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## Perioperative opioid-prescribing practices of resident trainees compared with staff surgeons



**OBJECTIVE:** Little is known about the opioid-prescribing practices of surgical trainees. Our objective was to evaluate the opioid prescriptions of resident trainees compared with academic and community staff surgeons following elective hysterectomy.

**STUDY DESIGN:** We performed a population-based cohort study using linked administrative data in Ontario, Canada,

where all dispensed prescription opioids are recorded, regardless of insurance status.<sup>1</sup> We included opioid-naïve women (age  $\geq 18$  years) who underwent elective hysterectomy between January 1, 2013 and March 31, 2019 and filled at least 1 opioid prescription in the perioperative period (day of hysterectomy to 7 days after). We excluded emergency surgeries, patients with malignancy, history of opioid toxicity, those who received opioids in the previous

**TABLE**  
Main outcomes in weighted sample

Prescriber	High-dosage opioid prescription		Total perioperative OME (mg)		OME value Recommended OME <sup>2</sup>
	Event rate (%)	Risk ratio (95% CI)	Mean $\pm$ SD	Mean difference (95% CI)	
All hysterectomies (N=20,352)					
Trainee <sup>a</sup>	6.0	Ref	144.59 $\pm$ 74.56	Ref	
All staff	11.3	1.35 (0.93–2.00)	164.59 $\pm$ 79.70	16.11 (7.53–24.95)	
Academic surgeon	7.4	1.22 (0.79–1.93)	157.60 $\pm$ 70.64	13.01 (1.85–25.77)	
Community surgeon	11.8	1.36 (0.91–2.02)	165.53 $\pm$ 80.80	16.75 (6.99–26.21)	
Minimally invasive hysterectomy (N=12,188)					
Trainee <sup>a</sup>	5.5	Ref	142.21 $\pm$ 72.47	Ref	<113 mg
All staff	10.0	1.25 (0.77–2.03)	160.81 $\pm$ 80.04	15.85 (5.43–25.84)	
Academic surgeon	6.7	1.22 (0.67–2.06)	158.91 $\pm$ 71.65	16.70 (3.93–28.94)	
Community surgeon	10.5	1.26 (0.78–2.04)	160.91 $\pm$ 81.59	15.66 (4.73–27.08)	
Open hysterectomy (N=8,164)					
Trainee <sup>a</sup>	7.1	Ref	149.49 $\pm$ 78.59	ref	<150 mg
All staff	13.2	1.46 (0.96–2.29)	170.29 $\pm$ 78.91	15.21 (2.73–26.98)	
Academic surgeon	8.9	1.25 (0.75–2.00)	154.65 $\pm$ 68.82	5.16 (–8.85 to 20.44)	
Community surgeon	13.7	1.48 (0.94–2.38)	172.35 $\pm$ 79.29	17.17 (5.01–29.17)	

CI, confidence interval; mg, milligrams; OME, oral morphine equivalent; ref, reference interval; SD, standard deviation.

<sup>a</sup> The trainee referent group weights differ for the 2 pairwise comparisons. The data presented above are from the weighted comparison of the trainees vs academic staff.

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year, and those who underwent additional surgery in the 30 days preceding hysterectomy. The exposure was the opioid prescriber (trainee vs academic or community surgeon) for the opioid prescription filled on or closest to the date of surgery. The primary outcome was high-dosage opioid prescription, defined as >225 mg total oral morphine equivalents (OME), equivalent to >30 5 mg oxycodone tablets, well above the recommended total dosage following hysterectomy.<sup>2</sup> We conducted 3 pairwise comparisons, in which the trainees were compared with all the staff and each of the 2 staff groups. To account for confounding, we used inverse probability of treatment weighting where we generated a propensity score using multiple logistic regression for being in a given prescriber group regressed on the baseline covariates.<sup>3</sup> Observations were weighted according to the inverse of the calculated probability of being in the given prescriber group. In the weighted sample, we reported the risk ratios and mean differences (MDs). We estimated the 95% confidence intervals (CIs) using nonparametric percentiles from 2000 bootstrapped samples using sampling that accounted for clustering within prescribers.<sup>4</sup> Use of the study data was authorized by Ontario's Personal Health Information Protection Act and did not require Research Ethics Board review.

**RESULTS:** We included 20,352 patients who filled a perioperative opioid prescription (4362 [21.4%] written by trainees, 1727 [8.5%] by academic surgeons, and 14,263 [70.1%] by community surgeons). After weighting, the baseline covariates were balanced between the prescriber groups ([Supplemental Table](#)). High-dosage opioid prescriptions were filled by 2091 (10.3%) patients. There was no difference in the risk of receiving a high-dosage opioid prescription written by a staff surgeon vs that of receiving a prescription by a trainee [risk ratio (RR) 1.35; 95% CI, 0.93–2.00]; there was also no difference between academic surgeon vs trainee (RR 1.22; 95% CI, 0.79–1.93) nor between community surgeon vs trainee (RR 1.36; 95% CI, 0.91–2.02). The findings were consistent in the subgroup analyses for minimally invasive and open hysterectomy ([Table](#)). Staff surgeons, from both the academic and community sites, prescribed more opioid quantities (mean difference in OMEs) than the trainees: MD 16.11 mg; 95% CI, 7.53–24.95.

