

Gender-based differences in physician payments within the fee-for-service system in Ontario: a retrospective, cross-sectional study

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Abstract

Background: Differences in physician income by gender have been described in numerous jurisdictions, but few studies have looked at a Canadian cohort with adjustment for confounders. In this study, we aimed to understand differences in fee-for-service payments to men and women physicians in Ontario.

Methods: We conducted a cross-sectional analysis of all Ontario physicians who submitted claims to the Ontario Health Insurance Plan (OHIP) in 2017. For each physician, we gathered demographic information from the College of Phys-

icians and Surgeons of Ontario registry. We compared differences in physician claims between men and women in the entire cohort and within each specialty using multivariable linear regressions, controlling for length of practice, specialty and practice location.

Results: We identified a cohort of 30 167 physicians who submitted claims to OHIP in 2017, including 17 992 men and 12 175 women. When controlling for confounding variables in a linear mixed-effects regression model, annual physician claims were \$93 930 (95% confi-

dence interval \$88 434 to \$99 431) higher for men than for women. Women claimed 74% as much as men when adjusting for covariates. This discrepancy was present in nearly all specialty categories. Men claimed more than women throughout their careers, with the greatest gap 10–15 years into practice.

Interpretation: We found a gender gap in fee-for-service claims in Ontario, with women claiming less than men overall and in nearly every specialty. Further work is required to understand the root causes of the gender pay gap.

A gender pay gap in physician incomes has been described across numerous jurisdictions.¹ Previous analyses have found income differences between women and men in the general physician population, among academic physicians and among physicians within the same specialty,^{2–8} and when controlling for years of experience, hours worked, geographic location, race and practice type.^{9–13}

Although the difference in physician income between women and men is well described in the United States, fewer studies have looked at a Canadian cohort. An analysis of surgeons in Ontario found that female surgeons earned less per hour spent operating than male surgeons, and suggested that female physicians were more likely to perform less lucrative procedures than male physicians.¹⁴ A recent report released by the Ontario Medical Association highlighted income disparity between men and women physicians in Ontario, but did not provide a detailed breakdown by specialty.¹⁵ Transparent

and detailed reporting on gender differences in physician payments can provide data to guide advocacy for greater pay equity.

In this study, we aimed to describe payments to physicians across the province of Ontario by gender when controlling for specialty choice, career stage and physician demographics.

Methods

Context

Ontario has a publicly funded, single-payer health care system for physician services. About 70% of physician payments are paid through a fee-for-service model for claims to the Ontario Health Insurance Plan (OHIP). The remainder of physician payments come from alternative payment plans, which can consist of salaries, hourly rates, capitation models or contract-based payments.¹⁶ A physician's salary can comprise a combination of

payments through fee-for-service and alternative payment plans. In particular, family physicians are more likely to be remunerated through an alternative payment plan than other physicians.¹⁶

Data sources

We collected data on physician payments and demographics from 4 publicly available sources. We obtained physician-level data on fee-for-service claims to OHIP in 2017, which were made public after a freedom of information request in 2018,¹⁷ and demographic information from the College of Physicians and Surgeons of Ontario (CPSO) registry, which is also publicly available.¹⁸ We collected aggregate data on total physician payments in 2017 from the National Physician Database.¹⁹ The National Physician Database is maintained by the Canadian Institute of Health Information and contains accurate demographic information on practising physicians in Ontario. We also gathered aggregate data on the number of physicians practising in Ontario in 2017 from the Ontario Physician Human Resources Data Centre (OPHRDC). The OPHRDC is considered the definitive registry of physicians in practice in Ontario.

Study design

We conducted a cross-sectional analysis of physician payments from OHIP during 2017. We used a unique identifier for each physician (CPSO number) and obtained demographic information from the CPSO registry, including self-reported gender,²⁰ number of years since obtaining an independent practice licence, location of practice (including the forward sortation area of the postal code), number of languages spoken, specialty and medical school. We derived whether the physician's location of practice was rural or urban from postal codes based on the Canada Post Corporation conventions.²¹ We grouped internal medicine subspecialties with fewer than 300 practitioners (i.e., endocrinology, gastroenterology, geriatrics, hematology, infectious disease, medical oncology, nephrology, respiratory, rheumatology) together into an aggregate category to ensure sufficient subjects per covariate, to prevent overfitting in regression models. We used this same threshold to group surgical subspecialties (i.e., cardiac surgery, otolaryngology, plastic surgery, neurosurgery, thoracic surgery, vascular surgery and urology).

