

Opioid prescription patterns among urologists as compiled from within Medicare

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Abstract

Introduction: We aimed to evaluate opioid prescribing patterns of urologists across the United States (U.S.) and the District of Columbia (D.C.) using publicly available data from Medicare Part D. Our secondary analysis was to identify any loco-regional trends that may exist within the U.S.

Methods: We queried publicly reported information from the Part D prescriber database, which is compiled from beneficiaries enrolled within the Medicare Part D prescription drug program. Only providers with the specialty description of urologist were included in this study.

Results: Between 2013 and 2017, a five-year average of 452 901 opioid claims by 9640 urologists — amounting to \$5 357 114 USD and comprising 3.78% of all claims made — were identified. The state of Maine featured the highest percentage of opioid claims in relation to all claims (5.81%). West Virginia had the greatest average total opioid claims per provider (90), while Michigan featured the highest average proportion of opioid claims per provider (10.63%). The fewest opioid claims were processed within the Mid-Atlantic and New England regions.

Conclusions: A multitude of factors likely contributes to variability between states. Urologists should be increasingly aware of their individual prescription tendencies and use available drug monitoring programs to reduce unnecessary prescriptions, all while providing more targeted and appropriate pain management.

Introduction

In 2017, the United States Department of Health and Human Services (HHS) declared the U.S. to be within the midst of a nationwide opioid crisis.¹ During the same year, according to the Centers for Disease Control and Prevention (CDC), as many as 20% of all patients were given either acute (≤ 3

months' duration) or chronic (>3 months' duration) pain-related diagnoses (excluding cancer-related pain).² Despite advocacy for reduced opioid prescribing by a variety of stakeholders, unnecessary prescribing remains rampant.³⁻⁵

Within the field of urology, the overuse of opioid prescribing is well-documented. Recent estimates suggest as much as 60% of post-procedural opioids going unused, furthering the potential for misuse and abuse.⁶⁻⁸ In conjunction with CDC recommendations, the American Urological Association (AUA) has published a unifying position statement, recommending limits of 50 morphine milligram equivalents (MME) for fewer than seven days. Furthermore, the association has recommended urologists dispense the fewest number of opioid prescriptions and use the least potent modalities possible while addressing postoperative pain.^{3,9} Given that a majority of outpatient urology encounters involve some degree of pain and subsequent pain management, understanding contemporary opioid prescribing patterns is essential to optimize clinical protocols, evaluate policy efforts, and mitigate risk for both patients and their healthcare providers.¹⁰⁻¹³ Although the persistence of unnecessary opioid prescribing has been well-documented within urology literature, there remains a dearth of information describing regional variations in prescribing practices. Variations in opioid-related practice patterns across hospitals, states, and regions may provide insight into best practices for responsible pain management protocols and help appraise the efforts of local and state policy interventions to help curb the opioid epidemic.

The goals of the present study were to evaluate regional trends and practice variations in opioid prescribing patterns among urologists having submitted claims to the Center for Medicare and Medicaid services Part D program. We hypothesized that opioid prescriptions by urologists were higher in years prior to 2017, compared to the year 2017, when the national opioid crisis was declared.

Methods

Dataset

Data was compiled and extracted from the publicly available Medicare Part D prescription drug program public use files (PUF) for the years 2013–2017. The Medicare dataset was selected, in part, for its wide variety of variables related to state, local, and individual provider-level prescription patterns, in concordance with previously published methodologies in other surgical subfields.^{14–19} These data sets include approximately 70% of all Medicare Part D beneficiaries. Medical providers identified with the specialty descriptor of urologist were incorporated into our analysis. We excluded data from unincorporated territories: Puerto Rico, Marshall Islands, American Samoa, Guam, and U.S. Virgin Islands.

Variables

Variables included were year, state, National Provider Identifier (NPI), total claim count, total drug cost, total day supply, beneficiary count, opioid claim count, opioid drug cost, opioid day supply, and beneficiary count.

