR 1.17, 95% CI 0.97–1.41; Q4 OR 1.27, 95% CI 1.05–1.55; Q5 OR 1.63, 95% CI 1.32–2.00) and timeliness (Q2 OR 1.29, 95% CI 0.98–1.69; Q3 OR 1.29, 95% CI 0.94–1.77; Q4 OR 1.58, 95% CI 1.16–2.13; Q5 OR 1.98, 95% CI 1.38–2.82). When stratified by geography, we observed several of these associations in large urban settings, but not in small urban settings. Trend tests were statistically significant for all 4 outcomes.

Interpretation: Although the access bonus correlated with access in larger urban settings, it did not in smaller settings, aligning with previous research questioning its utility in smaller geographies. The access bonus may benefit from a redesign that considers geography and patient experience.

In the early 2000s, Canadians were having challenges accessing primary care.^{1–6} To address the problem, Ontario was among several provinces that implemented aggressive primary care reform,^{7–9} including the 2004 introduction of a pay-for-performance financial incentive, the access bonus, which can increase a family physician's earnings by up to about 20% of their capitation payments.¹⁰ The access bonus is structured such that primary care practices earn bonuses when their patients do not seek external care (i.e., outside use) for core primary care services. The more outside use, the lower the bonus,¹¹ though emergency department visits are not included in the calculation.

In 2019, our team published a study showing that rurality was strongly associated with high bonus achievement despite

higher use of the emergency department, higher per capita costs and delivery of fewer primary care services, compared with urban settings.¹² In the urban context, lower access bonus achievement appeared to reflect patient choice and the abundance of external sources of care (e.g., walk-in clinics) rather than accessibility of primary care practices.

Competing interests: See the end of the article.

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Like many pay-for-performance studies, our 2019 study used health care utilization data as a proxy measure for access.¹² This approach, however, may not capture other aspects of access,^{13,14} and therefore may not reflect the entire patient experience.¹⁵ Given the importance of the patient experience in evaluating health care quality,¹⁶ we sought to evaluate the relation between access to primary care, as reported by patients in Ontario, and the access bonus received by their family physicians. In view of our previous finding that rurality strongly predicts access bonus achievement, we focused specifically on the urban context, where more variability in bonus achievement exists and where the competition created by walk-in clinics may play a role in the incentive's effectiveness.¹⁷ We evaluated the relation between patient-reported access and access bonus payments from 2013 to 2017. We hypothesized that the bonus amount should correlate with patient-reported access as physicians and practices with higher bonus achievement may organize their services to optimize access.

Methods

Design

We undertook a cross-sectional secondary data analysis using Ontario data from a patient experience survey linked with health administrative data.

Setting and context

The access bonus is available to Ontario family practices that operate within a blended capitation model of care. In this model, patients are enrolled to a family physician and most physician earnings come from an annual per-patient payment, adjusted for patient age and sex. These models can be team-based or not, with team-based models receiving additional support from government-funded allied health professionals.

Data sources and linkages

Patient experience data came from the Health Care Experiences Survey (HCES), a random telephone survey that asks patients aged 16 years and older about their experiences with health care. Funded by the Ontario government, the HCES was launched in October 2012 and is conducted quarterly by York University.¹⁸ The Ontario population is sampled using the Registered Persons Database, a provincial database containing personal and demographic data for all current and previous Ontario Health Insurance Plan (OHIP) registrants. The HCES includes questions on primary care access, which we used as the outcomes for our study.¹⁸ We also used HCES patient-reported data about education, primary language, immigration status and health status in the analyses.

As part of the consent process for the HCES, participants are asked for permission to link their responses to their health administrative data. We obtained health administrative data from ICES. ICES is an independent, nonprofit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze health care and demographic data, without consent, for health system evaluation and

improvement. Patient-level health administrative data came from the Registered Persons Database (age, sex) and census data holdings (income quintiles). Physician-level data came from the ICES Physician Database (age, sex, Canadian graduate, number of years in practice), the Primary Care Population Database (geographic location, roster size [number of enrolled patients]) and Architected Payments data (access bonus achievement). Practice-level data came from the Primary Care Population database (practice model, group size) and OHIP billings (after-hours services provided).

The HCES and ICES data sets were linked using unique encoded identifiers and analyzed at ICES.

Participants

More than 2000 adults (≥ 16 yr) are included in each quarterly wave of the HCES.¹⁹ We derived our study population from HCES participants from 2013 to 2017. The average survey response rate over the study period was 51%, ranging from 46% to 56%. Of those interviewed more than once, we included only the first interview in our sample. We restricted our sample to those who indicated they had a regular primary care source and who consented to have their survey data linked to health administrative data. We excluded patients belonging to practices not in blended capitation models and therefore ineligible for the access bonus. We excluded patients from practices exempted from providing a minimum level of weekly after-hours availability. We excluded patients in rural geographies using the Rurality Index of Ontario (RIO) scoring system, which is detailed below.²⁰

Variable definitions

We stratified our urban sample into 3 geographies using the RIO scoring system. This system was developed by the Ontario Medical Association and is used by the Ontario government for planning purposes.²⁰ Maps and the RIO methodology are described elsewhere.²⁰ In summary, a RIO score for a community is determined using a calculation that considers population size and density, travel time to the nearest basic referral centre and travel time to the nearest advanced referral centre. Scores range from 0–100 and reflect a relative ranking of rurality. A higher score reflects a higher degree of rurality.

We used the same definition for “urban” (RIO 0–39) as was used previously,¹² and stratified areas according to a priori categories based conceptually on the different ways in which health care services are organized and delivered across various urban communities. For example, a large tertiary care centre like Toronto was considered a different urban context than a smaller, more remote city like North Bay. We labelled our geographies as large urban (RIO 0; e.g., Toronto), medium urban (RIO 1–9; e.g., Burlington) and small urban (RIO 10–39; e.g., North Bay).

Outcomes

Patients' experiences of access came from 4 measures in the HCES, namely telephone access, after-hours access, wait time for care and timeliness of wait for care. Table 1 describes the question stems, answer choices and the binary

Table 1: Patient-reported access variables and coding schemes from the Health Care Experiences Survey (HCES)

Variable	HCES question stem	Coding scheme for answer choices
Telephone access (HCES item access_2)	How often did your provider or someone else in the office speak to you when you called or get back to you the same day?†	Favourable: Always, often Unfavourable: Sometimes, rarely, never, volunteers “it depends” Missing: Don't know, refused
After-hours access (HCES item access_6)	Not including hospital emergency departments, does your provider have an after-hours clinic where patients can be seen by or talk to a doctor or nurse when the provider's office is closed?	Favourable: Yes Unfavourable: No, Don't know Missing: Refused
Wait time for care (HCES item sick_3)	How many days did it take from when you first tried to see your provider to when you actually saw them or someone else in their office?‡	Favourable: Same day, next day Unfavourable: 2 to ≥ 20 days Missing: Don't know, refused
Timeliness of wait for care (HCES item sick_6)*	Would you say the length of time it took between making the appointment and the actual visit was about right, somewhat too long or much too long?‡	Favourable: About right Unfavourable: Somewhat too long, much too long Missing: Other, don't know, refused

*Added to survey in April 2016.

†Asked only of participants answering “Yes” to the question, “Have you called or tried to call your provider's office with a medical question or concern during the day on a Monday to Friday in the last 12 months?”

‡Asked only of participants answering “Yes” to the question, “Not counting yearly check-ups or monitoring of an ongoing health issue, in the last 12 months did you want to see your provider because you were sick or had a health concern?”

coding schemes (favourable or unfavourable) applied to each outcome variable. The measure of timeliness was added to the HCES in April 2016, meaning a smaller sample of respondents was available for that outcome than for the other 3 outcomes, which were in the survey from the beginning of the study period.

Exposure

Our main exposure of interest was access bonus achievement. The access bonus is deposited monthly into a practice group's account for distribution to its physicians and represents a sum of each physician's bonus attribution. Each physician receives a monthly report of their individual attribution and a list of their patients who sought outside use. Conceptually, both group- and physician-level factors can influence access bonus achievement. At the physician level, differences in individual roster management may reflect individual responses to the incentive. To account for these within-group variations, we therefore treated the bonus as a physician-level variable. We calculated access bonus achievement as the proportion of the maximum potential bonus that was achieved by the physician in the fiscal year closest to the HCES interview date. For example, if a physician was eligible for a maximum bonus of \$10000 and achieved \$5000, the bonus achievement for that physician was calculated as 50%.

