Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

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eMethods. Supplementary Methods

Billing codes to identify consultations claimed by surgeons

We excluded in-patient consultations and those referred by emergency room doctors as these referrals were likely made to the surgeon on-call rather than by choice of the referring physician. We recorded only the first consultation between unique patient-surgeon pairs.

Each consultation billing code includes identifiers for patient, surgeon, and referring physician.

Specialty	Consultation billing code	Description of code
All surgeons	A935	Special surgical consultation
Cardiac surgery	A095	Consultation
General surgery	A035	Consultation
Thoracic surgery	A645	Consultation
Gynecology	A205	Consultation
Ophthalmology	A235	Consultation
	A256	Special optometrist-requested assessment
	A253	Optometrist-requested assessment
	A251	Special ophthalmologic assessment
Orthopedic surgery	A065	Consultation
Otolaryngology	A245	Consultation
Plastic surgery	A085	Consultation
Urology	A355	Consultation
Vascular surgery	A175	Consultation
Neurosurgery	A045	Consultation

Identification of specialty of surgeons

Historically, OHIP billing codes have identified the following surgical specialty areas: general surgery (specialty code 03), neurosurgery (specialty code 04), orthopedic surgery (specialty code 06), plastic surgery (specialty code 08), cardiothoracic surgery (specialty code 09), obstetrics and gynecology (specialty code 20), ophthalmology (specialty code 23), otolaryngology (specialty code 24), and urology (specialty code 35). As thoracic surgery and vascular surgery did not have unique billing codes, surgeons practicing these specialties could be captured through the general surgery or cardiothoracic billing codes. Beginning in 2005, surgeons were able to bill under a thoracic surgery code (specialty code 64) and, beginning in 2013, vascular surgeons were able to bill under a unique vascular surgery billing code (specialty code 17). However, specialty code 09 continue to capture "cardiothoracic surgery." To ensure that the specialties of cardiac, thoracic, vascular, and general surgeons were appropriately identified, we applied the following algorithms:

Vascular surgery

All surgeons billing under specialty code 17 were classified as vascular surgeons. For all remaining surgeons, we identified surgeons who submitted at least 5 claims for any of the following procedures during the study period: 1) Aorto-iliac repair plus bilateral common femoral repair (R785), 2) Extended profundoplasty (R856), 3) Axillo-bifemoral graft (R933), 4)

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Aorto-femoral graft (R934), 5) Femoro-popliteal with saphenous vein (R791), 6) Femoro-popliteal with prosthetic graft (R794), 7) Femoro-anterior/posterior tibial/peroneal bypass graft with saphenous vein (R787), 8) Femoro-anterior/posterior tibial/peroneal bypass graft with prosthetic graft (R780). For these surgeons, we examined claims for their 10 most commonly performed procedures across the study period to determine the primary specialty of these surgeons.

Thoracic surgery
All surgeons billing under specialty code 64 were classified as thoracic surgeons. For all remaining surgeons, we identified surgeons who submitted at least 5 claims for any of the following procedures during the study period: 1) Lobectomy (M143), 2) Wedge resection of lung (M145), 3) Segmental lung resection, including segmental bronchus and artery (M144), 4) Pneumonectomy (M142). For these surgeons, we examined claims for their 10 most commonly performed procedures across the study period to determine the primary specialty of these surgeons.

Cardiac surgery
We identified surgeons who submitted at least 5 claims for any of the following procedures during the study period: 1) Coronary artery repair, two vessels (R743), 2) Coronary artery repair, one vessel (R742), 3) Aortic valve replacement (R738), 4) Mitral valvuloplasty (R733), 5) Mitral valve reconstruction, simple (R773), 6) Mitral valve reconstruction, complex (R774), 7) Mitral valve replacement (R735), 8) Replacement of aortic valve, replacement of ascending aorta, and reimplantation of coronary arteries (R863), 9) Insertion of permanent endocardial electrode and implantation of pack (Z444), 10) Implantation of cardioverter defibrillator by transvenous approach (R761), 11) AV sequential pacemaker with permanent atrial and ventricular endocardial electrodes (R752). For these surgeons, we examined claims for their 10 most commonly performed procedures across the study period to determine the primary specialty of these surgeons.

We later excluded cardiac, thoracic, and vascular surgery as these specialties each had fewer than 15 female surgeons across the study period, limiting our ability to evaluate sex differences in referrals.