State-level and regional analysis

States were organized into regions within the CMS database (Fig. 1). These regions were East North Central: Illinois (IL), Indiana (IN), Michigan (MI), Ohio (OH), Wisconsin (WI);

East South Central: Alabama (AL), Kentucky (KY), Mississippi (MS), Tennessee (TN); Mid-Atlantic: New Jersey (NJ), New York (NY), Pennsylvania (PA); Mountain: Arizona (AZ), Colorado (CO), Idaho (ID), Montana (MT), New Mexico (NM), Nevada (NV), Utah (UT), Wyoming (WY); New England: Connecticut (CT), Massachusetts (MA), Maine (ME), New Hampshire (NH), Rhode Island (RI), Vermont (VT); Pacific: Alaska (AK), California (CA), Hawaii (HI), Oregon (OR), Washington (WA); South Atlantic: District of Columbia (D.C.), Delaware (DE), Florida (FL), Georgia (GA), Maryland (MD), North Carolina (NC), South Carolina (SC), Virginia (VA), West Virginia (WV); West North Central: Iowa (IA), Kansas (KS), Minnesota (MN), Missouri (MO), North Dakota (ND), Nebraska (NE), South Dakota (SD); West South Central: Arkansas (AR), Louisiana (LA), Oklahoma (OK), Texas (TX). Frequency and cost data were calculated in each state and then aggregated into the corresponding region. In addition, a five-year trend analysis was performed across the different regions for both the claim counts and the associated cost.

Care provider-level analysis

All data were aggregated using each unique NPI to calculate the averages per urologist, then the median of these averages was calculated across each region. Gender of the prescribing urologist was also evaluated. Prescribers who wrote fewer than 10 opioid prescriptions to Medicare Part D patients within a given calendar year are omitted from

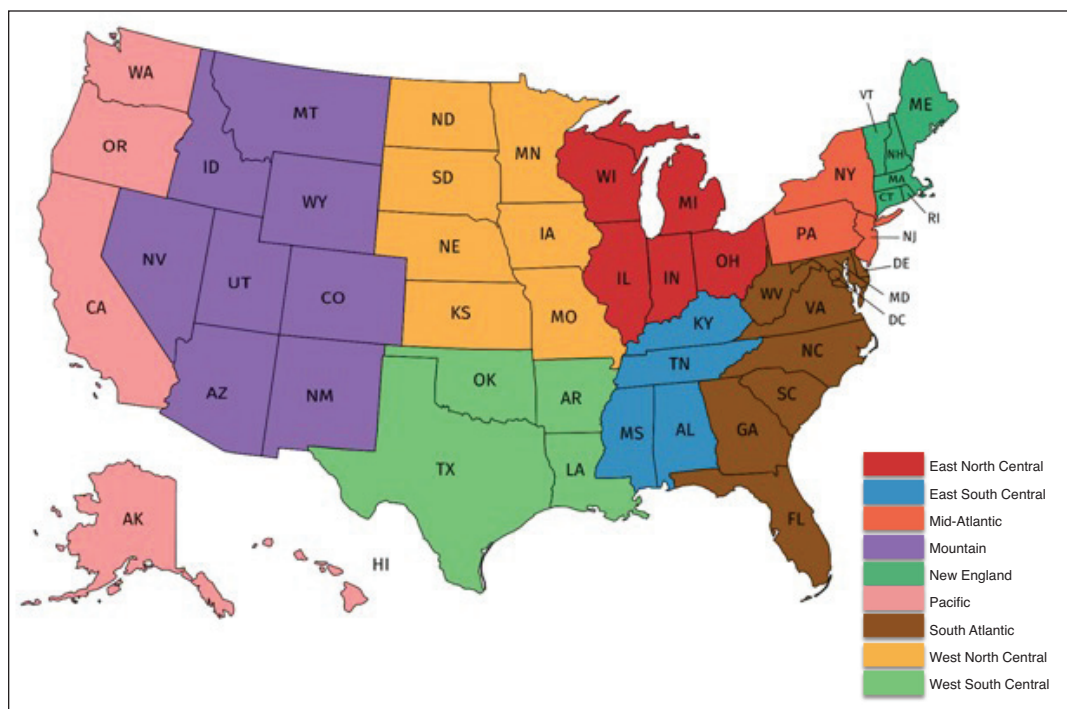


Fig. 1. Regions as defined within the Medicare Part D (PUF) database.

the database to preserve patient confidentiality and were, therefore, excluded from our analysis.

