


Trends in Medical Expenditure and Resource Utilization Among Opioid, Benzodiazepine, Skeletal Muscle Relaxant, and Gabapentin Users: A Pooled Cross-Sectional Analysis from 2009-2019

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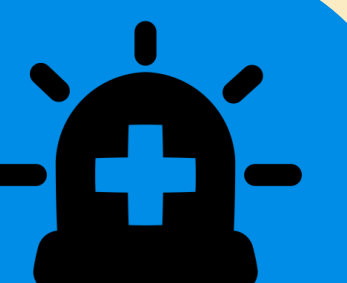
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Introduction




50.2M

- Number of adults in the United States suffer from chronic pain.¹
- Use of opioids as treatment for chronic pain has resulted in significant morbidity and mortality.²



74.8%

- The proportion of all deaths due to drug overdose involved an **opioid**.³
- Efforts have focused on reducing opioid use to mitigate these effects, and less on use of opioids with other harmful drugs, such as benzodiazepines, skeletal muscle relaxants, or gabapentin.



29.0%

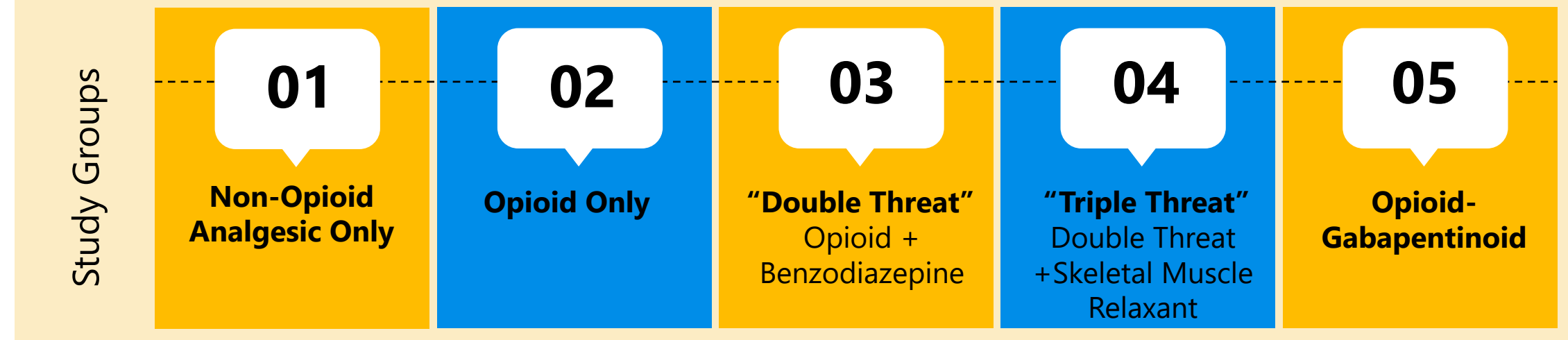
- For example, 29.0% of those who die from opioid overdose have evidence of concurrent benzodiazepine use.⁴ Those using opioids, benzodiazepines, and skeletal muscle relaxants are **nine times more likely** to use the Emergency Department than those who do not.⁵

It is largely **unknown** how trends in use of these combinations has shifted over time and how they differ for medical expenditure and resource utilization

Objectives

- To evaluate differences in healthcare expenditure and resource utilization among non-opioid analgesic, opioid-only, opioid + benzodiazepine (“double threat”), opioid + benzodiazepine + skeletal muscle relaxant (“triple threat”), and opioid-gabapentinoid (“opioid-gaba”) users from 2009-2019 among adults in the US
- To evaluate changes in healthcare expenditure and resource utilization over time between non-opioid analgesic, opioid-only, double threat, triple threat, and opioid-gaba users from 2009-2019 among adults in the US

Methods



- Medical Expenditure Panel Survey (MEPS) data were pooled from 2009-2019 to generate five study groups that were defined based on medications reported by adult (age > 18 years) participants during distinct survey periods per year (three periods/year).
- Study outcomes were evaluated comparing each distinct study group compared to the non-opioid analgesic group using the pooled data.

Primary Outcomes



Total Medical Expenditure

- Study groups were compared to the non-opioid analgesic group using a series of survey weighted two-part models; results reported as average marginal effects (\$)



Resource Utilization

- Study groups were compared to the non-opioid analgesic group using a series of survey weighted negative binomial regression models for each utilization category

Two-part models were performed using STATA's twopm package. All other analyses were performed using R (Boston, MA) with a significance level of 0.05. All models were adjusted for covariates.