We did not want to force a linear relationship between access bonus achievement and the log odds of the binary outcome. Based on the pattern of distribution of the bonus in our data set, and in keeping with previous literature,¹² we therefore classified the bonus into quintiles and treated these as categorical variables. Quintile 1 represented the lowest physician bonus achievement and quintile 5 represented the highest achievement. We used quintile 1 as the reference group in the analyses.

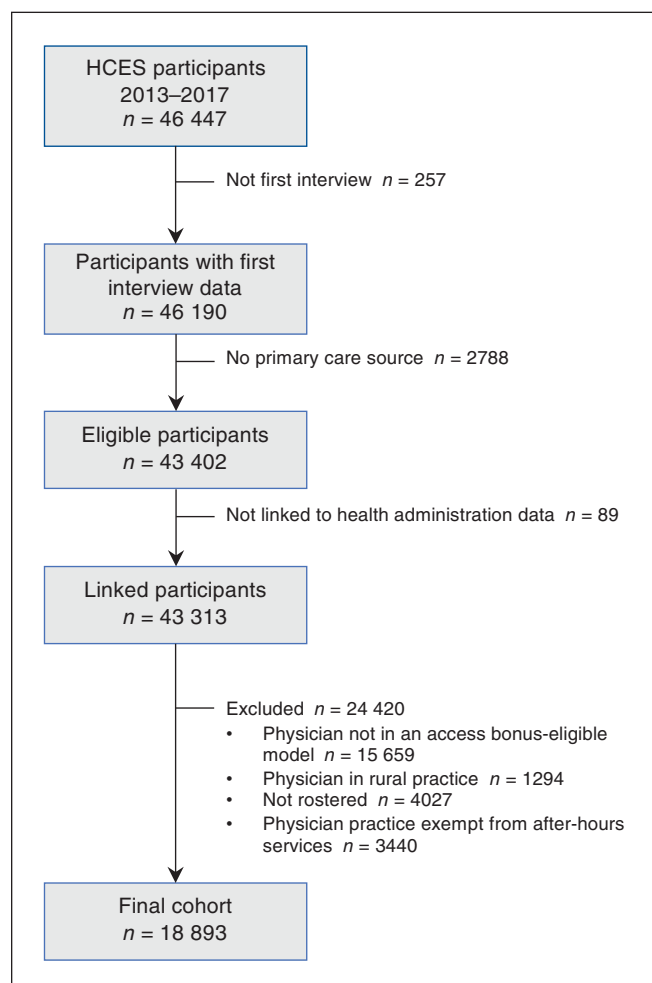


Figure 1: Patient cohort flowchart. Note: HCES= Health Care Experiences Survey.

Table 2: Patient characteristics

Variable	No. (%) of patients			
	Total sample (RIO 0–39) (<i>n</i> = 18 893)	Large urban (RIO 0) (<i>n</i> = 8325)	Medium urban (RIO 1–9) (<i>n</i> = 6214)	Small urban (RIO 10–39) (<i>n</i> = 4354)
Sex (<i>n</i> = 18 893)				
Female	11 278 (59.7)	5066 (60.9)	3664 (59.0)	2548 (58.5)
Male	7615 (40.3)	3259 (39.2)	2550 (41.0)	1806 (41.5)
Age, yr (<i>n</i> = 18 893)				
16–18	374 (2.0)	168 (2.0)	118 (1.9)	88 (2.0)
19–34	2444 (12.9)	1089 (13.1)	871 (14.0)	484 (11.1)
35–49	4562 (24.2)	2138 (25.7)	1528 (24.6)	896 (20.6)
50–64	5859 (31.0)	2500 (30.0)	1925 (31.0)	1434 (32.9)
65–74	3436 (18.2)	1469 (17.7)	1079 (17.4)	888 (20.4)
≥ 75	2218 (11.7)	961 (11.5)	693 (11.2)	564 (13.0)
Language (<i>n</i> = 18 815)				
English, English & French, English & other	17 294 (91.9)	7406 (89.5)	5719 (92.4)	4169 (96.0)
French	436 (2.3)	170 (2.1)	160 (2.6)	106 (2.4)
Other	1085 (5.8)	703 (8.5)	313 (5.16)	69 (1.6)
Education (<i>n</i> = 18 749)				
Some high school or less	1998 (10.7)	720 (8.7)	662 (10.7)	616 (14.3)
High school	3760 (20.1)	1431 (17.3)	1266 (20.5)	1063 (24.6)
Some postsecondary	1652 (8.8)	689 (8.3)	569 (9.2)	394 (9.1)
College	4868 (26.0)	1949 (23.6)	1660 (26.9)	1259 (29.2)
University	4304 (23.0)	2185 (26.5)	1410 (22.8)	709 (16.4)
Postgraduate	2167 (11.6)	1283 (15.5)	606 (9.8)	278 (6.4)
Income quintile (<i>n</i> = 18 836)				
1 (lowest)	2854 (15.2)	1349 (16.3)	865 (14.0)	640 (14.7)
2	3327 (17.7)	1519 (18.3)	986 (15.9)	822 (18.9)
3	3795 (20.2)	1659 (20.0)	1207 (19.5)	929 (21.4)
4	4257 (22.6)	1765 (21.3)	1467 (23.7)	1025 (23.6)
5 (highest)	4603 (24.4)	2000 (24.1)	1678 (27.1)	925 (21.3)
Immigrant* (<i>n</i> = 18 822)				
Yes	4096 (21.8)	2312 (27.9)	1266 (20.4)	518 (11.9)
No	14 726 (78.2)	5965 (72.1)	4933 (79.6)	3828 (88.1)
Self-reported general health (<i>n</i> = 18 818)				
Poor	781 (4.2)	307 (3.7)	259 (4.2)	215 (5.0)
Fair	2087 (11.1)	904 (10.9)	682 (11.0)	501 (11.6)
Good	5290 (28.1)	2258 (27.2)	1808 (29.2)	1224 (28.2)
Very good	7129 (37.9)	3164 (38.2)	2353 (38.2)	1622 (37.4)
Excellent	3531 (18.8)	1655 (20.0)	1101 (17.8)	775 (17.9)

Note: RIO = Rurality Index of Ontario.

*Mean years since immigration: large urban 34.29 (standard deviation [SD] 18.54) years, medium urban 37.95 (SD 19.15) years, small urban 44.58 (SD 17.42) years.

Covariates

We identified covariates by reviewing previous literature that evaluated factors related to primary care access.^{13,14,21-24} Patient-level covariates were age, sex, education, primary language, health status, income quintile, and immigration status. Physician-level covariates were age, sex, Canadian medical graduate (yes or no), years in practice and roster size.

Practice-level covariates were group size, practice model and annual number of after-hours services. We reported patient emergency department use, primary care visits and walk-in clinic use as part of the descriptive analysis. We used a look-back period of 12 months before the HCES interview date to derive variables from health administrative data (e.g., physician- and practice-level variables).

Table 3: Practice characteristics

Variable	No. (%) of practices*			
	Total sample (RIO 0–39) <i>n</i> = 414	Large urban (RIO 0) <i>n</i> = 210	Medium urban (RIO 1–9) <i>n</i> = 130	Small urban (RIO 10–39) <i>n</i> = 74
Not team-based practice	277 (66.9)	142 (67.6)	100 (76.9)	35 (47.3)
Team-based practice	137 (33.1)	68 (32.4)	30 (23.1)	39 (52.7)
No. of physicians per practice, mean ± SD (<i>n</i> = 414)	10 (9.6)	11 (9.4)	9 (8.0)	12 (12.2)
No. of after-hours services per year, mean ± SD (<i>n</i> = 400)	3935 ± 4797	3962 ± 4760	3924 ± 3662	3876 ± 6347

Note: RIO = Rurality Index of Ontario, SD = standard deviation.
*Unless indicated otherwise.