Correlating age-adjusted drug death rate by state with opioid claim count

Drug-related, age-adjusted death rates were obtained from the publicly available CDC WONDER database.²⁰ Averaged rates were based on the time frame 2013–2018. ICD-10s (International Classification of Diseases, 10th revision) for drug poisoning deaths were identified, including X40-49, X64, X85, and Y11-14.

Statistical analysis

Descriptive statistics are included as counts and percentages for categorical variables and as means and standard deviations (SD) for continuous variables. Pairwise Student t-test and Chi-squared tests were used as appropriate. A p-value < 0.05 was considered statistically significant. All analyses, graphs, and mappings were carried out using R 3.6.3 statistical software.

Results

Within a five-year average of opioid claims among urologists, a total of 335 421 beneficiaries (12.3% of all beneficiaries) made 452 901 opioid claims (3.78% of all prescription claims by urologists), amounting to a total cost of \$5 357 114 USD (0.46% of all costs for urologist prescriptions).

Five-year average regional trends in beneficiaries by state

From an individual state level, Florida, California, and Texas demonstrated the largest number of opioid claims (39 062 [3.82% of total claims], 37 580 [3.19%], and 31 044 [3.63%], respectively) and beneficiaries (30 348, 29 119, and 22 917, respectively) (Table 1). California distributed the greatest total opioid day supply of 246 193. D.C., Wyoming, and Vermont demonstrated the fewest number of opioid claims: 348 (3.37% of total claims), 474 (3.68%), and 535 (2.5%), respectively, with Alaska having the fewest beneficiaries with 231 (Table 1).

States with the highest percentage of opioid claims in relation to all claims included Maine (5.8%), Utah (5.79%), and Tennessee (5.51%). The lowest proportion of opioid claims were identified in New York (2.03%), Connecticut (2.19%), and Vermont (2.50%) (Fig. 2, Table 1).

The highest opioid drug costs were found in California (\$457 757), Florida (\$388 632), and Georgia (\$274 266) compared to Alaska (\$3355), Wyoming (\$4323), and D.C. (\$5000), which had the lowest (Fig. 2).

The greatest percentage of average proportional annual opioid costs were in West Virginia (1.7%), followed by South

Table 1. Five-year average opioid Medicare Part D claims by urologists, state-level data (2013–2017)

Region	State	Opioid claim count	Opioid claims as a proportion of total claims (%)
East North Central	IL	11 951	3.17
	IN	13 642	4.54
	MI	17 333	4.87
	OH	18 884	3.62
	WI	6683	3.76
	Total	68 492	3.95
East South Central	AL	12 945	5.43
	KY	9211	5.04
	MS	6388	4.57
	TN	18 237	5.51
Total	46 781	5.25	
Mid-Atlantic	NJ	10 440	2.52
	NY	15 008	2.03
	PA	17 254	3.09
Total	42 702	2.49	
Mountain	AZ	9685	4.09
	CO	5628	4.39
	ID	2623	5.13
	MT	1377	4.79
	NM	1936	4.04
	NV	3141	4.26
	UT	3139	5.79
	WY	474	3.68
	Total	28 004	4.42
	New England	CT	3709
MA		6964	2.85
ME		1570	5.81
NH		1393	3.45
RI		1657	2.6
VT		535	2.5
Total		15 829	2.8
Pacific	AK	344	4.74
	CA	37 580	3.19
	HI	1510	3.16
	OR	6729	4.52
	WA	8150	5.05
	Total	54 314	3.52
South Atlantic	DC	348	3.37
	DE	1394	3.25
	FL	39 062	3.82
	GA	21 089	5.2
	MD	5354	3.7
	NC	18 745	3.99
	SC	13 141	5.47
	VA	9269	3.83
	WV	4588	5.39
	Total	112 988	4.24

Table 1 (cont'd). Five-year average opioid Medicare Part D claims by urologists, state-level data (2013–2017)