The data set used in our primary analysis did not include physicians who were reimbursed entirely under an alternative payment plan. To determine the number of Ontario physicians missing from our data set, we compared it with the aggregate data derived from the OPHRDC for the same study period.²²

Statistical analysis

We compared baseline physician characteristics and unadjusted total annual claims between women and men using a standardized mean difference (SMD), as described by Austin.²³ We considered a value greater than 0.1 as a sign of an important covariate imbalance.²³

To determine the adjusted association between physician gender and total annual claims, we constructed a linear mixed effects regression, with total annual claims as the outcome and physician specialty as a random effect. Fixed effects included gender, years in practice and rural or urban location of practice. We chose these covariates a priori based on literature review.

Previous studies have found that the magnitude of the gender pay gap increases with time after entering independent practice.^{24,25} We chose to include geographic location in the model because previous studies have found physician compensation to vary between urban and rural areas.²⁶ We also conducted pre-specified multivariable linear regressions for physicians within each specialty, with gender, years in practice and rural or urban location of practice as covariates. We fitted all regression models using a restricted log-likelihood estimator. We adjusted *p* values to correct for multiple hypothesis testing using the Holm-Bonferroni method.²⁷ We generated estimated marginal salaries stratified by gender from the fitted models. We compared the distribution of women and men in each specialty between the study population and the OPHRDC data using χ^2 tests for proportions.

We conducted a sensitivity analysis to test if the results of our primary analysis would change if alternative payment plan remuneration was accounted for. To do this, we used data derived from the 2017 National Physician Database, which includes aggregate total payments to physicians in 19 specialties.¹⁹ For each specialty, we compared the total physician payments to the fee-for-service billings in our primary analysis. The difference between the 2 values (δ) gave an estimation of the physician payments within each specialty that were missing from our primary analysis.

First, we considered a scenario in which men and women were equally likely to receive payments through alternative payment plans. Using this assumption, we adjusted the fee-for-service payments to men and women within each specialty upwards by δ . We then compared adjusted physician payments between men and women using a linear mixed effects regression, controlling for location and years of practice. Second, we considered a conservative scenario in which all payments from alternative payment plans had gone to women. We adjusted the payments to women within each specialty upwards and left payments to men unchanged. This assumption would likely underestimate the true difference in payments between men and women, but it could provide a lower bound on the true difference in payments. Using this second assumption, we again compared physician payments to men and women using a linear mixed effects regression, as above.

We used R studio version 1.3 for all statistical analyses. We generated plots using the ggplot2 package.

Ethics approval

The study was reviewed by the Research Ethics Board (REB) at Unity Health Toronto and deemed not to require REB approval given that data are all publicly available.

Results

We identified 30 167 physicians who had submitted claims to OHIP between Jan. 1, 2017, and Dec. 31, 2017. Of these, 17 992 (59.6%) physicians were men and 12 175 (40.4%) were women. The OPHRDC report identified 30 584 practising physicians within Ontario during the same time period. Our data set thus included 98.6% of the total practising physicians in Ontario during the study period. We evaluated the distribution of physicians within each specialty category in our data set compared with the

OPHRDC report (59% men, 41% women) and found no significant difference in the distribution of men and women physicians (Appendix 1, Table S1, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.210437/tab-related-content). Although in recent years the CPSO has allowed physicians to identify as non-binary during registration, no physicians in our data set reported a gender identity other than man or woman.

A comparison of physician characteristics stratified by gender is seen in Table 1. On average, men in our cohort had been in practice longer than women (19.8 v. 14.0 yr, SMD 0.44). Pediatrics and

obstetrics and gynecology had a lower ratio of men to women, compared with the overall cohort (Table 1). Medical subspecialties, psychiatry and laboratory-based specialties had a similar ratio of women and men as the overall cohort. In the remainder of specialties, the ratio of men to women was higher than in the overall cohort. When grouping physicians by total annual claims, more women were represented in the group of physicians claiming less than \$300 000 annually, and more men were represented among physicians claiming \$300 000 or more annually (Figure 1). Density plots of physician payments for women and men showed