Table 4: Physician characteristics

Variable	No. (%) of physicians*			
	Total sample (RIO 0–39) <i>n</i> = 3940	Large urban (RIO 0) <i>n</i> = 2026	Medium urban (RIO 1–9) <i>n</i> = 1222	Small urban (RIO 10–39) <i>n</i> = 692
Age, yr, mean ± SD (<i>n</i> = 3940)	51.9 ± 11.4	51.6 ± 11.7	51.8 ± 11.0	53.0 ± 10.9
Years in practice, mean ± SD (<i>n</i> = 3938)	26.8 ± 3.2	26.7 ± 3.0	26.8 ± 3.2	27.0 ± 3.6
Roster size, mean ± SD (<i>n</i> = 3940)	1522 ± 639	1435 ± 658	1638 ± 604	1571 ± 605
Proportion (%) of maximum potential access bonus achieved, mean ± SD (<i>n</i> = 3940)	40.26 ± 30.67	32.86 ± 28.39	40.63 ± 30.30	61.23 ± 27.87
Sex (<i>n</i> = 3940)				
Female	1872 (47.5)	1100 (54.3)	535 (43.8)	237 (34.3)
Male	2068 (52.5)	926 (45.7)	687 (56.2)	455 (65.8)
Canadian graduate (<i>n</i> = 3938)				
No	907 (23.0)	416 (20.5)	328 (26.8)	163 (23.6)
Yes	3031 (77.0)	1608 (79.4)	894 (73.2)	529 (76.4)
Access bonus achievement by quintile				
1 (lowest)	877 (22.3)	545 (26.9)	269 (22.0)	63 (9.1)
2	865 (22.0)	554 (27.3)	260 (21.3)	51 (7.4)
3	818 (20.8)	457 (22.6)	253 (20.7)	108 (15.6)
4	726 (18.4)	298 (14.7)	253 (20.7)	175 (25.3)
5 (highest)	654 (16.6)	172 (8.5)	187 (15.3)	295 (42.6)

Note: RIO = Rurality Index of Ontario, SD = standard deviation.
*Unless indicated otherwise.

Statistical analysis

We conducted a descriptive analysis of the total sample and the geographically stratified sample.

To evaluate the relationship between access bonus achievement and the 4 patient-reported access outcomes, we conducted univariate and multivariable logistic regression analyses for both the total sample and the geographically stratified sample. To account for nesting of patients within physicians and physicians within practices, we used multilevel modelling (patient-, physician- and practice-level). We tested linear trends, adjusted for clustering, for each outcome for the total sample and for each geographic stratum.

We used SAS Enterprise Guide version 7.1 (SAS Institute Inc.) for all analyses.

Ethics approval

The use of data in this project was authorized under section 45 of Ontario’s *Personal Health Information Protection Act*, which does not require review by a Research Ethics Board.

Results

We included 18893 patients enrolled with 3940 physicians in 414 practices (Figure 1). Table 2, Table 3 and Table 4 report the descriptive analyses of patient, practice and physician characteristics, respectively. Mean patient age was 53.8 (standard deviation [SD] 17.05), years and 11278 (59.7%) patients were female. Most patients had completed postsecondary education ($n = 11339$, 60.6%), spoke English as their primary language ($n = 17294$, 91.9%), were nonimmigrants ($n = 14726$, 78.2%), and were in middle income quintiles ($n = 11379$, 60.5%). Compared with patients in large and medium urban settings, patients in small urban settings had a lower mean number of primary care visits (small urban 3.00 [SD 3.33], medium urban 3.27 [SD 3.68], large urban 3.28 [SD 3.44]) and a higher number of emergency department visits (small urban 0.48 [SD 1.04], medium urban 0.36 [SD 1.23], large urban 0.36 [SD 1.03]) in the previous year.

Most practices did not use team-based models. Most practices and physicians were in large urban settings. Mean physician age was 51.9 (SD 11.66) years, and 1872 (47.5%) physicians

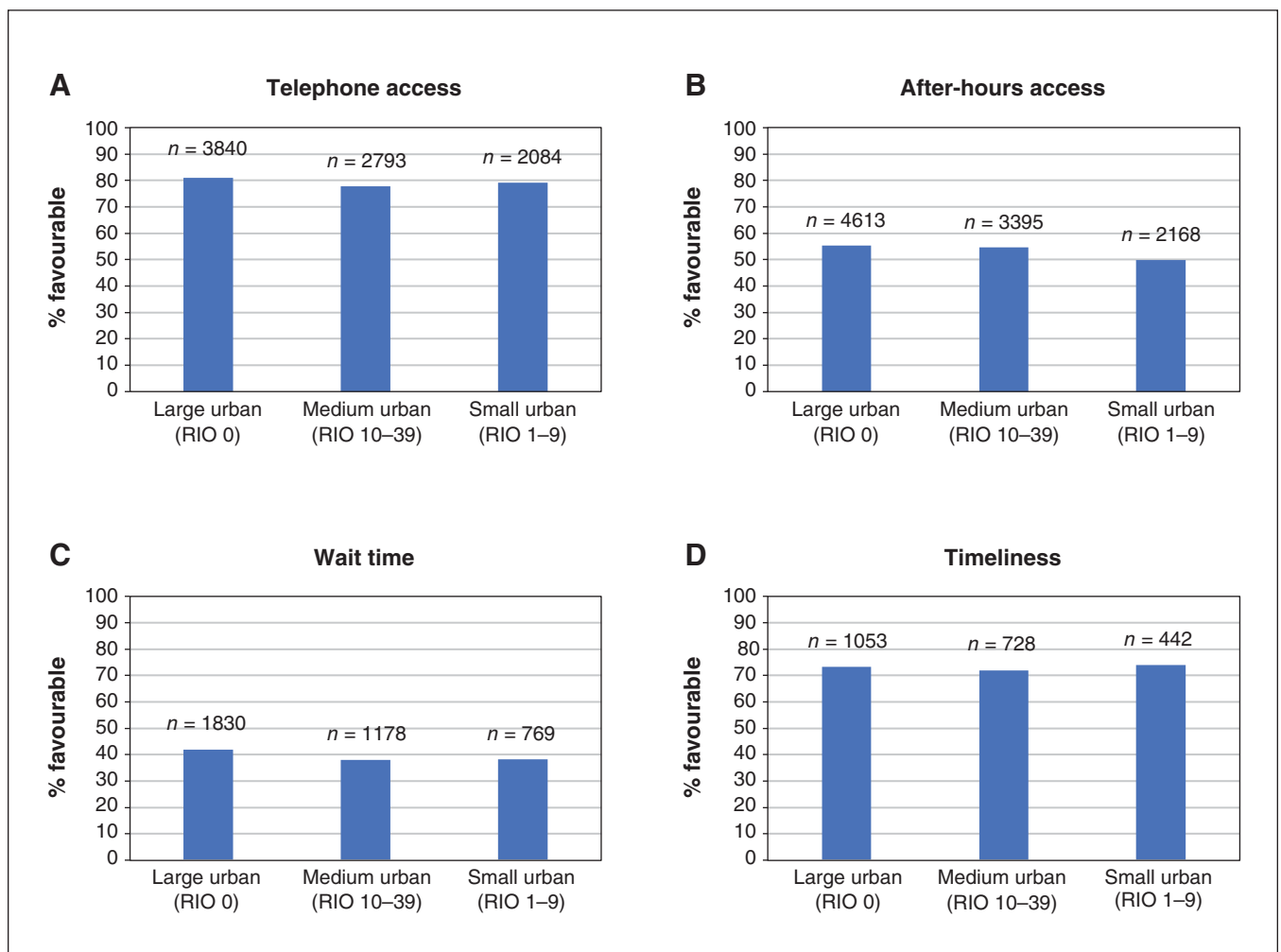


Figure 2: Patient-reported access (2013 to 2017), namely (A) telephone access ($n = 10\ 968$), (B) after-hours access ($n = 18\ 889$), (C) wait time for care ($n = 9485$) and (D) timeliness of wait for care ($n = 3048$) from Health Care Experiences Survey. “Timeliness” reflects survey responses from April 2016 to 2017. Note: RIO = Rurality Index of Ontario.

were female. The mean annual number of after-hours services provided was highest in large urban practices (3962.5 [SD 4760.1] services).