Region	State	Opioid claim count	Opioid claims as a proportion of total claims (%)
West North Central	IA	3915	3.62
	KS	4058	3.69
	MN	7492	5.14
	MO	10 541	3.53
	ND	764	3.26
	NE	2122	3.2
	SD	838	3.02
	Total	29 728	3.81
West South Central	AR	5714	4.66
	LA	10 056	3.23
	OK	7248	4.56
	TX	31 044	3.63
	Total	54 062	3.73

Carolina (0.99%) and Kentucky (0.83%), whereas the lowest were in Illinois, Vermont, and New York (0.28%, 0.25%, and 0.22%, respectively) (Fig. 2).

Annual trends per urologist

A total of 9640 urologic providers were identified within the Medicare Part D database between 2013 and 2017. The mean opioid claim count per provider (five-year average) was 53 (SD: 52), with the greatest average for claims in the East South Central region (AL, KY, MS, TN) at 82 (SD 80), among 626 providers. The fewest average claim counts were similar within the Mid-Atlantic (NJ, NY, PA) and New England (CT, MA, ME, NH, RI, VT) regions at 37 and 38 (SD 43 and 31), among 1428 and 505 providers, respectively (Table 2).

West Virginia had the greatest average total opioid claim count per provider, 90, followed by South Carolina and