Table 1: Characteristics of Ontario physicians in 2017 by gender

Characteristic	No. (%) of physicians*			SMD
	All n = 30 167	Men n = 17 992	Women n = 12 175	
Amount claimed, \$				
< 100 000	11 877 (39.4)	5985 (33.3)	5890 (48.4)	0.48
100 000–299 999	8898 (29.5)	4927 (27.4)	3971 (32.6)	
≥ 300 000	9392 (31.1)	7080 (39.4)	2312 (19.0)	
Years in practice, mean ± SD	17.4 ± 13.8	19.8 ± 14.5	14.0 ± 11.7	0.44
Languages spoken				
1	17 770 (58.9)	10 569 (58.7)	7201 (59.1)	0.03
2	8628 (28.6)	5100 (28.3)	3528 (29.0)	
3	2583 (8.6)	1587 (8.8)	996 (8.2)	
> 3	1186 (3.9)	736 (4.1)	450 (3.7)	
Rural location of practice	1076 (3.6)	614 (3.4)	462 (3.8)	
Specialty				0.51
Anesthesiology	1379 (4.6)	936 (5.2)	443 (3.6)	
Cardiology	641 (2.1)	522 (2.9)	119 (1.0)	
Clinical immunology	36 (0.1)	21 (0.1)	15 (0.1)	
Dermatology	238 (0.8)	124 (0.7)	114 (0.9)	
Diagnostic radiology	1166 (3.9)	835 (4.6)	331 (2.7)	
Emergency medicine	255 (0.8)	175 (1.0)	79 (0.6)	
Family medicine	14 314 (47.4)	7675 (42.7)	6639 (54.5)	
General surgery	840 (2.8)	618 (3.4)	222 (1.8)	
Internal medicine	1797 (6.0)	1236 (6.9)	561 (4.6)	
Medical subspecialty	1730 (5.7)	1012 (5.6)	718 (5.8)	
Neurology	422 (1.4)	276 (1.5)	146 (1.2)	
Obstetrics and gynecology	918 (3.0)	384 (2.1)	534 (4.4)	
Ophthalmology	479 (1.6)	375 (2.1)	104 (0.8)	
Orthopedic surgery	650 (2.2)	592 (3.3)	58 (0.5)	
Pediatrics	1206 (4.0)	504 (2.8)	702 (5.8)	
Pathology, microbiology and clinical biochemistry	308 (1.0)	191 (1.1)	117 (1.0)	
Physical medicine	210 (0.7)	135 (0.8)	75 (0.6)	
Psychiatry	2188 (7.2)	1247 (6.9)	941 (7.7)	
Surgical subspecialty	821 (2.7)	667 (3.7)	154 (1.3)	

Note: SD = standard deviation, SMD = standardized mean difference.
*Unless indicated otherwise.

