

Incidence of Postoperative Opioid Use Disorder Following Major Surgery

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BACKGROUND:

The opioid crisis remains a public health emergency in the U.S. In a subset of surgical patients, perioperative opioid exposure is a pathway to persistent use and opioid use disorder (OUD). Opioid stewardship and public health programs have sought to decrease the incidence of OUD.

METHODS

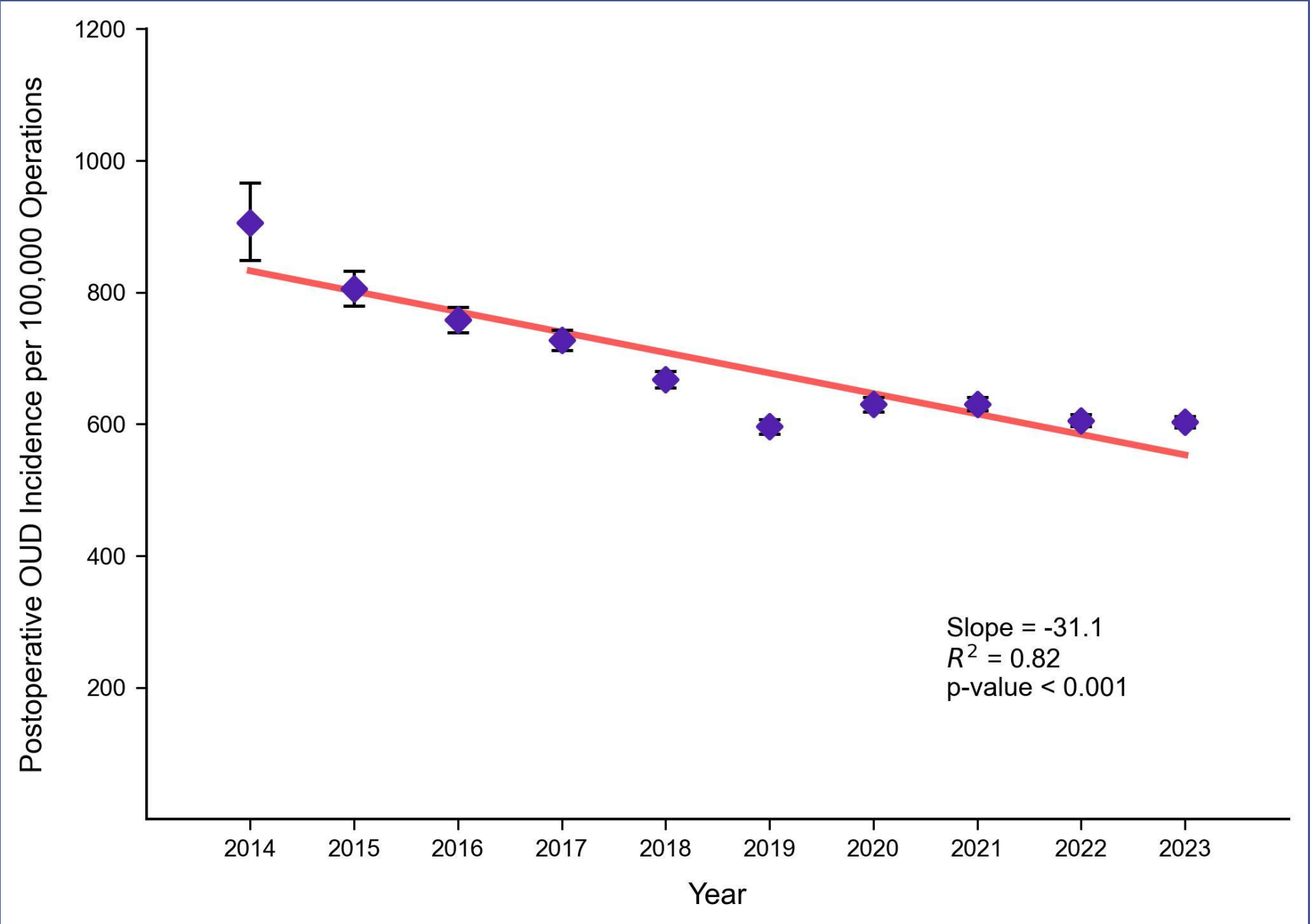
- Retrospective observational study using **Epic Cosmos**, a de-identified EHR research platform containing **300 million patients** from participating U.S. health systems.
- Adult patients** (≥18 years) undergoing 27 common surgical procedures identified by CPT codes between **2014–2024** were included.
- Outcome:** clinically documented **OUD** defined by ICD-10 F11 or SNOMED 75544000, **occurring 90 days to 2 years postoperatively**.
- Postoperative OUD incidence was reported per 100,000 operations with 95% confidence intervals (CI) calculated using the Wilson score method.
- Temporal trends were evaluated using linear regression of annual incidence rates, reporting slope, R², and P values.