Table 4 includes description of the main exposure, access bonus, by geographic setting. The mean proportion of maximum potential access bonus achieved by physicians in our total sample was 40.26% (SD 30.67%). The mean was highest in small urban settings and lowest in large urban settings.

Figure 2 describes the 4 patient-reported access outcomes by geography. Figure 3 depicts the results of our univariate regression analyses. We found statistically significant, positive relationships between access bonus achievement and each access outcome.

Our multivariable regression analysis also showed positive relationships between access bonus achievement and

patient-reported access ($p < 0.05$, 95% CI) (Figure 4). Access bonus achievement was positively associated with telephone access (Q2 odds ratio [OR] 1.18, 95% confidence interval [CI] 0.98–1.42); Q3 OR 1.34, 95% CI 1.10–1.63; Q4 OR 1.46, 95% CI 1.19–1.79; Q5 OR 1.87, 95% CI 1.50–2.33), after-hours access (Q2 OR 1.26, 95% CI 1.09–1.47; Q3 OR 1.46, 95% CI 1.23–1.74; Q4 OR 1.77, 95% CI 1.46–2.15; Q5 OR 1.88, 95% CI 1.52–2.32), wait time for care (Q2 OR 1.01, 95% CI 0.85–1.20; Q3 OR 1.17, 95% CI 0.97–1.41; Q4 OR 1.27, 95% CI 1.05–1.55; Q5 OR 1.63, 95% CI 1.32–2.00) and timeliness (Q2 OR 1.29, 95% CI 0.98–1.69; Q3 OR 1.29, 95% CI 0.94–1.77; Q4 OR 1.58, 95% CI 1.16–2.13; Q5 OR 1.98, 95% CI 1.38–2.82).

When stratified by geography, we observed several positive relations in large urban settings, a few positive relations

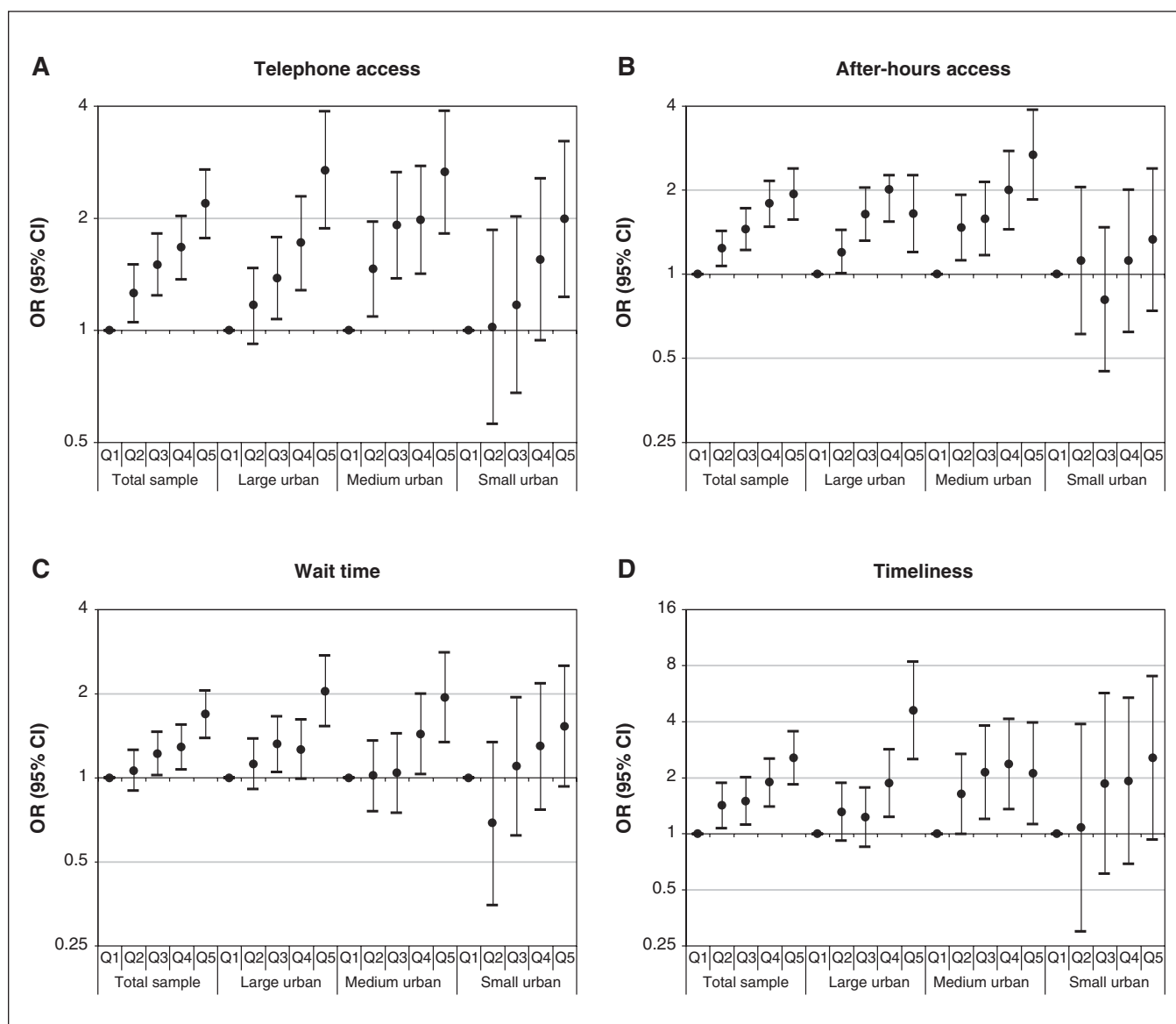


Figure 3: Multilevel univariate regression analysis of the odds of the patient reporting favourable (A) telephone access, (B) after-hours access, (C) wait time for care and (D) timeliness of wait for care, by geography and physician bonus quintile (Q1 = reference [lowest] quintile). Note: CI = confidence interval, OR = odds ratio.