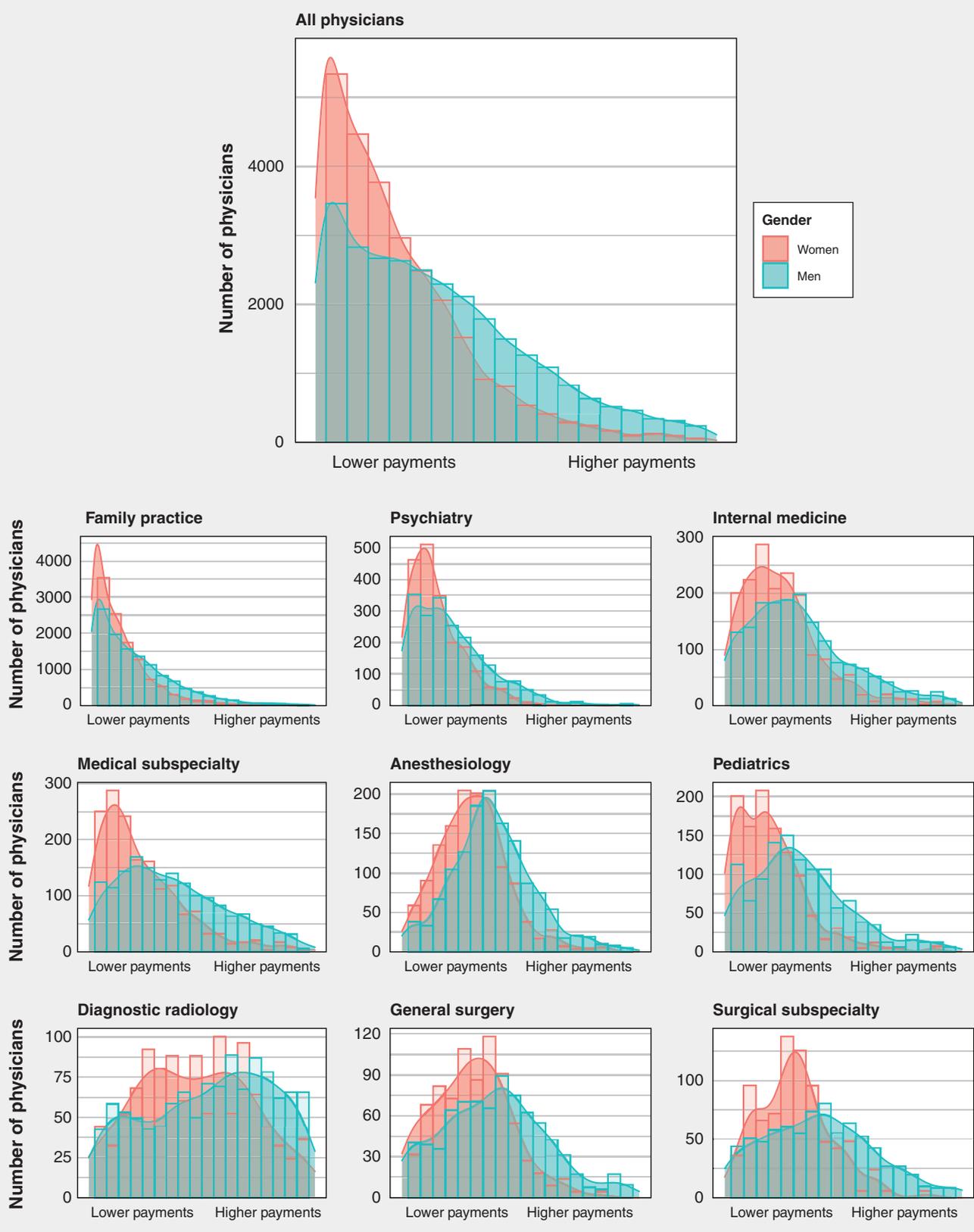


Figure 1: Distribution of physician payments, stratified by gender, for all physicians and for physicians within the 9 most common specialty categories.

right-skewed distributions in which the highest paid physicians tended to be men. We compared the total annual claims of women and men by length of time in independent practice. Men claimed more than women throughout their careers; the magnitude of difference peaked at 10–15 years into practice (Figure 2).

Multivariable regression

The unadjusted difference in physician claims between men and women was \$123 364 (95% confidence interval [CI] \$117 355 to \$129 372). When adjusting for specialty choice, numbers of years in practice and location of practice, total annual claims were \$93 930 (95% CI \$88 434 to \$99 431) higher for men than for women (Table 2). Estimated mean payments to women were 74% of estimated payments to men. Urban location of practice was associated with higher total annual claims. Physicians in practice for 11–15 years had the highest total annual claims, and claims decreased with successively higher or lower years in practice (Figure 2).

We explored the difference in fee-for-service claims within each specialty by running a separate linear regression for physicians within each specialty category (Table 3). When adjusting for length of time in practice and rural or urban location of practice, fee-for-service claims were significantly higher for men within each specialty except for emergency medicine.

Sensitivity analysis

In the sensitivity analysis, we estimated payments from alternative payment plan by specialty. On average, the estimated payments from alternative payment plan for 2017 were \$55 623

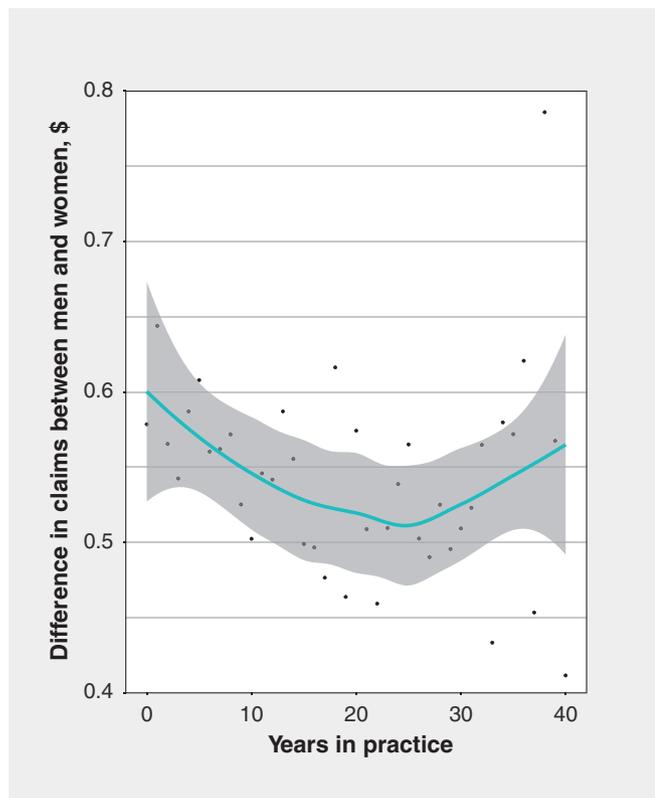


Figure 2: Difference in total annual claims between women and men physicians by number of years in practice.