Specialty categories for referring physicians
Referring physicians were categorized into specialty areas as follows:

Primary care specialists	
00	Family practice
05	Community medicine
26	Pediatrics
56	Optometry
76	Nurse practitioner
Medical specialists	
07	Geriatrics
13	Internal medicine
15	Endocrinology

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16	Nephrology
18	Neurology
31	Physical medicine
34	Therapeutic radiology
41	Gastroenterology
44	Medical oncology
46	Infectious disease
47	Respirology
48	Rheumatology
60	Cardiology
61	Hematology
62	Clinical Immunology
63	Nuclear medicine
Surgical specialists	
03	General surgery
04	Neurosurgery
06	Orthopedic surgery
08	Plastic surgery
09	Cardiothoracic surgery
17	Vascular surgery
20	Obstetrics and gynecology
23	Ophthalmology
24	Otolaryngology
35	Urology
64	Thoracic surgery
Other	
01	Anesthesia
02	Dermatology
19	Psychiatry
22	Genetics
28	Pathology
29	Microbiology
30	Clinical biochemistry
33	Diagnostic radiology

Determining patients' marginalization, resource utilization, and comorbidity status

Degree of marginalization was determined using the Ontario Marginalization Index, a validated, census-based metric combining measures of material deprivation, residential instability, ethnic concentration, and dependency.

Resource utilization and comorbid status were determined using the Canadian Institutes of Health Information (CIHI) Discharge Abstract Database (DAD), which holds detailed diagnostic

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and procedural information for all Ontario hospital admissions, the National Ambulatory Care Reporting System (NACRS) database, which collects diagnostic information on emergency department and ambulatory care visits, and the Same Day Surgery (SDS) database, which holds diagnostic and procedural data for all same day surgery visits.

Resource utilization was classified using Resource Utilization Bands (RUBs) of the Johns Hopkins Adjusted Clinical Group (ACG) System version 10.0 (Johns Hopkins University). This system classifies individuals into six groups based on expected resource utilization (1, non-user; 6, very high morbidity).

Both RUBs and ADGs were determined using a two-year look-back period.

Identification of procedural referrals

To determine the proportion of procedural referrals, patients were followed for two years from the date of consultation. Procedural referrals were those where the surgeon who submitted a claim for the consultation also submitted a claim for an operative or endoscopic procedure. Operative referrals were the subset of referrals that resulted in an operative procedure within 2 years. In obstetrics, we did not include deliveries in our definition of operative or procedural referrals. For Cesarean sections, we could not distinguish between elective and emergent indications, unless performed after-hours. Additionally, the decision for an elective Cesarean section is not often made at the time of initial referral. Vaginal deliveries were not included in the definition of procedural referrals as deliveries may be performed by the obstetrician on call, rather than by the consulting obstetrician.

In-breeding and Relative Homophily

In-breeding homophily: The tendency for individuals to more closely associate with those who are like themselves

Relative homophily: Compares the fraction of referrals to male specialists between male and female physicians

To illustrate these concepts, consider the following hypothetical example. Assume a population where 70% of surgeons are male and 30% of surgeons are female. The table below presents a hypothetical scenario illustrating the proportion of referrals from male and female physicians to male and female surgeons:

		Surgeons	
		Male surgeons (m)	**Female surgeons (f)**
Referring physicians	Male physician (M)	80% (M_m)	20% (M_f)
	Female physician (F)	75% (F_m)	25% (F_f)

Population proportion of male surgeons = 70% (P_m)
Population proportion of female surgeons = 30% (P_f)

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Based on the table above, we see that male physicians refer 80% of patients to male surgeons and 20% of patients to female surgeons. In contrast, female surgeons refer 75% of patients to male surgeons and 25% of patients to female surgeons.

In-breeding homophily among males is then present when the proportion of male-to-male referrals exceeds the population proportion of male surgeons:

In-breeding homophily among males: $M_m > P_m$

Similarly, in-breeding homophily among females is present when the proportion of female-to-female referrals exceeds the population proportion of female surgeons:

In-breeding homophily among females: $F_f > P_f$

In the ideal world, the proportion of referrals to surgeons of either sex would reflect the population proportion of surgeons. I.e. 70% of referrals would be seen by male surgeons and 30% of referrals would be seen by female surgeons.

However, in this example, in-breeding homophily is present among males, as 80% of referrals are male-to-male (higher than the 70% population proportion of male surgeons). In contrast, in-breeding homophily is not present among females as 25% of referrals are female-to-female (lower than the 30% population proportion of female surgeons).

The presence of in-breeding homophily does not alone indicate bias as there are a number of reasons why the real-world distribution of referrals may not reflect population proportions of male and female surgeons. For example, if women more often undertook part-time work, they would be less available to see referrals. This would necessitate a greater proportion of referrals to be seen by male surgeons.

In the absence of bias, both male and female referring physicians would be constrained by the same factors when making referrals to male and female surgeons (e.g. less availability of female surgeons). Therefore, both male and female surgeons should over-refer to male surgeons to an equal degree. Relative homophily assesses whether male and female referring physicians send a similar proportion/fraction of referrals to male surgeons.

Relative homophily = [proportion of referrals made by male physicians to male surgeons (M_m)] – [proportion of referrals made by female physicians to male surgeons (F_m)]

If both male and female physicians refer, or over-refer, to male surgeons to an equal degree, relative homophily = 0; if male physicians refer a greater proportion of patients to male surgeons than do female physicians, relative homophily >0. In the example above, relative homophily is present as 80% of referrals from male physicians were sent to male surgeons, whereas 75% of referrals from female physicians were sent to male surgeons. Although both sexes over-refer to

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male surgeons (defined as a referral proportion greater than the population proportion), male physicians over-refer to a greater degree, suggestive of biased referrals.