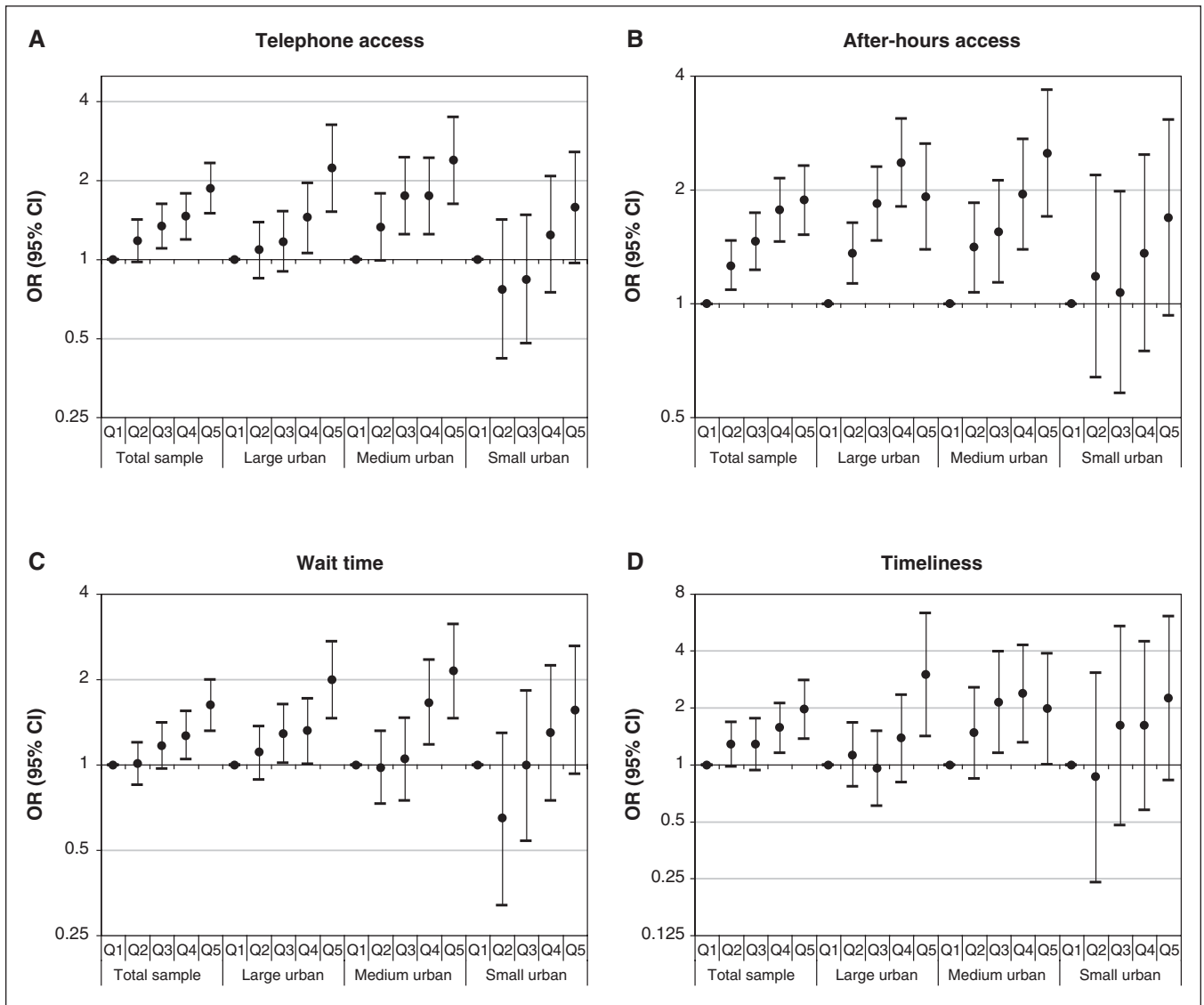


Figure 4: Multilevel multivariable logistic regression analysis of the odds of the patient reporting favourable (A) telephone access, (B) after-hours access, (C) wait time for care and (D) timeliness of wait for care, by geography and physician bonus quintile (Q1 = reference [lowest quintile]). Note: CI = confidence interval, OR = odds ratio.

in medium settings and no relations in small settings. Certain patient demographics (i.e., female sex, older age, higher education, nonimmigrant status, better self-reported health) also correlated with better access across several measures. Intraclass correlation coefficients showed that patient-level factors accounted for most of the variance in all 4 outcomes in the multivariate regression analyses. Tables 5–8 report the multivariable regression results for the main exposure, as well as patient-, physician- and practice-level covariates.

Linear trend testing found statistically significant trends across quintiles in the total sample and in large and medium urban settings for all 4 outcomes. In small urban settings, we observed trends for telephone access and wait time for care. These results are summarized in Appendix 1, available at www.cmajopen.ca/content/9/4/E1080/suppl/DC1.

Interpretation

In this study, we evaluated the pay-for-performance access bonus through the lens of the patient experience, and with a deeper dive into the complex, competitive urban landscape. We looked at 4 patient-reported access measures from the large, multi-year HCES, and stratified urban Ontario into 3 distinct geographies. We found the access bonus correlates with better patient-reported access in large urban settings and, to some extent, in medium urban settings.

Our findings suggest that in the most competitive primary care markets, such as large cities with numerous walk-in clinics, the bonus may motivate physicians and practices to organize and deliver services in ways that better meet patient needs. Although a cross-sectional study cannot confirm causality, the dose–response trends seen for 3 of the

Table 5 (part 1 of 2): Multilevel multivariable logistic regression for patient-reported telephone access, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Main exposure				
Access bonus quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.18 (0.98–1.42)	1.09 (0.85–1.39)	1.33 (0.99–1.79)	0.77 (0.42–1.42)
3	1.34 (1.10–1.63)	1.17 (0.90–1.53)	1.75 (1.25–2.45)	0.84 (0.48–1.48)
4	1.46 (1.19–1.79)	1.45 (1.06–1.96)	1.75 (1.25–2.44)	1.24 (0.75–2.08)
5 (highest)	1.87 (1.50–2.33)	2.23 (1.52–3.26)	2.39 (1.63–3.50)	1.58 (0.97–2.57)
ICC, practice, %	3.26	1.80	2.18	1.78
ICC, physician, %	6.70	6.74	6.52	7.98
Patient, n	10 778	4642	3542	2594
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	0.99 (0.89–1.10)	1.05 (0.89–1.25)	0.96 (0.80–1.16)	0.94 (0.75–1.18)
Age, yr				
< 18	Ref.	Ref.	Ref.	Ref.
19–34	0.84 (0.50–1.39)	1.20 (0.56–2.54)	0.99 (0.41–2.36)	0.33 (0.09–1.22)
35–49	0.88 (0.53–1.45)	1.16 (0.55–2.42)	1.08 (0.46–2.54)	0.35 (0.10–1.28)
50–64	0.94 (0.57–1.54)	1.23 (0.59–2.57)	1.10 (0.47–2.57)	0.42 (0.12–1.53)
65–74	1.56 (0.94–2.58)	2.14 (1.01–4.52)*	1.79 (0.76–4.25)	0.69 (0.19–2.54)
≥ 75	1.40 (0.84–2.34)	1.35 (0.64–2.88)	2.03 (0.84–4.93)	0.74 (0.20–2.78)
Education				
Some high school or less	Ref.	Ref.	Ref.	Ref.
High School	1.32 (1.07–1.63)	1.34 (0.93–1.93)	1.3 (0.90–1.87)	1.29 (0.87–1.91)
Some postsecondary	1.37 (1.07–1.76)	1.25 (0.83–1.88)	1.76 (1.14–2.72)	1.00 (0.63–1.59)
College	1.18 (0.96–1.46)	1.24 (0.87–1.77)	1.26 (0.88–1.80)	0.99 (0.67–1.44)
University	1.17 (0.94–1.45)	1.09 (0.77–1.56)	1.24 (0.85–1.80)	1.03 (0.68–1.55)
Postgraduate	1.02 (0.80–1.29)	0.98 (0.67–1.43)	1.14 (0.74–1.74)	0.76 (0.46–1.26)
Primary language				
Other	Ref.	Ref.	Ref.	Ref.
English, English & French, English & other	1.08 (0.84–1.40)	0.94 (0.67–1.32)	1.61 (1.02–2.54)	0.86 (0.31–2.4)
French	0.93 (0.61–1.42)	0.72 (0.37–1.39)	1.24 (0.61–2.51)	1.08 (0.31–3.85)
Health status				
Poor	Ref.	Ref.	Ref.	Ref.
Fair	1.29 (1.01–1.66)	1.37 (0.90–2.08)	1.13 (0.73–1.74)	1.24 (0.77–2.00)
Good	1.41 (1.12–1.77)	1.35 (0.91–1.98)	1.46 (0.98–2.17)	1.31 (0.85–2.00)
Very good	1.98 (1.57–2.49)	1.97 (1.33–2.90)	1.83 (1.23–2.71)	2.06 (1.34–3.16)
Excellent	2.21 (1.72–2.83)	2.30 (1.51–3.49)	1.69 (1.11–2.59)	2.97 (1.82–4.85)