across all specialties (Appendix 2, Table S2, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.210437/tab-related-content). We first supposed that men and women were equally likely to receive payments from alternative payment plans, and adjusted the payments listed by the National Physician Database. In this scenario, physician payments were \$95 447 (95% CI \$89 925 to \$100 974) higher for men than for women. In a second conservative scenario, we supposed that all payments from alternative payment plan went to women. Using this assumption, physician payments were \$31 870 (95% CI \$25 089 to \$38 660) higher for men than for women ($p < 0.001$).

Interpretation

Our results show a gender pay gap in physician fee-for-service claims in Ontario. We found that women had lower annual claims than men in 2017, claiming 74% of what men claimed overall when accounting for rurality and years in practice. The difference in claims was present within almost every specialty and persisted in a sensitivity analysis that accounted for missing payments from alternative payment plans in our primary data source.

Our results are comparable to those of similar studies that have evaluated physician salaries in multiple jurisdictions.^{2–6,28–30} Studies evaluating specific subgroups of physicians have found sex- and gender-based salary discrepancies among research, academic and clinical physician groups.^{2,7,9,31,32} Similar to our findings, previous studies found that female physicians earned less than male physicians at the start of their careers, and that the income difference grew with time.^{10,33,34} A retrospective analysis of physician income in Ontario from 1992 to 2013 found a composite-adjusted, female-to-male, annual median income ratio of 0.77, which was present in most subspecialties.³⁵ Another study of primary care physicians in British Columbia found that female physicians made 36% less than male physicians in similar practice environments.³⁶ A study of surgeons in Ontario found that female surgeons tended to earn less per hour spent operating than male physicians.¹⁴ A recent study in Ontario showed that females were less represented in the highest paying specialties, and that payments to female physicians were lower than payments to male physicians across most specialties; however, unlike our analysis, this study did not adjust for confounding factors and excluded certain groups of physicians.³⁷ Our findings among physicians in Ontario are also similar to the broader job market. Women tend to make less than men in a wide variety of careers and the gender pay gap tends to widen with time.^{25,38}

Previous analyses have suggested that women physicians are more likely to work part-time than men physicians.^{36,39–41} However, studies that controlled for differences in work hours found that the number of hours worked did not fully account for the magnitude of the gender pay gap.¹⁴ In addition, the Canadian Medical Association's national physician survey found only a small difference in hours worked between the binary sexes.⁴² Other experts have suggested that female physicians are encouraged to enter lower-paying specialties, and

Table 2: Multivariate linear model of total annual claims, adjusted for covariates

Characteristic	Difference in mean total annual claims, \$ (95% CI)	<i>p</i> value*
Gender (men v. women)	95 172 (89 925 to 100 974)	< 0.001
Location of practice (rural v. urban)	-79 797 (-93 937 to -65 734)	< 0.001
Years in practice		
0-5		Ref.
6-10	49 185 (41 070 to 57 731)	< 0.001
11-15	63 528 (54 605 to 72 964)	< 0.001
16-20	50 461 (40 134 to 60 960)	< 0.001
21-25	38 283 (27 121 to 49 858)	< 0.001
26-30	20 676 (10 960 to 30 403)	< 0.001
> 30	-38 190 (-46 234 to -30 230)	< 0.001

Note: CI = confidence interval, Ref. = reference category.
**p* values were adjusted to correct for multiple hypothesis testing using the Holm-Bonferroni method.