Negative binomial model measuring relative homophily adjusted for patient factors

To measure relative homophily adjusted for patient factors, we constructed a referring physician-year-level negative binomial model with annual number of referrals to male surgeons as the outcome and the natural logarithm of total annual referrals as the offset.

Covariates, updated annually, included year of referral (categorical), age of referring physician (continuous), years of experience of the referring physician (continuous), percentage of the referring physician's patients >50 years old, percentage of male patients, percentage of patients with ADGs >10, percentage of patients with high/very high morbidity (based on RUB), percentage of patients in the lowest two income groups, and average patient marginalization. We included a referring physician specialty-by-sex interaction.

The model was fit using generalized estimating equations to account for clustering by referring physician.

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eTable 1. Surgeon characteristics

Characteristic	**Male surgeons** (n = 4,389; *77.5%*)	**Female surgeons** (n = 1,271; *22.5%*)	**Standardized Difference**
Specialty, *n (%)*			0.82
General surgery	1,019 (23.2)	256 (20.1)	
Neurosurgery	168 (3.8)	19 (1.5)	
Orthopedic surgery	880 (20.1)	89 (7.0)	
Plastic surgery	267 (6.1)	73 (5.7)	
Gynecology	686 (15.6)	598 (47.0)	
Ophthalmology	579 (13.2)	135 (10.6)	
Otolaryngology	382 (8.7)	73 (5.7)	
Urology	408 (9.3)	28 (2.2)	
Age*, *median (IQR)*	49 (41-59)	43 (37-49)	0.66
Years in practice*, *median (IQR)*	12.9 (7.7-19.6)	9.3 (4.2-15.6)	0.42

*Measured at time of consultation

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eTable 2. Referring physician characteristics

Characteristic	**Male physicians** (n = 27,792; 61.9%)	**Female physicians** (n = 17,101; 38.1%)	**Standardized Difference**
Specialty, *n (%)*			0.42
Primary care specialist	14,097 (50.7)	11,899 (69.6)	
Medical specialist	4,505 (16.2)	1,941 (11.4)	
Surgical specialist	4,862 (17.5)	1,254 (7.3)	
Other	4,328 (15.6)	2,007 (11.7)	
Age*, *median (IQR)*	52 (44-60)	46 (39-53)	0.57
Years in practice*, *median (IQR)*	16.2 (10.2-22.3)	12.1 (6.6-18.9)	0.42

*Measured at time of consultation

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eTable 3. Number and percentage of referrals sent to male and female surgeons that resulted in a procedure within 2 years of date of consultation, by specialty area of referring physician. Only specialties with standardized difference >0.1 are shown.

Specialty	Patients referred to male surgeons	Patients referred to female surgeons	Standardized Difference
Overall	11,121,566 (33.0)	1,532,000 (25.4)	0.17
Primary care specialist			0.17
Procedure within 2 years	9,157,011 (32.1)	1,238,062 (24.3)	
No procedure within 2 years	19,395,062 (67.9)	3,853,317 (75.7)	
Medical specialist			0.08
Procedure within 2 years	460,672 (34.8)	61,833 (31.2)	
No procedure within 2 years	864,308 (65.2)	136,315 (68.8)	
Surgical specialist			0.20
Procedure within 2 years	1,259,994 (38.1)	186,119 (28.7)	
No procedure within 2 years	2,044,713 (61.9)	461,530 (71.3)	
Other specialist			0.01
Procedure within 2 years	243,889 (49.0)	45,986 (48.8)	
No procedure within 2 years	253,701 (51.0)	48,272 (51.2)	
General surgery	3,786,481 (60.3)	508,947 (53.9)	0.13
Primary care physician			0.13
Procedure within 2 years	3,420,854 (61.0)	447,564 (54.6)	
No procedure within 2 years	2,186,851 (39.0)	371,983 (45.3)	
Medical specialist			0.08
Procedure within 2 years	179,182 (58.4)	26,610 (54.3)	
No procedure within 2 years	127,794 (41.6)	22,428 (45.7)	
Surgical specialist			0.14
Procedure within 2 years	156,017 (51.4)	28,981 (44.6)	
No procedure within 2 years	147,301 (48.6)	36,039 (55.4)	
General surgeon			0.20
Procedure within 2 years	96,691 (55.0)	18,842 (45.2)	
No procedure within 2 years	79,043 (45.0)	22,799 (54.8)	
Other specialist			0.07
Procedure within 2 years	30,428 (53.4)	5,792 (56.8)	
No procedure within 2 years	26,560 (46.6)	4,408 (43.2)	
Gynecology	944,239 (23.7)	419,513 (16.2)	0.19
Primary care physician			0.21
Procedure within 2 years	803,152 (24.1)	352,956 (15.7)	
No procedure within 2 years	2,526,434 (75.9)	1,887,551 (84.2)	
Medical specialist			0.08
Procedure within 2 years	12,951 (18.5)	7,423 (15.6)	