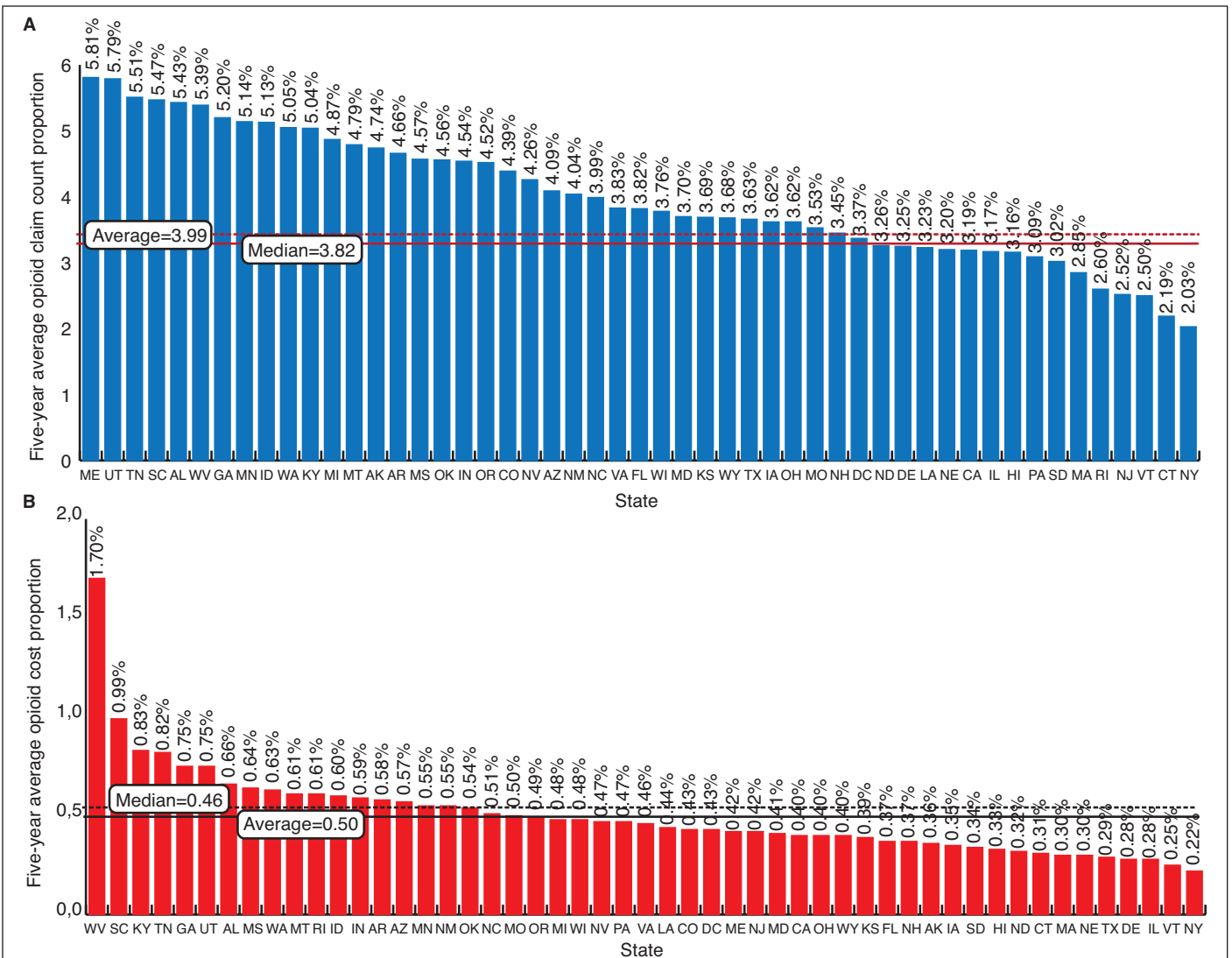


Fig. 2. (A) Five-year average annual opioid claim count by state. **(B)** Average annual opioid drug cost proportion by state.

Table 2. Five-year average opioid Medicare Part D claims per urologist, provider-level data (2013–2017)

Region	State	n	Opioid claim count	Opioid claim proportion to total claims (%)	Female (%)	Male (%)
Overall		9640	53 (52)	6.86 (9.18)	883 (9.2)	8756 (90.8)
East North Central	IL	403	38 (28)	8.85 (12.56)	46 (11.4)	357 (88.6)
	IN	213	75 (87)	6.32 (6.59)	16 (7.5)	197 (92.5)
	MI	375	55 (65)	10.63 (12.21)	47 (12.5)	328 (87.5)
	OH	385	57 (39)	7.18 (9.82)	29 (7.5)	356 (92.5)
	WI	188	44 (32)	9.58 (13.50)	27 (14.4)	161 (85.6)
East South Central	AL	165	86 (54)	7.04 (5.46)	14 (8.5)	151 (91.5)
	KY	135	73 (74)	8.31 (9.13)	17 (12.6)	118 (87.4)
	MS	84	86 (56)	5.76 (4.15)	5 (6.0)	79 (94.0)
	TN	242	83 (102)	8.57 (10.19)	25 (10.3)	217 (89.7)
Mid-Atlantic	NJ	319	38 (25)	4.00 (7.05)	17 (5.3)	302 (94.7)
	NY	657	31 (34)	4.83 (7.73)	44 (6.7)	613 (93.3)
	PA	452	45 (59)	6.84 (11.15)	43 (9.5)	408 (90.3)
Mountain	AZ	192	57 (36)	6.96 (7.30)	17 (8.9)	175 (91.1)
	CO	148	44 (25)	8.62 (12.18)	18 (12.2)	130 (87.8)
	ID	47	62 (32)	5.47 (3.00)	5 (10.6)	42 (89.4)
	MT	33	49 (21)	7.21 (6.35)	3 (9.1)	30 (90.9)
	NM	45	50 (38)	5.63 (5.32)	8 (17.8)	37 (82.2)
	NV	53	67 (48)	5.60 (4.63)	5 (9.4)	48 (90.6)
	UT	61	59 (41)	7.89 (6.83)	5 (8.2)	56 (91.8)
	WY	14	38 (16)	3.86 (1.54)	0 (0.0)	14 (100.0)
New England	CT	122	37 (27)	3.46 (4.18)	10 (8.2)	112 (91.8)
	MA	222	37 (27)	7.03 (10.38)	25 (11.3)	197 (88.7)
	ME	38	46 (32)	5.96 (2.94)	2 (5.3)	36 (94.7)
	NH	55	29 (15)	5.79 (6.28)	10 (18.2)	45 (81.8)
	RI	46	48 (58)	6.29 (7.74)	6 (13.0)	40 (87.0)
	VT	22	31 (25)	3.79 (4.21)	3 (13.6)	19 (86.4)
Pacific	AK	19	23 (14)	7.04 (5.90)	2 (10.5)	17 (89.5)
	CA	974	45 (34)	6.74 (10.09)	115 (11.8)	859 (88.2)
	HI	39	46 (30)	4.14 (3.08)	7 (17.9)	32 (82.1)
	OR	126	56 (31)	6.79 (9.43)	20 (15.9)	106 (84.1)
	WA	201	46 (25)	7.94 (7.57)	31 (15.4)	170 (84.6)
South Atlantic	DC	28	20 (10)	7.06 (8.58)	5 (17.9)	23 (82.1)
	DE	28	54 (37)	3.84 (2.40)	3 (10.7)	25 (89.3)
	FL	678	63 (49)	6.38 (7.62)	32 (4.7)	646 (95.3)
	GA	280	81 (73)	7.48 (7.03)	20 (7.1)	260 (92.9)
	MD	191	33 (44)	7.45 (11.86)	19 (9.9)	172 (90.1)
	NC	321	64 (56)	6.36 (7.18)	19 (5.9)	302 (94.1)
	SC	148	89 (107)	7.02 (6.94)	9 (6.1)	139 (93.9)
	VA	215	46 (33)	5.41 (5.77)	12 (5.6)	203 (94.4)
West North Central	WV	56	90 (111)	7.55 (7.24)	2 (3.6)	54 (96.4)
	IA	87	53 (36)	7.14 (8.70)	8 (9.2)	79 (90.8)
	KS	88	50 (29)	5.57 (5.98)	4 (4.5)	84 (95.5)
	MN	169	48 (29)	8.46 (7.28)	20 (11.8)	149 (88.2)
	MO	182	62 (44)	9.15 (13.36)	16 (8.8)	166 (91.2)
	ND	19	44 (26)	4.50 (3.77)	1 (5.3)	18 (94.7)
	NE	55	41 (22)	7.04 (10.14)	5 (9.1)	50 (90.9)
	SD	29	40 (35)	6.20 (9.05)	2 (6.9)	27 (93.1)