Table 5 (part 2 of 2): Multilevel multivariable logistic regression for patient-reported telephone access, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Income quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.01 (0.85–1.20)	1.10 (0.84–1.44)	0.99 (0.72–1.35)	0.97 (0.68–1.40)
3	1.07 (0.90–1.27)	1.07 (0.82–1.40)	1.20 (0.88–1.62)	0.99 (0.69–1.43)
4	1.00 (0.84–1.18)	1.12 (0.86–1.46)	1.10 (0.82–1.48)	0.84 (0.59–1.19)
5	1.08 (0.91–1.28)	1.11 (0.86–1.45)	1.24 (0.93–1.65)	0.88 (0.61–1.26)
Immigrant status				
Yes	Ref.	Ref.	Ref.	Ref.
No	1.19 (1.03–1.37)	1.25 (1.02–1.53)	1.12 (0.87–1.44)	1.17 (0.83–1.65)
Physician, n				
	3940	2026	1222	692
Age	1.01 (1.00–1.01)	1.01 (1.00–1.01)	1.01 (1.00–1.02)	1.00 (0.99–1.01)
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	0.98 (0.86–1.11)	0.89 (0.73–1.08)	1.00 (0.81–1.24)	1.00 (0.76–1.33)
Canadian graduate				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.20 (1.05–1.37)	1.30 (1.04–1.62)	1.27 (1.02–1.58)*	0.87 (0.65–1.17)
Years in practice (per 5-yr increase)	0.89 (0.82–0.97)	0.82 (0.72–0.94)	0.96 (0.82–1.11)	0.91 (0.78–1.07)
Roster size (per 100-patient increase)	0.92 (0.84–1.01)	0.88 (0.76–1.02)	0.94 (0.81–1.10)	1.00 (0.82–1.23)
Practice, n				
	414	210	130	74
Group size (per 10-member increase)	1.03 (0.96–1.10)	1.05 (0.95–1.16)	0.91 (0.81–1.02)	1.09 (0.96–1.24)
Number of after-hours services (per 500-hr increase)	0.96 (0.89–1.04)	0.92 (0.83–1.02)	1.04 (0.92–1.18)	0.99 (0.85–1.14)
Practice model				
Not team-based	Ref.	Ref.	Ref.	Ref.
Team-based	0.92 (0.79–1.07)	0.86 (0.69–1.07)	1.19 (0.91–1.56)	0.72 (0.53–0.98)

Note: CI = confidence interval, ICC = intraclass correlation coefficient, OR = odds ratio, Ref. = reference, RIO = Rurality Index of Ontario.
*Unless indicated otherwise.

4 outcomes (i.e., the higher the access bonus, the higher the odds for favourable telephone access, after-hours access and wait time) suggest the relationship may be causal.

These findings contrast with previous research measuring access using health care utilization data, which found no correlation between the bonus and patient access.¹² A key reason for the difference in findings may be the different outcomes used to define access, highlighting the multidimensional nature of access^{13,14,25} and the need for policy-makers to depend on more than 1 measure. Moreover, the current study explored the relationship between the access bonus and patient-reported access at different levels of urban geography, and used a different conceptual

approach to calculating the physician bonus to capture within-group variations.

In small urban settings, we did not see correlations between the access bonus and any of the patient-reported access measures. This suggests that the incentive may not be effective in geographies where competition is minimal, patient choice is limited and emergency departments (often staffed by family physicians) are the primary setting for time-sensitive care. This finding does align with the conclusion from previous research questioning the utility of the access bonus, particularly in smaller settings.¹² In this context, the bonus does not appear to relate to the access provided to patients.

Table 6 (part 1 of 2): Multilevel multivariable logistic regression for patient-reported after-hours access, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Main exposure				
Access bonus quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.26 (1.09–1.47)	1.36 (1.13–1.64)	1.41 (1.07–1.85)	1.18 (0.64–2.19)
3	1.46 (1.23–1.74)	1.84 (1.47–2.30)	1.55 (1.14–2.12)	1.07 (0.58–1.98)
4	1.77 (1.46–2.15)	2.36 (1.81–3.09)	1.95 (1.39–2.73)	1.36 (0.75–2.48)
5 (highest)	1.88 (1.52–2.32)	1.92 (1.39–2.65)	2.50 (1.70–3.68)	1.69 (0.93–3.07)
ICC, practice, %	17.25	13.03	17.67	22.85
ICC, physician, %	5.66	4.80	6.99	4.53
Patient, n	10 778	4642	3542	2594
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	1.57 (1.46–1.68)	1.76 (1.58–1.96)	1.39 (1.23–1.57)	1.54 (1.33–1.79)
Age, yr				
< 18	Ref.	Ref.	Ref.	Ref.
19–34	1.66 (1.26–2.17)	2.04 (1.34–3.08)	1.55 (0.96–2.51)	1.42 (0.81–2.48)
35–49	2.45 (1.88–3.19)	3.13 (2.09–4.69)	2.52 (1.57–4.06)	1.66 (0.96–2.86)
50–64	2.47 (1.90–3.20)	3.06 (2.06–4.57)	2.69 (1.69–4.29)	1.59 (0.94–2.71)
65–74	2.38 (1.83–3.10)	3.19 (2.13–4.77)	2.71 (1.69–4.34)	1.35 (0.79–2.32)
≥ 75	1.82 (1.39–2.38)	2.22 (1.47–3.33)	1.84 (1.14–2.97)	1.30 (0.75–2.26)
Education				
Some high school or less	Ref.	Ref.	Ref.	Ref.
High school	1.13 (0.99–1.28)	1.13 (0.91–1.41)	1.04 (0.83–1.30)	1.19 (0.93–1.51)
Some postsecondary	1.13 (0.97–1.33)	1.20 (0.93–1.55)	1.12 (0.85–1.46)	1.01 (0.74–1.37)
College	1.29 (1.13–1.48)	1.29 (1.04–1.61)	1.31 (1.04–1.64)	1.25 (0.97–1.60)
University	1.28 (1.11–1.47)	1.37 (1.10–1.71)	1.21 (0.95–1.53)	1.15 (0.87–1.52)
Postgraduate	1.33 (1.14–1.55)	1.46 (1.15–1.85)	1.13 (0.85–1.49)	1.27 (0.89–1.81)
Primary language				
Other	Ref.	Ref.	Ref.	Ref.
English, English & French, English & other	1.62 (1.37–1.92)	1.57 (1.26–1.95)	1.81 (1.32–2.48)	1.23 (0.67–2.25)
French	1.11 (0.83–1.48)	0.87 (0.57–1.33)	1.43 (0.88–2.33)	0.73 (0.32–1.64)
Health status				
Poor	Ref.	Ref.	Ref.	Ref.
Fair	1.09 (0.90–1.32)	0.98 (0.72–1.33)	1.21 (0.87–1.69)	0.94 (0.64–1.39)
Good	1.05 (0.88–1.26)	1.00 (0.75–1.34)	1.12 (0.83–1.52)	0.89 (0.63–1.26)
Very good	1.18 (0.99–1.41)	1.12 (0.84–1.49)	1.21 (0.89–1.64)	1.03 (0.73–1.46)
Excellent	1.04 (0.86–1.25)	0.97 (0.72–1.31)	1.04 (0.75–1.43)	0.99 (0.68–1.43)

Table 6 (part 2 of 2): Multilevel multivariable logistic regression for patient-reported after-hours access, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Income quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.03 (0.92–1.17)	1.11 (0.93–1.33)	1.03 (0.83–1.28)	0.96 (0.75–1.24)
3	1.09 (0.97–1.22)	0.96 (0.80–1.14)	1.31 (1.07–1.61)	1.17 (0.91–1.49)
4	1.16 (1.03–1.30)	1.19 (1.00–1.41)	1.27 (1.04–1.55)	1.10 (0.87–1.41)
5	1.09 (0.97–1.22)	1.05 (0.89–1.25)	1.25 (1.03–1.53)	1.01 (0.79–1.29)
Immigrant status				
Yes	Ref.	Ref.	Ref.	Ref.
No	1.24 (1.13–1.36)	1.24 (1.09–1.41)	1.34 (1.13–1.59)	1.17 (0.93–1.48)
Physician, n	3940	2026	1222	692
Age	0.99 (0.99–1.00)	1.00 (0.99–1.00)	0.99 (0.99–1.00)	0.99 (0.99–1.00)
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	1 (0.91–1.09)	0.97 (0.85–1.11)	1 (0.85–1.19)	1.12 (0.90–1.38)
Canadian graduate				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.09 (0.98–1.20)	1.03 (0.88–1.21)	1.11 (0.93–1.33)	1.18 (0.95–1.47)
Years in practice (per 5-yr increase)	1.00 (0.94–1.07)	1.07 (0.97–1.18)	0.96 (0.85–1.07)	1.10 (0.98–1.25)
Roster size (per 100-patient increase)	0.90 (0.83–0.96)	0.83 (0.74–0.92)	0.92 (0.81–1.04)	1.02 (0.87–1.20)
Practice, n	414	210	130	74
Group size (per 10-member increase)	1.12 (1.02–1.23)	1.17 (1.03–1.33)*	1.05 (0.90–1.22)	1.08 (0.87–1.34)
Number of after-hours services (per 500-hr increase)	1.00 (0.89–1.12)	0.98 (0.85–1.12)	0.98 (0.83–1.16)	1.05 (0.81–1.36)
Practice model				
Not team-based	Ref.	Ref.	Ref.	Ref.
Team-based	1.23 (0.99–1.52)	1.47 (1.13–1.93)	1 (0.66–1.51)	1.29 (0.78–2.14)

Note: CI = confidence interval, ICC = intraclass correlation coefficient, OR = odds ratio, Ref. = reference, RIO = Rurality Index of Ontario.
*Unless indicated otherwise.