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No procedure within 2 years	57,049 (81.5)	40,250 (84.4)	
Surgical specialist			0.06
Procedure within 2 years	122,827 (22.5)	56,763 (20.0)	
No procedure within 2 years	423,304 (77.5)	226,880 (80.0)	
Gynecologist			0.05
Procedure within 2 years	109,595 (22.0)	51,272 (20.0)	
No procedure within 2 years	389,474 (78.0)	205,538 (80.0)	
Other specialist			0.07
Procedure within 2 years	5,309 (17.0)	2,371 (14.5)	
No procedure within 2 years	25,920 (83.0)	13,988 (85.5)	
Ophthalmology	1,320,863 (25.8)	187,101 (21.1)	0.11
Primary care physician			0.09
Procedure within 2 years	847,094 (22.1)	124,609 (18.5)	
No procedure within 2 years	2,990,273 (77.9)	547,829 (81.5)	
Medical specialist			0.04
Procedure within 2 years	14,781 (8.7)	2,069 (7.5)	
No procedure within 2 years	155,623 (91.3)	25,420 (92.3)	
Surgical specialist			0.19
Procedure within 2 years	451,335 (42.2)	59,716 (33.0)	
No procedure within 2 years	617,577 (57.8)	121,475 (67.0)	
Ophthalmologist			0.20
Procedure within 2 years	445,317 (43.7)	59,147 (33.9)	
No procedure within 2 years	574,711 (56.3)	115,329 (66.1)	
Other specialist			0.21
Procedure within 2 years	7,653 (17.9)	707 (10.5)	
No procedure within 2 years	35,146 (82.1)	6,055 (89.5)	

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eTable 4. Number and percentage of referrals to male and female surgeons that resulted in surgery within 2 years of consultation, excluding endoscopic procedures.

Specialty	Patients referred to male surgeons	Patients referred to female surgeons	Standardized Difference
Overall	7,898,994 (25.9)	1,207,223 (21.2)	0.11
General surgery	1,740,444 (41.2)	251,990 (36.7)	0.09
Neurosurgery	94,678 (18.3)	5,512 (15.3)	0.08
Orthopedic surgery	1,185,798 (18.7)	59,577 (17.9)	0.02
Plastic surgery	980,420 (38.6)	170,686 (35.0)	0.08
Obstetrics/Gynecology	888,539 (22.7)	391,957 (15.3)	0.19
Ophthalmology	1,320,846 (25.8)	187,101 (21.1)	0.11
Otolaryngology	891,843 (17.2)	131,072 (19.6)	0.06
Urology	796,426 (30.9)	9,328 (20.0)	0.25

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eTable 5. Relative homophily by specialty of surgeon and referring physician

	Overall	**Primary Care Specialist**	**Medical Specialist**	**Surgical Specialist**	**Other Specialist**
All specialties	7.79	7.68	5.57	14.07	4.62
General surgery	5.53	5.65	3.45	8.53	6.12
Neurosurgery	0.98	-0.06	2.84	1.46	3.28
Orthopedic surgery	1.67	1.68	2.07	2.54	0.23
Plastic surgery	4.66	3.91	6.61	10.09	8.86
Obstetrics/Gynecology	10.55	10.92	8.23	8.58	6.21
Ophthalmology	3.77	3.33	4.21	6.80	3.42
Otolaryngology	3.75	3.69	6.42	4.78	1.93
Urology	0.90	1.01	0.59	0.46	1.92

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eTable 6. Multivariable analysis of the association between sex of the referring physician and rate of referrals made to male surgeons. Estimates are from a negative binomial regression of the annual number of referrals to male surgeons (offset = natural logarithm of total annual number of referrals), fit using generalized estimating equations to account for clustering by referring physician.

Characteristics	**Rate Ratio (RR)**	**95%CI**	**p-value**
Sex of referring physician	[Interaction, see below]	-	-
Specialty of referring physician	[Interaction, see below]	-	-
Year			
1997-2001	Reference	-	-
2002-2006	0.974	0.972-0.976	<0.0001
2007-2011	0.943	0.941-0.945	<0.0001
2012-2016	0.901	0.899-0.903	<0.0001
Average age of referring physician	1.000	1.000-1.000	0.013
Average number of years in practice	1.000	0.999-1.000	0.061
Proportion of patients by characteristics*			
Age >50	1.104	1.100-1.101	<0.0001
Male	1.173	1.167-1.179	<0.0001
ADG >10	1.036	1.028-1.044	<0.0001
RUB High-very high	0.979	0.973-0.986	<0.0001
Income – lowest two fifths	0.995	0.991-1.00	0.039
Average patient marginalization			
Interaction			<0.001
Primary care specialists			
Female specialists	Reference	-	-
Male specialists	1.054	1.051-1.058	-
Medical specialists			
Female specialists	Reference	-	-
Male specialists	1.030	1.020-1.039	-
Surgical specialists			
Female specialists	Reference	-	-
Male specialists	1.140	1.126-1.155	-
Other specialists			
Female specialists	Reference	-	-
Male specialists	1.042	1.034-1.051	-