Characteristics		Postoperative OUD		Total	P Value
		Without	With		
Total, No, (%)		13,294,649 (99.23%)	10,3715 (0.77%)	13,398,364	
Age at procedure (Mean ± SD)		53.8 ± 17.8	55.9 ± 15.4	53.8 ± 17.8	< 0.001
Legal Sex	Female	8,069,958 (60.70%)	60,302 (58.14%)	8,130,260 (60.68%)	< 0.001
	Male	5,222,409 (39.28%)	43,401 (41.85%)	5,265,810 (39.30%)	
	Unknown	2,282 (0.02%)	12 (0.01%)	2,294 (0.02%)	
Race	White	8,616,331 (64.81%)	71,091 (68.54%)	8,687,422 (64.84%)	< 0.001
	Black or African American	1,298,434 (9.77%)	11,509 (11.10%)	1,309,943 (9.78%)	
	Asian	249,885 (1.88%)	360 (0.35%)	250,245 (1.87%)	
	American Indian or Alaska Native	47,855 (0.36%)	644 (0.62%)	48,499 (0.36%)	
	Native Hawaiian or Other Pacific Islander	25,298 (0.19%)	97 (0.09%)	25,395 (0.19%)	
	Multiple Race	1,229,898 (9.25%)	12,051 (11.62%)	1,241,949 (9.27%)	
	Other Race	423,920 (3.19%)	1,491 (1.44%)	425,411 (3.18%)	
	Unknown	1,403,028 (10.55%)	6,472 (6.24%)	1,409,500 (10.52%)	
	Not Hispanic or Latino	10,478,521 (78.82%)	89,720 (86.51%)	10,568,241 (78.88%)	< 0.001
Ethnicity	Hispanic or Latino	1,076,885 (8.10%)	4,627 (4.46%)	1,081,512 (8.07%)	
	Unknown	1,739,243 (13.08%)	9,368 (9.03%)	1,748,611 (13.05%)	

Postoperative OUD incidence varied substantially by surgical procedure.

A significant downward trend in postoperative OUD incidence was observed over the 10-year period.

Operation Type	Postoperative OUD Rate Per 100,000 Operations (95% CI)	Postoperative OUD Cases	All Operations
Appendectomy	363.7 (349.0–379.1)	2,231	613,350
Bowel Resection	1,168.1 (1,102.7–1,237.4)	1,143	97,851
Bunion Surgery	680.2 (653.5–708.0)	2,381	350,047
Cervical/Lumbar Disc & Stenosis	1,175.5 (1,146.0–1,205.7)	5,888	500,913
Cesarean Section	210.1 (202.4–218.1)	2,738	1,303,228
Cholecystectomy	577 (565.2–589.1)	8,911	1,544,270
Colorectal Resection	870.2 (839.1–902.5)	2,870	329,809
CABG	521.4 (496.3–547.8)	1,569	300,909
Cystectomy	1,205.5 (1,020.7–1,423.2)	137	11,365
Gastrectomy	1,646.4 (1,430.8–1,893.8)	192	11,662
Heart Valve Replacement	522.5 (480.8–567.8)	552	105,654
Hernia Repair	573.8 (562.2–585.7)	9,154	1,595,283
Hip Arthroplasty	689.5 (670.9–708.7)	5,076	736,136
Hysterectomy	381.6 (372.0–391.4)	5,932	1,554,587
Joint Arthroscopy	637 (624.9–649.4)	10,347	1,624,290
Knee Arthroplasty	645 (631.0–659.3)	7,929	1,229,252
Lobectomy/Pneumonectomy	1,024.5 (952.1–1,102.3)	709	69,207
Lower Extremity Amputation	1,630.3 (1,550.8–1,713.7)	1,514	92,868
Mastectomy	382.2 (369.0–395.8)	3,117	815,585
Nephrectomy	643.8 (599.7–691.1)	758	117,744
Open Fracture Treatment	818.4 (804.1–833.0)	1,2181	1,488,344
Other Spine Surgery	1,516.3 (1,465.8–1,568.4)	3,304	217,906
Prostatectomy	254.2 (229.9–281.1)	378	148,682
Shoulder Arthroplasty	1,056.3 (1,014.8–1,099.5)	2,362	223,611
Spine Fusion	1,655.6 (1,624.0–1,687.9)	1,0137	612,279
Thyroidectomy	390.5 (368.7–413.6)	1,156	296,022
TURP	538.4 (506.9–571.9)	1,049	194,828



RESULTS:

- The final cohort included 16,185,682 operations,
- Postoperative OUD occurred after 103,715 operations, resulting in an **incidence of 640.8 per 100,000 operations** (95% CI, 636.9–644.7).
- The **highest procedure-specific incidence rates** were observed after **spine fusion** (1,655.6 per 100,000 operations; 95% CI, 1,624.0–1,687.9), **gastrectomy** (1,646.4; 95% CI, 1,430.8–1,893.8), and **lower extremity amputation** (1,630.3; 95% CI, 1,550.8–1,713.7).
- Caesarean delivery had the lowest incidence** (210.1 per 100,000 operations; 95% CI, 202.4–218.1).
- Over the 10-year study period, annual postoperative OUD incidence declined, with a significant negative linear trend (slope –31.1; R² = 0.82; P < .001).

CONCLUSION:

Using multi-institutional, very large-scale EHR data, we provide updated overall and procedure-specific estimates of OUD incidence following major surgery and observed a significant decline in annual postoperative OUD incidence over 10 years.

These findings support continued opioid stewardship and targeted perioperative risk mitigation for higher-risk surgeries.

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