Table 2 (cont'd). Five-year average opioid Medicare Part D claims per urologist, provider-level data (2013–2017)

Region	State	n	Opioid claim count	Opioid claim proportion to total claims (%)	Female (%)	Male (%)
West South Central	AR	67	88 (65)	5.12 (3.00)	3 (4.5)	64 (95.5)
	LA	177	61 (47)	5.39 (8.05)	16 (9.0)	161 (91.0)
	OK	119	68 (56)	8.75 (11.02)	7 (5.9)	112 (94.1)
	TX	628	53 (44)	6.21 (8.31)	58 (9.2)	570 (90.8)
p			<0.001	<0.001	0.015	

Arkansas (89 and 88, respectively). The states with the fewest average total opioid claims included the D.C, Alaska, and New Hampshire (20, 23, and 29 respectively) (Table 2).

When evaluating the proportion of opioid to total Medicare claims, providers in Michigan, Wisconsin, and Missouri had the highest average proportion at 10.63%, 9.58%, and 9.15%, respectively. Providers in Connecticut, Wyoming, and Vermont made up the three states with the lowest proportion of opioid to total Medicare claims (3.46%, 3.79%, and 3.86%, respectively) (Table 2).

The annual opioid claim count proportion across all nine regions appears relatively unchanged, with only a modest decrease noted over the five years queried (Fig. 3A). Despite this, the overall proportion of opioid costs appears to have decreased across all regions year over year (Fig. 3B).

Discussion

Opioid over-prescription and abuse has been well-documented across the U.S. for many decades. With as many as 80% of postoperative patients in the U.S. receiving an opiate and as few as 27% of them being used, a significant public health, financial, and medical gap in demand

and utility exists.⁶⁻⁸ Within the Medicare Part D prescriber database, we found that 3.78% of all urologist Medicare claims involve opioids, for a total of 452 901 claims and \$5 357 114. For perspective, among other surgical specialties within the same Medicare database, opioid prescription claims range from 3.6% among otolaryngologists to as high as 41.45% amongst neurosurgeons.^{17,21} This large variation across surgical subspecialties may be a result of differences in the acuity of patient populations treated. The variation may also be a function of specialty-specific practice patterns or differing levels of engagement and efforts put forward by regional and national professional societies.²²⁻²⁵