*by 10% increments

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eTable 7. Results of stratified conditional logit discrete choice models

	Male referring physicians			*Female referring physicians*	
	Odds ratio	**95% CI**		**Odds ratio**	**95% CI**
Sex of surgeon					
Female	Reference	-		1.016	1.014-1.019
Male	1.320	1.318-1.322		Reference	-
Age of surgeon	0.995	0.995-0.995		0.990	0.990-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.001	1.001-1.001		1.004	1.004-1.004

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eTable 8. Results of sensitivity analysis of discrete choice models limited to most recent 5 years of data

	Male referring physicians			*Female referring physicians*	
	Odds ratio	**95% CI**		**Odds ratio**	**95% CI**
Sex of surgeon					
Female	Reference	-		0.949	0.946-0.953
Male	1.314	1.310-1.318		Reference	-
Age of surgeon	0.993	0.993-0.993		0.990	0.989-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.002	1.001-1.002
Surgeon's years in practice	1.000	1.000-1.000		1.000	0.999-1.000

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eTable 9. Sensitivity analysis excluding one specialty at a time from discrete choice models to ensure results robust to latent occupational segregation within specialties

	Male referring physicians			*Female referring physicians*	
	Odds ratio	**95% CI**		**Odds ratio**	**95% CI**
Excluding General Surgery					
Sex of surgeon					
Female	Reference	-		1.018	1.016-1.021
Male	1.292	1.290-1.295		Reference	-
Age of surgeon	0.994	0.993-0.994		0.987	0.986-0.989
Difference in age between surgeon and referring physician	1.000	0.999-1.000		0.999	0.998-1.001
Surgeon's years in practice	1.002	1.002-1.002		1.006	1.006-1.007
Excluding Neurosurgery					
Sex of surgeon					
Female	Reference	-		1.015	1.013-1.018
Male	1.323	1.321-1.325		Reference	-
Age of surgeon	0.995	0.994-0.995		0.990	0.989-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.001	1.001-1.001		1.004	1.004-1.004
Excluding Orthopedic Surgery					
Sex of surgeon					
Female	Reference	-		1.003	1.000-1.005
Male	1.329	1.326-1.331		Reference	-
Age of surgeon	0.995	0.995-0.995		0.989	0.989-0.989
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.000	1.000-1.000		1.003	1.003-1.003
Excluding Plastic Surgery					
Sex of surgeon					
Female	Reference	-		1.012	1.001-1.015
Male	1.328	1.326-1.330		Reference	-
Age of surgeon	0.995	0.995-0.995		0.990	0.989-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.001	1.001-1.001		1.004	1.004-1.004

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Excluding Obstetrics/Gynecology					
Sex of surgeon					
Female	Reference	-		0.999	0.996-1.001
Male	1.324	1.322-1.327		Reference	-
Age of surgeon	0.994	0.994-0.994		0.991	0.991-0.992
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.002	1.002-1.002		1.003	1.002-1.003
Excluding Ophthalmology					
Sex of surgeon					
Female	Reference	-		1.044	1.042-1.047
Male	1.308	1.305-1.310		Reference	-
Age of surgeon	0.996	0.995-0.996		0.990	0.990-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.002	1.002-1.002		1.006	1.006-1.006
Excluding Otolaryngology					
Sex of surgeon					
Female	Reference	-		1.012	1.010-1.014
Male	1.338	1.335-1.340		Reference	-
Age of surgeon	0.995	0.995-0.995		0.991	0.990-0.991
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.000	1.000-1.001		1.003	1.003-1.004
Excluding Urology					
Sex of surgeon					
Female	Reference	-		1.022	1.020-1.024
Male	1.314	1.312-1.316		Reference	-
Age of surgeon	0.995	0.995-0.995		0.990	0.990-0.990
Difference in age between surgeon and referring physician	1.000	1.000-1.000		1.000	1.000-1.000
Surgeon's years in practice	1.001	1.000-1.001		1.004	1.004-1.004