Table 3: Absolute and relative difference in adjusted total annual claims, adjusted for covariates within each specialty group

Specialty	Difference in total annual claims between men and women*		
	Absolute difference, \$ (95% CI)	Payments to women as a percentage of payments to men, % (95% CI)	<i>p</i> value†
Ophthalmology	328 061 (204 327 to 451 796)	59 (30 to 88)	< 0.001
Cardiology	257 459 (185 579 to 329 339)	61 (29 to 93)	< 0.001
Diagnostic radiology	182 785 (133 319 to 232 251)	64 (32 to 96)	< 0.001
Orthopedic surgery	178 076 (108 451 to 247 702)	52 (32 to 71)	< 0.001
Medical subspecialty	153 546 (129 812 to 177 281)	58 (42 to 74)	< 0.001
Surgical subspecialty	138 806 (91 439 to 186 173)	72 (53 to 90)	< 0.001
General surgery	125 177 (86 482 to 163 872)	66 (55 to 77)	< 0.001
Anesthesiology	101 450 (77 700 to 125 201)	72 (58 to 87)	< 0.001
Pediatrics	86 110 (62 601 to 109 619)	66 (39 to 93)	< 0.001
Neurology	81 103 (40 343 to 121 863)	71 (63 to 80)	< 0.001
Internal medicine	80 124 (53 371 to 106 876)	77 (63 to 91)	< 0.001
Family and general practice	72 767 (66 883 to 78 650)	57 (55 to 60)	< 0.001
Emergency medicine	65 970 (-53 25 to 137 264)	46 (11 to 124)	0.7
Obstetrics and gynecology	62 167 (29 274 to 95 060)	83 (69 to 97)	0.003
Psychiatry	58 803 (45 772 to 71 833)	76 (65 to 86)	< 0.001

Note: CI = confidence interval.
*Payments information in this table accounts only for fee-for-service payments and does not include physician payments through an alternate payment plan.
†*p* values were adjusted to correct for multiple hypothesis testing using the Holm-Bonferroni method.

male physicians are more likely to enter higher-paying, procedural specialties.^{43,44} Consistent with this research, representation of residency applicants by sex has been shown to vary widely across specialties in Canada.⁴⁵ Indeed, we did find a statistically significant difference between the ratio of women in pediatrics and the baseline ratio in our cohort; in contrast, the ratio of men was higher in all surgical subspecialties compared

with the cohort baseline. However, we found that women were paid less than men in nearly every specialty. Other researchers have suggested that complex systemic biases exist during training and in practice that contribute to the gender pay gap.^{7,32,46-53} The reasons underlying the discrepancy in payments that we observed are likely complex and multifactorial, and should be a focus of further research.

Limitations

We were unable to control for important covariates that were unavailable for our analysis, such as the number of hours worked or the types of fee codes submitted by women and men. We were able to capture only payments made to physicians through the fee-for-service system. Although about 30% of physician payments in Ontario are made through an alternative payment plan, we were unable to directly characterize these payments.¹⁶ To attempt to account for this, we conducted a sensitivity analysis in which we estimated the payments missing from our first data set and allocated all missing payments to women physicians. We recognize that this analysis may not reflect the true gender pay gap, but it does show that the gender pay gap persists and is still substantial even in a conservative scenario where all payments from alternative payment plans went to women. We cannot know what portion of these payments truly went to women during our study period. However, a survey of physicians in Calgary found that physicians reimbursed entirely through an alternative payment plan were 37% more likely to be women.⁵⁴ This suggests that, although we were unable to characterize payments from alternative payment plans in our main analysis, this does not change our main conclusion that a substantial gender pay gap exists in most specialties. It is noteworthy that emergency medicine physicians are more likely to be compensated through an alternative payment plan than a fee-for-service model. This may account for the larger confidence intervals seen for emergency medicine physicians in our linear regression model, which relies only on fee-for-service billings. We relied on gender data self-reported by physicians when applying for registration with the CPSO. In recent years, this registration form included 3 options (male, female and nonbinary). Although the CPSO asks physicians to report their gender during registration, the application form uses terminology relating to sex (male and female). However, the CPSO's general bylaws state that the registry contains information on physician gender.²⁰ In our study, we have taken the position that the intent of the CPSO is to collect physician gender, and we have used terminology relating to gender. Nonetheless the incongruent terminology used by the CPSO poses a limitation to our study. We were not able to account for physician overhead costs, as this can vary across specialties and jurisdictions and is not consistently reported.⁵⁵ Finally, we were not able to account for physician consulting income, which can be substantial, but is inconsistently reported.

Conclusion

We evaluated fee-for-service payments to Ontario physicians in 2017 and found that adjusted physician payments to women were 74% of payments to men. Payments to women were lower than to men in nearly all specialties. Our study was limited by our inability to control for important factors, such as hours worked. Future work should attempt to collect more detailed information for each physician to better describe the causes of the gender pay gap. Despite this, our results provide a cross-sectional analysis of physician payments in Ontario that promotes transparency and has implications for individual physicians and physician advocacy groups.

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