Our multilevel, multivariable regression analysis of the total sample found that certain patient demographics reported better access. Female sex, older age, higher education, nonimmigrant status and better self-reported health correlated with better access across several measures. Although these relations were less consistent when the sample was geographically stratified, they suggest alignment with previous research that found certain patients are more likely to enjoy better access.^{13,21} This finding reiterates the importance of designing services to meet the needs of more vulnerable populations. We further note, based on our intraclass correlation coefficients, that patient factors are more influential than physician or practice factors, which is consistent with previous research that found physician incentives

may be of limited utility.^{26–29} These observations also raise interesting questions around the relation between access-oriented incentives and continuity of care.

Longitudinal and qualitative research would help to understand the nature and direction of causal relationships better. For example, a qualitative study exploring organizational factors may help us to understand why otherwise similar practices may differ in bonus achievement and patient-reported access, providing guidance for practices wishing to improve their services.

Limitations

A cross-sectional analysis cannot confirm causality; it is possible that better access was a pre-existing feature of large urban practices that opted into the blended capitation model.³⁰

Table 7 (part 1 of 2): Multilevel multivariable logistic regression for patient-reported wait time for care, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Main exposure				
Access bonus quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.01 (0.85–1.20)	1.11 (0.89–1.37)	0.98 (0.73–1.32)	0.65 (0.32–1.3)
3	1.17 (0.97–1.41)	1.29 (1.02–1.64)	1.05 (0.75–1.47)	1.00 (0.54–1.83)
4	1.27 (1.05–1.55)	1.32 (1.01–1.72)	1.66 (1.18–2.35)	1.30 (0.75–2.25)
5 (highest)	1.63 (1.32–2.00)	2.00 (1.46–2.73)	2.15 (1.46–3.14)	1.56 (0.93–2.63)
ICC, practice, %	4.87	3.27	4.98	1.20
ICC, physician, %	6.16	4.77	4.96	12.35
Patient, n	10 778	4642	3542	2594
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	1.12 (1.02–1.23)	1.13 (0.98–1.31)	1.18 (0.99–1.40)	1.08 (0.87–1.34)
Age, yr				
≤ 18	Ref.	Ref.	Ref.	Ref.
19–34	1.50 (1.01–2.23)	1.60 (0.90–2.84)	1.09 (0.55–2.18)	2.35 (0.92–5.98)
35–49	1.48 (1.01–2.18)	1.34 (0.76–2.33)	1.49 (0.76–2.94)	2.06 (0.83–5.10)
50–64	1.50 (1.02–2.19)	1.45 (0.83–2.52)	1.37 (0.71–2.66)	2.08 (0.85–5.09)
65–74	1.90 (1.30–2.80)	1.87 (1.07–3.28)	1.49 (0.76–2.92)	3.17 (1.28–7.82)
≥ 75	2.13 (1.44–3.16)	2.03 (1.14–3.60)	2.28 (1.15–4.53)	2.56 (1.01–6.48)
Education				
Some high school or less	Ref.	Ref.	Ref.	Ref.
High school	0.99 (0.82–1.19)	0.94 (0.70–1.27)	1.14 (0.81–1.60)	0.88 (0.61–1.27)
Some postsecondary	0.85 (0.68–1.06)	0.83 (0.59–1.17)	0.94 (0.64–1.38)	0.79 (0.50–1.25)
College	0.94 (0.78–1.14)	0.96 (0.72–1.29)	1.08 (0.77–1.51)	0.76 (0.52–1.10)
University	0.87 (0.72–1.06)	0.90 (0.67–1.20)	0.93 (0.65–1.32)	0.64 (0.43–0.96)
Postgraduate	0.80 (0.65–1.00)	0.81 (0.59–1.10)	0.90 (0.60–1.34)	0.65 (0.38–1.11)
Primary language				
Other	Ref.	Ref.	Ref.	Ref.
English, English & French, English & other	0.88 (0.71–1.10)	0.88 (0.67–1.17)	1.21 (0.80–1.84)	0.71 (0.27–1.83)
French	0.68 (0.46–1.01)	0.83 (0.48–1.42)	0.78 (0.36–1.69)	0.58 (0.18–1.92)
Health status				
Poor	Ref.	Ref.	Ref.	Ref.
Fair	0.92 (0.72–1.17)	0.85 (0.59–1.22)	0.80 (0.52–1.23)	1.21 (0.74–1.98)
Good	0.95 (0.76–1.19)	0.89 (0.63–1.25)	0.91 (0.62–1.35)	1.12 (0.71–1.75)
Very good	1.16 (0.93–1.44)	0.99 (0.71–1.39)	1.24 (0.84–1.84)	1.29 (0.83–2.02)
Excellent	1.30 (1.02–1.65)	1.18 (0.83–1.70)	1.27 (0.83–1.93)	1.38 (0.84–2.29)

Table 7 (part 2 of 2): Multilevel multivariable logistic regression for patient-reported wait time for care, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Income quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.05 (0.89–1.23)	1.04 (0.83–1.31)	1.13 (0.83–1.54)	1.04 (0.72–1.49)
3	1.05 (0.90–1.23)	0.96 (0.77–1.21)	1.30 (0.97–1.76)	0.98 (0.68–1.40)
4	1.14 (0.97–1.33)	1.02 (0.81–1.27)	1.33 (1.00–1.78)	1.31 (0.92–1.85)
5	1.17 (1.01–1.37)	1.04 (0.83–1.30)	1.54 (1.16–2.05)	1.10 (0.76–1.57)
Immigrant status				
Yes	Ref.	Ref.	Ref.	Ref.
No	1.00 (0.88–1.13)	0.98 (0.83–1.17)	0.96 (0.76–1.2)	1.33 (0.94–1.89)
Physician, n	3940	2026	1222	692
Age	1.00 (1.00–1.01)	1.00 (1.00–1.01)	1.01 (1.00–1.02)	1.00 (0.99–1.02)
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	0.92 (0.82–1.03)	0.88 (0.75–1.03)	0.94 (0.77–1.16)	0.95 (0.71–1.26)
Canadian graduate				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.07 (0.94–1.21)	0.93 (0.77–1.12)	1.03 (0.83–1.27)	1.37 (1.01–1.85)
Years in practice (per 5-yr increase)	0.90 (0.83–0.98)	1.04 (0.92–1.17)	0.80 (0.69–0.93)	0.84 (0.70–1.01)
Roster size (per 100-patient increase)	1.03 (0.94–1.12)	1.13 (0.99–1.28)	0.94 (0.81–1.08)	1.03 (0.83–1.27)
Practice, n	414	210	130	74
Group size (per 10-member increase)	0.92 (0.86–0.99)	1.02 (0.93–1.12)	0.80 (0.70–0.91)	0.89 (0.79–1.01)
Number of after-hours services (per 500-hr increase)	1.08 (1.00–1.16)	1.05 (0.95–1.16)	1.12 (0.99–1.28)	1.13 (0.99–1.31)
Practice model				
Not team-based	Ref.	Ref.	Ref.	Ref.
Team-based	1.1 (0.94–1.28)	1.13 (0.92–1.38)	1.27 (0.96–1.69)	0.96 (0.71–1.31)

Note: CI = confidence interval, ICC = intraclass correlation coefficient, OR = odds ratio, Ref. = reference, RIO = Rurality Index of Ontario.
*Unless indicated otherwise.

Smaller sample sizes in smaller geographies means any effects in these settings needed to be larger to be statistically significant. The same sample size limitation was seen for the timeliness outcome, which was only added to the HCES in April 2016. We did not include some forms of access, such as email, because of small sample size in the HCES for these questions. In the future, increases in email and other forms of virtual care may allow studies to evaluate these forms of access.