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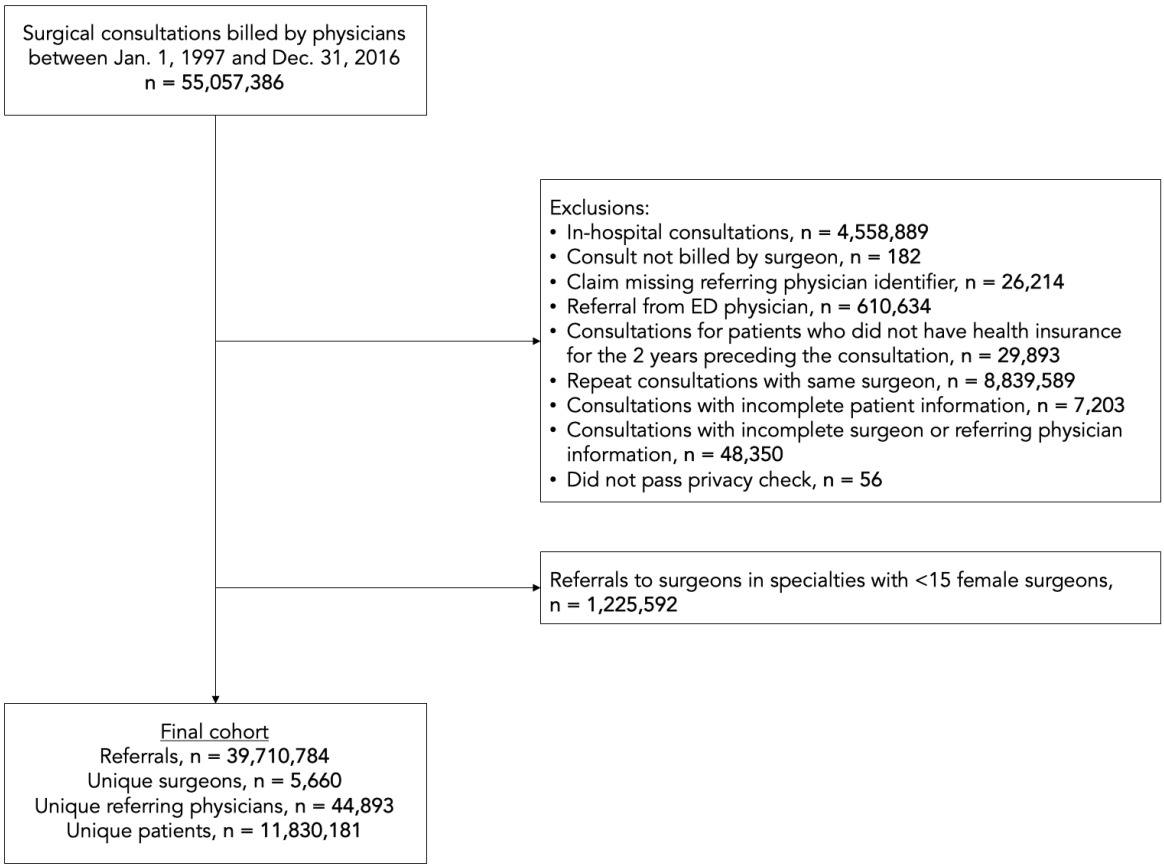
eFigure 1. Study flow diagram



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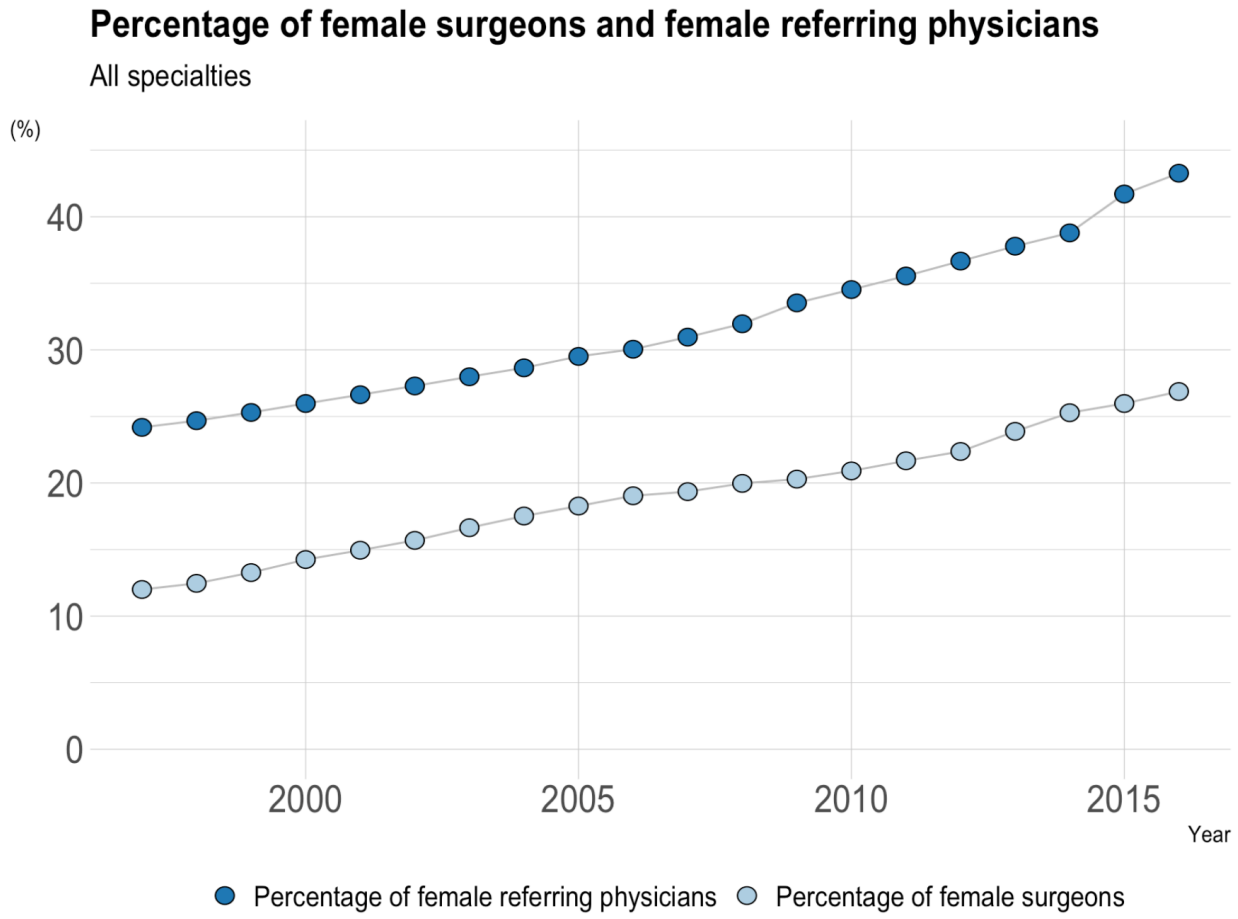
eFigure 2. Percentage of female surgeons and female referring physicians across the study period (all specialties). Cochran Armitage test for trend p-values <0.0001