**CONCLUSION:** Trainees wrote >20% of the hysterectomy-associated opioid prescriptions. The high-dosage opioid prescriptions were similar between the trainees and staff. Although trainees prescribed statistically lower opioid dosages, the clinical significance of the approximately 2 fewer 5 mg oxycodone pills per patient is uncertain. A limitation of evaluating the trainee prescribing practices is the unknown influence of supervising attendings on trainee prescriptions. Nonetheless, prudent perioperative opioid prescribing is a shared responsibility of staff and trainees alike and should be integrated into medical education. ■

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## SUPPLEMENTAL TABLE

## Baseline characteristics of patients after inverse probability of treatment weighting

Characteristics	Trainee vs all staff surgeons			Trainee vs academic surgeon			Trainee vs community surgeon		
	Trainee (N = 4362)	All staff (N = 15,990)	St Diff	Trainee (N = 4362)	Academic surgeon (N = 1727)	St Diff	Trainee (N = 4,362)	Community surgeon (N = 14,263)	St diff
Age (y), mean±SD	47.97±10.55	48.04±10.34	0.01	49.39±10.87	49.46±11.80	0.01	47.61±10.87	47.87±11.80	0.03
Charlson index (%)									
0	6.2%	5.8%	0.02	6.6%	6.7%	0.00	5.9%	5.7%	0.01
1	0.5%	0.6%	0.00	0.8%	0.7%	0.01	0.5%	0.5%	0.01
2	0.2%	0.1%	0.02	0.2%	0.3%	0.01	0.2%	0.1%	0.01
≥3	0.1%	0.1%	0.01	0.1%	0.1%	0.00	0.0%	0.1%	0.02
No hospitalizations	93.0%	93.4%	0.02	92.3%	92.3%	0.00	93.5%	93.6%	0.01
Comorbidities (%)									
Any mental health diagnosis	29.6%	30.7%	0.02	32.7%	33.0%	0.01	28.9%	30.3%	0.03
Substance use disorder	1.1%	1.0%	0.01	1.3%	1.2%	0.00	1.0%	1.0%	0.00
Psychotic disorder	1.8%	1.9%	0.00	2.1%	2.3%	0.01	1.9%	1.9%	0.00
Mood disorder	6.3%	6.6%	0.01	7.3%	7.6%	0.01	6.0%	6.4%	0.02
Anxiety disorder	24.4%	24.9%	0.01	26.3%	26.3%	0.00	23.9%	24.6%	0.02
Income quintile (%)									
1st	17.5%	16.4%	0.03	15.9%	15.7%	0.00	17.9%	16.4%	0.04
2nd	20.2%	19.8%	0.01	19.5%	19.6%	0.00	20.3%	19.9%	0.01
3rd	19.0%	20.9%	0.05	20.6%	20.6%	0.00	18.7%	21.0%	0.06
4th	22.2%	22.1%	0.00	21.7%	22.0%	0.01	22.3%	22.1%	0.00
5th	21.0%	20.8%	0.00	22.3%	22.0%	0.01	20.8%	20.5%	0.01
Rural residence (%)	13.9%	13.3%	0.02	9.3%	9.2%	0.00	14.6%	13.5%	0.03
Minimally invasive hysterectomy (%)	65.3%	60.2%	0.11	67.2%	69.2%	0.04	64.4%	59.6%	0.10
Surgery duration quintile (%)									
1st	20.1%	19.6%	0.01	8.3%	8.1%	0.01	21.9%	20.5%	0.04
2nd	20.5%	20.4%	0.00	11.7%	11.4%	0.01	21.1%	20.7%	0.01

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(continued)

## SUPPLEMENTAL TABLE

## Baseline characteristics of patients after inverse probability of treatment weighting (continued)

Characteristics	Trainee vs all staff surgeons			Trainee vs academic surgeon			Trainee vs community surgeon		
	Trainee (N = 4362)	All staff (N = 15,990)	St Diff	Trainee (N = 4362)	Academic surgeon (N = 1727)	St Diff	Trainee (N = 4,362)	Community surgeon (N = 14,263)	St diff
3rd	19.0%	19.2%	0.01	16.0%	15.4%	0.02	18.9%	19.3%	0.01
4th	19.3%	19.6%	0.01	25.1%	24.2%	0.02	18.6%	19.5%	0.02
5th	20.1%	20.1%	0.00	37.5%	39.3%	0.04	18.4%	19.0%	0.02
Diagnosis (%)									
Abnormal uterine bleeding	52.1%	50.8%	0.02	41.2%	40.5%	0.01	54.6%	52.2%	0.05
Prolapse	27.1%	26.0%	0.02	32.4%	32.4%	0.00	25.3%	25.0%	0.01
Pelvic inflammatory disease	6.4%	7.1%	0.03	25.7%	25.3%	0.01	28.4%	27.1%	0.03
Pain or endometriosis	27.8%	27.2%	0.01	1.3%	1.4%	0.01	1.9%	1.7%	0.01
Postmenopausal issues	1.8%	1.7%	0.01	42.2%	43.8%	0.03	43.7%	45.1%	0.03
Fibroids	43.2%	44.3%	0.02	11.2%	11.6%	0.01	13.5%	13.3%	0.01
Ovarian mass or cysts	12.8%	12.9%	0.00	41.2%	40.5%	0.01	54.6%	52.2%	0.05
Length of hospital stay (d), mean±SD	1.81±1.01	1.78±0.97	0.03	1.55±1.02	1.51±0.88	0.04	1.88±1.05	1.81±0.99	0.07

SD, standard deviation; St Diff, standardized difference.

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