Significant geographic variability is evident when evaluating claims by provider, as well as by state. The states with the highest average proportion of opioid claims to all claims per provider included Michigan, Wisconsin, and Missouri at 10.63%, 9.58%, and 9.15%, respectively, compared to Connecticut, Wyoming, and Vermont, as the states with the lowest proportion of claims (3.46%, 3.79%, and 3.86%, respectively). This contrasts with the regions and states with the highest average of opioid claims per provider, which were predominantly within the West North Central and South Atlantic regions. Providers in West Virginia, South

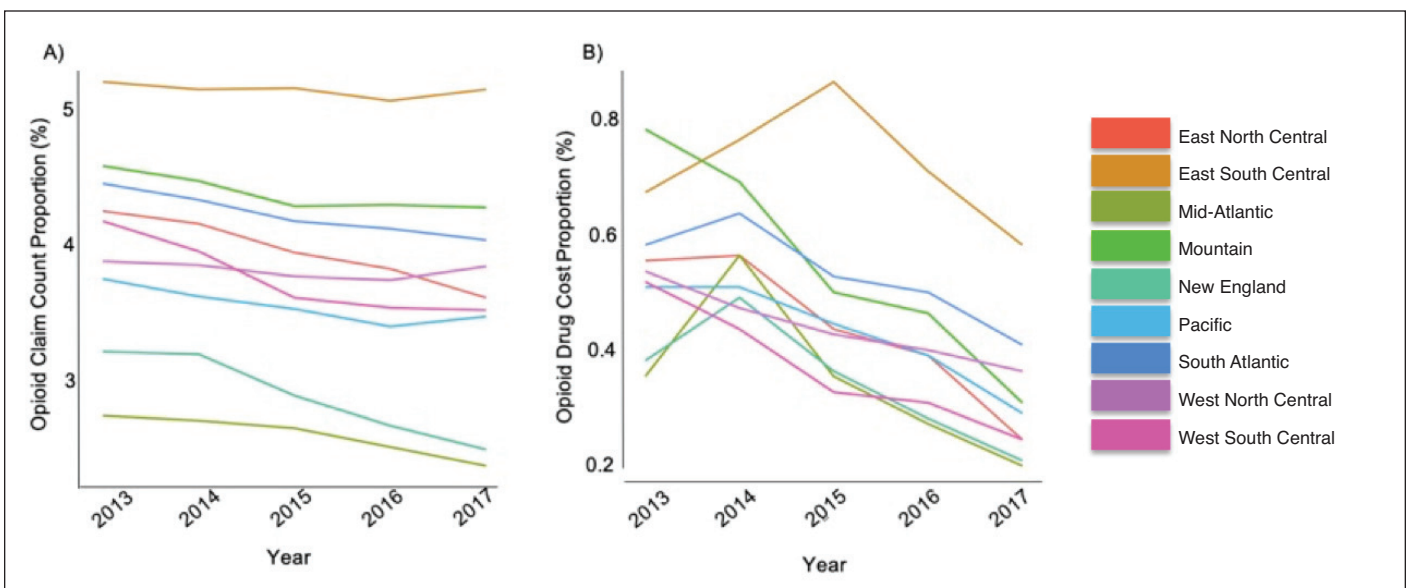


Fig. 3. (A) Annual opioid claim count proportions across the U.S. regions. **(B)** Annual opioid drug cost proportions across the U.S. regions.

Carolina, and Arkansas comprised the top three states with the highest average opioid claim per provider at 90, 89, and 88 claims, respectively. Loco-regional trends in prescriber habits, familiarity, or patient preference may all be contributing to this variation.

This pattern of states at highest risk is consistent with previously demonstrated patterns of opioid prescription behavior across multiple specialties.^{5-7,16-18,21,23} The exact impact of urologists contributing to this pattern is unclear. One speculative theory is that this region overlaps with the portion of the country at a higher risk for nephrolithiasis. Historically demonstrated to have an increased incidence of kidney stones, the colloquial “Stone Belt” portions of the south and eastern U.S., in particular North and South Carolina, Georgia, Alabama, Mississippi, and Tennessee, overlap with this region of increased opioid prescription prevalence.²⁶⁻²⁸ Higher incidences of calculi may predict more frequent encounters and subsequent demand for prescription pain control.