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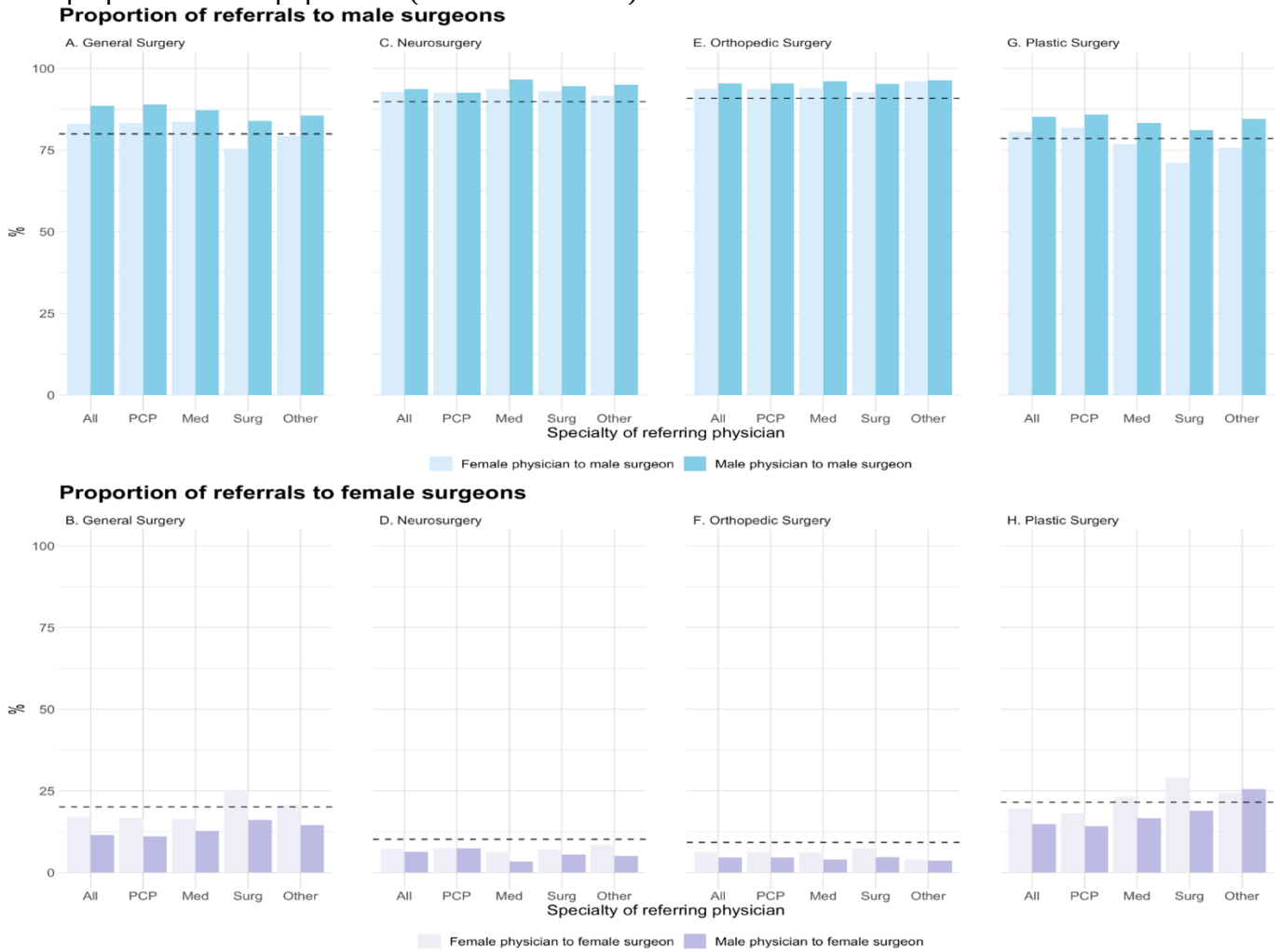
eFigure 3. Proportion of referrals from male and female physicians to male surgeons and female surgeons, by specialty area of the referring physician and specialty of surgeon. Dashed line represents the proportion of male and female surgeons in the population. Bars above the dashed line represent a greater proportion of referrals to male or female surgeons than their proportion in the population (i.e. over-referral). Bars below the dashed line represent a lower proportion of referrals to male or female surgeons than their proportion in the population (i.e. under-referral).