Like many surveys, the HCES is susceptible to sampling bias and recall bias,²¹ and the HCES' low average response rate of 51% may amplify these biases. The nonlinearity of certain covariates, such as roster size and group size, mean that regression results for these covariates should be interpreted with caution. Finally, we did not adjust for multiple

comparisons. Although we increased the chance of type 1 error by asking multiple questions, linear trend tests suggest the dose–response trends in our results are real.

Conclusion

This study adds to existing literature by evaluating the access bonus through a patient experience lens and within the complex urban context. Although the bonus did correlate with access in larger urban settings, this was not the case in small urban settings, aligning with previous research questioning its utility in smaller geographies. Limited evidence supports pay-for-performance in health care. The access bonus incentive may benefit from a redesign that considers geographic factors and the patient experience.

Table 8 (part 1 of 2): Multilevel multivariable logistic regression for patient-reported timeliness of wait, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Main exposure				
Access bonus quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	1.29 (0.98–1.69)	1.13 (0.77–1.68)	1.48 (0.85–2.58)	0.87 (0.24–3.08)
3	1.29 (0.94–1.77)	0.96 (0.61–1.52)	2.15 (1.16–3.99)	1.62 (0.48–5.44)
4	1.58 (1.16–2.13)	1.39 (0.81–2.36)	2.39 (1.32–4.31)	1.62 (0.58–4.52)
5 (highest)	1.98 (1.38–2.82)	3.01 (1.42–6.38)	1.99 (1.01–3.90)	2.26 (0.83–6.14)
ICC, practice, %	1.89	3.61	1.30	0.98
ICC, physician, %	7.93	6.64	9.95	15.61
Patient, n	10 778	4642	3542	2594
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	0.83 (0.7–1.00)	0.99 (0.74–1.33)	0.7 (0.49–0.98)	0.67 (0.37–1.19)
Age, yr				
≤ 18	Ref.	Ref.	Ref.	Ref.
19–34	0.44 (0.16–1.24)	0.41 (0.06–2.65)	0.29 (0.04–2.05)	1.10 (0.08–15.61)
35–49	0.48 (0.16–1.40)	0.41 (0.06–2.77)	0.45 (0.06–3.43)	0.79 (0.05–12.52)
50–64	0.58 (0.20–1.66)	0.66 (0.10–4.38)	0.39 (0.06–2.70)	0.96 (0.06–14.32)
65–74	1.08 (0.38–3.06)	0.99 (0.15–6.54)	0.90 (0.13–6.37)	1.85 (0.12–27.32)
≥ 75	1.17 (0.42–3.28)	0.89 (0.13–5.87)	0.98 (0.14–6.97)	3.88 (0.28–53.10)
Education				
Some high school or less	Ref.	Ref.	Ref.	Ref.
High school	1.36 (0.93–1.97)	1.85 (1.04–3.28)	1.15 (0.55–2.39)	1.02 (0.37–2.83)
Some postsecondary	1.42 (0.91–2.2)	2.03 (0.96–4.32)	1.17 (0.54–2.51)	0.83 (0.23–3.06)
College	1.11 (0.79–1.57)	1.57 (0.90–2.71)	0.84 (0.42–1.68)	1.03 (0.38–2.78)
University	1.12 (0.79–1.60)	1.72 (0.99–2.98)	0.78 (0.37–1.63)	0.74 (0.27–2.03)
Postgraduate	1.18 (0.77–1.80)	1.52 (0.83–2.78)	0.95 (0.38–2.38)	1.04 (0.28–3.81)
Primary language				
Other	Ref.	Ref.	Ref.	Ref.
English, English & French, English & other	1.41 (0.96–2.08)	1.24 (0.72–2.13)	2.68 (1.09–6.61)	1.44 (0.10–21.36)
French	1.3 (0.71–2.40)	1.55 (0.45–5.31)	2.5 (0.61–10.26)	1.20 (0.07–20.91)
Health status				
Poor	Ref.	Ref.	Ref.	Ref.
Fair	1.00 (0.66–1.51)	1.29 (0.58–2.89)	0.72 (0.34–1.54)	1.01 (0.34–3.05)
Good	1.39 (0.94–2.05)	1.42 (0.66–3.04)	1.32 (0.63–2.80)	1.39 (0.42–4.61)
Very good	1.48 (0.99–2.22)	1.81 (0.83–3.94)	1.36 (0.67–2.76)	1.11 (0.35–3.55)
Excellent	2.02 (1.31–3.10)	1.79 (0.82–3.91)	2.39 (1.05–5.46)	2.57 (0.67–9.82)

Table 8 (part 2 of 2): Multilevel multivariable logistic regression for patient-reported timeliness of wait, by geography

Variable	OR (95% CI)*			
	Total sample (RIO 0–39)	Large urban (RIO 0)	Medium urban (RIO 1–9)	Small urban (RIO 10–39)
Income quintile				
1 (lowest)	Ref.	Ref.	Ref.	Ref.
2	0.99 (0.71–1.37)	0.95 (0.54–1.67)	1.15 (0.64–2.09)	1.09 (0.46–2.58)
3	1.23 (0.91–1.66)	0.86 (0.55–1.36)	2.00 (1.04–3.83)	1.87 (0.75–4.65)
4	0.99 (0.76–1.29)	0.99 (0.66–1.49)	1.31 (0.77–2.21)	0.80 (0.34–1.89)
5	0.97 (0.74–1.26)	0.89 (0.58–1.38)	1.07 (0.60–1.91)	1.13 (0.51–2.49)
Immigrant status				
Yes	Ref.	Ref.	Ref.	Ref.
No	1.15 (0.90–1.47)	1.45 (1.03–2.02)	0.68 (0.38–1.20)	1.63 (0.74–3.62)
Physician, n	3940	2026	1222	692
Age	1.01 (1.00–1.02)	1.01 (0.99–1.02)	1.01 (0.99–1.03)	1.03 (1.00–1.06)
Sex				
Male	Ref.	Ref.	Ref.	Ref.
Female	1.03 (0.84–1.25)	0.89 (0.66–1.21)	1.57 (1.04–2.37)	0.69 (0.35–1.35)
Canadian graduate				
No	Ref.	Ref.	Ref.	Ref.
Yes	1.05 (0.85–1.31)	0.94 (0.66–1.33)	1.28 (0.83–1.98)	0.87 (0.44–1.74)
Years in practice (per 5-yr increase)	0.91 (0.78–1.05)	0.97 (0.74–1.27)	0.96 (0.72–1.27)	0.77 (0.55–1.08)
Roster size (per 100-patient increase)	0.85 (0.74–0.98)	0.92 (0.74–1.16)	0.95 (0.74–1.21)	0.62 (0.37–1.03)
Practice, n	414	210	130	74
Group size (per 10-member increase)	0.89 (0.83–0.96)	0.94 (0.82–1.08)	0.79 (0.67–0.92)	0.88 (0.72–1.09)
Number of after-hours services (per 500-hr increase)	1.13 (1.01–1.25)	1.02 (0.90–1.15)	1.21 (0.99–1.49)	1.32 (1.02–1.70)
Practice model				
Not team-based	Ref.	Ref.	Ref.	Ref.
Team-based	1.27 (1.02–1.59)	1.29 (0.89–1.87)	1.40 (0.90–2.19)	1.19 (0.65–2.18)

Note: CI = confidence interval, ICC = intraclass correlation coefficient, OR = odds ratio, Ref. = reference, RIO = Rurality Index of Ontario.
*Unless indicated otherwise.

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Program for Faculty Development, Vancouver Physician Staff Association and Osgoode Hall Law School. She reports participation on the data safety monitoring board of the CHOICES study. No other competing interests were declared.

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Data sharing: The data set from this study is held securely in coded form at ICES. Although data sharing agreements prohibit ICES from making the data set publicly available, access may be granted to those who meet prespecified criteria for confidential access, available at www.ices.on.ca/DAS. The full data set creation plan and underlying analytic code are available from the authors upon request, understanding that the computer programs may rely upon coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.

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