What is less clear is how providers from Michigan, Wisconsin, and Missouri had such high proportions of opioid claims, despite being geographically distant from the states West Virginia, South Carolina, and Arizona (which had the overall highest proportion of opioid claims). When evaluating individual states based on their opioid prescribing laws, we are unable to appreciate any significant legal precedent, as they vary drastically state by state. Despite widely accepted medical guidelines and suggested published limits, no general consensus exists in law or practice.^{19,23} As of 2019, over half of the states within the U.S. had some form of legal restriction on the duration and quantity of opioids for opioid-naïve or post-surgical patients. Most states have seven-day limits, with some states even stricter: five-day (NC, NJ, MN), three-day (KY), and four-day limits exclusive to acute dental or ophthalmic pain (MN).²⁹ Further variation is seen when evaluating the quantity of opioids prescribed. For example, Maine restricts the prescribed amount to 100 MME per day compared to Nevada, 90 MME/day, or Ohio, 30 MME/day; several other states have no amount restrictions at all. All of this variability exists despite CDC advocacy for less than 50 MME per day for seven-day therapy.^{2,3}

One consistency across all states (with the exception of Missouri) is the implementation and gradually increasing use of prescription drug monitoring programs (PDMPs) to monitor pharmaceutical prescriptions. Analysis among Medicare beneficiaries across 10 U.S. states by Moyo et al showed that pre- and post-PDMP use was associated with a decrease in the type, strength, and day supply of opioids.^{30,31} Further analysis using the Rhode Island PDMP demonstrated that significant cost savings, especially with regards to Medicare beneficiaries bearing the highest average cost of prescribed opioids, could be achieved through use of generic formulations, as well as reduced opioid use.³² Our data does demonstrate that in the

years preceding 2017, an average decrease of opioid prescriptions year over year across all regions occurred (Fig. 4B). This likely suggests that initiatives, as well as awareness surrounding opioid misuse and over-prescription were becoming increasingly widespread. Alternatively, this decrease in prescribing may be related to a nationwide shift towards minimally invasive procedures, which has been well-documented in the urological literature.^{33,34} Teasing apart the effects of such trends on indications for opioid use from the effects of regional and national awareness campaigns is an important avenue for future research. It is also possible that the crucial need to reduce opioid prescribing has been an impetus for the quick adoption of minimally invasive procedures with faster recovery times and fewer postoperative pain management considerations.

Study limitations

The Medicare database unfortunately only includes eligible individuals who are 65 years or older and does not account for patients who classify as self-pay or use private insurance. Classification for urologic providers within the Medicare Part D PUF files is also limited and does not separate by subspecialty, preventing identification of trends within certain subspecialties. Furthermore, we are unable to distinguish which procedures may have been performed and for what conditions, in relation to their pain and prescription duration needs. We cannot adequately evaluate the degree to which chronic vs. acute opioid prescriptions may be represented. Unfortunately, based on the structure and content within the Medicare Part D database, many of these limitations may be insurmountable for the scope of this study, however, do present interesting opportunities for future research through inquiry and cooperation with large insurance providers, health agencies, and providers.

Conclusions

Legislation, in addition to awareness of the degree of opioid over-prescription, appeared to be prevalent several years prior to the acknowledgement of the opioid crisis in the U.S. This suggests providers, including urologists, have recognized and gradually adjusted practice patterns accordingly to face this challenge. No clear correlation between region or state and prescription claims exists. This is likely because many different factors contribute to the variability in claims, including but not limited to each patient’s individual health status, prescriber habits, insurance coverage, loco-regional policies, and even manufacturer marketing. It is more prudent than ever that urologists implement responsible and reasonable treatment options for every patient, whether with opiates or alternative analgesics, when managing their acute or chronic urological pain.

Competing interests: The authors do not report any competing personal or financial interests related to this work.

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