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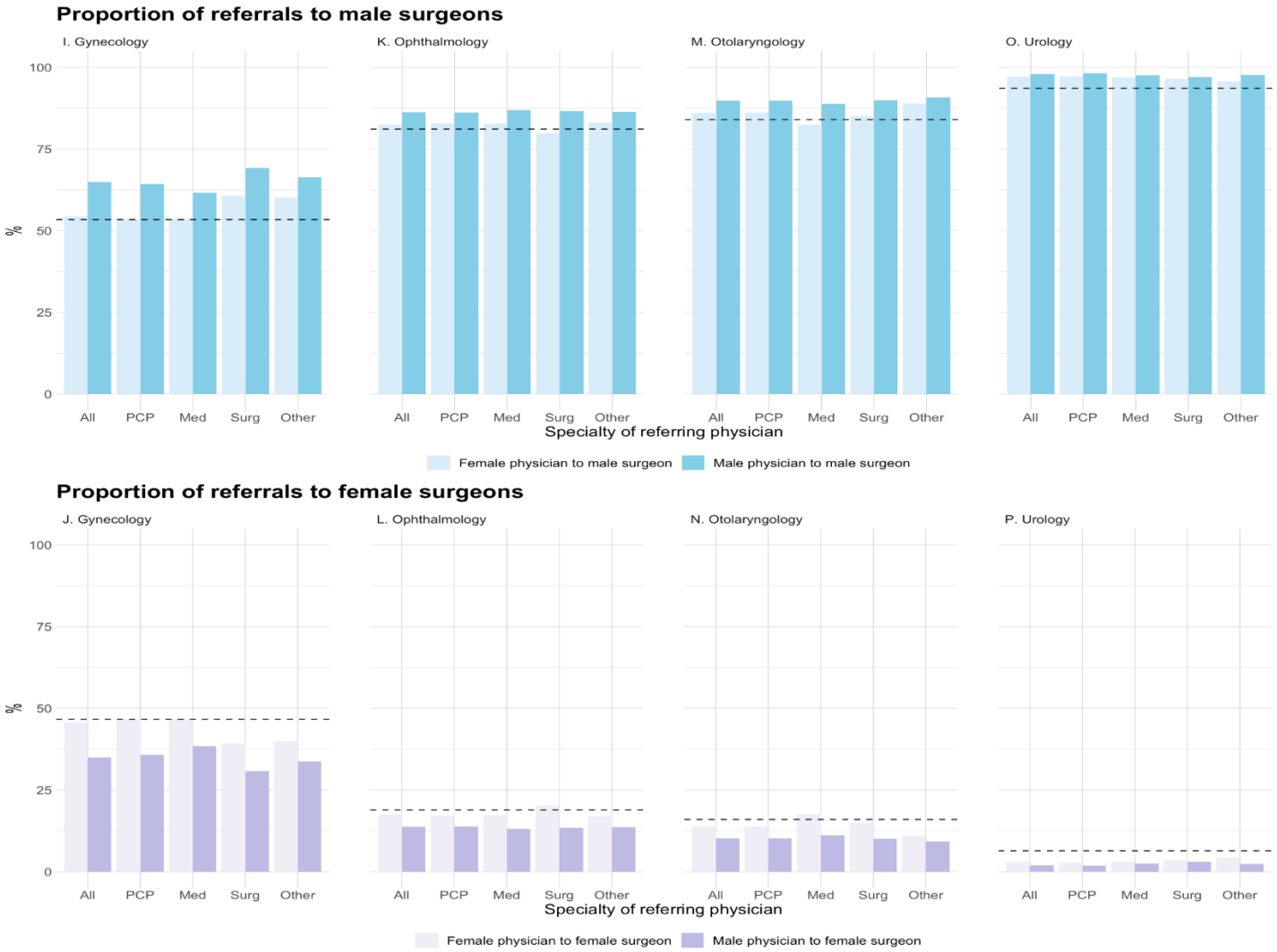

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