Secondary Outcomes



Medical Expenditure Categories

- Study groups were compared to non-opioid analgesic users according to individual expenditure categories using the same methods for total medical expenditure



Average Yearly Changes from 2009-2019

- Study groups were evaluated for yearly changes in all study outcomes compared to the non-opioid analgesic only group using a series of linear regression models with an interaction term between study group and year.

Results

From 2009 to 2019, compared to the Non-Opioid Analgesic Only Group....

In total, 370,738 participants were pooled, representing a weighted **376.6 million lives:**

Non-Opioid Only	N = 18,214 (4.9%)
Opioid Only	N = 16,796 (4.5%)
Double Threat	N = 1,742 (0.47%)
Triple Threat	N = 439 (0.12%)
Opioid-Gaba	N = 1,230 (0.33%)

Interaction term regression coefficients :**p<0.05

+\$1,237**	Opioid-Gaba users had the highest yearly average increase in total medical expenditure
+\$98**	Opioid-only users had the highest yearly average increase in outpatient expenditure
+0.042**	Triple threat users had the highest average yearly increase in number of ED visits
+0.030**	Opioid-GABA users had the highest yearly increase in number of inpatient discharges and outpatient visits (+0.17**)
+0.22**	Opioid-only users had the highest average yearly increase in number of office-based visits

Figure 1: Number of participants per drug group per year

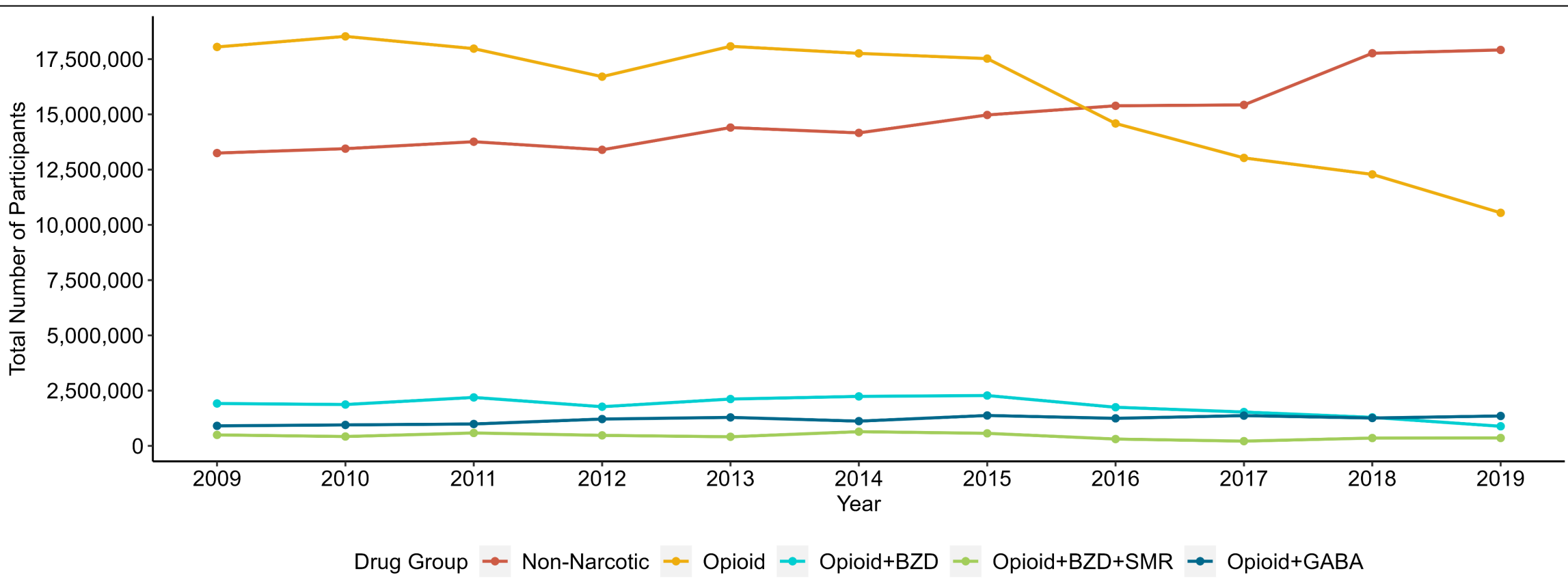


Figure 2: Average total medical expenditure per person per drug group per year

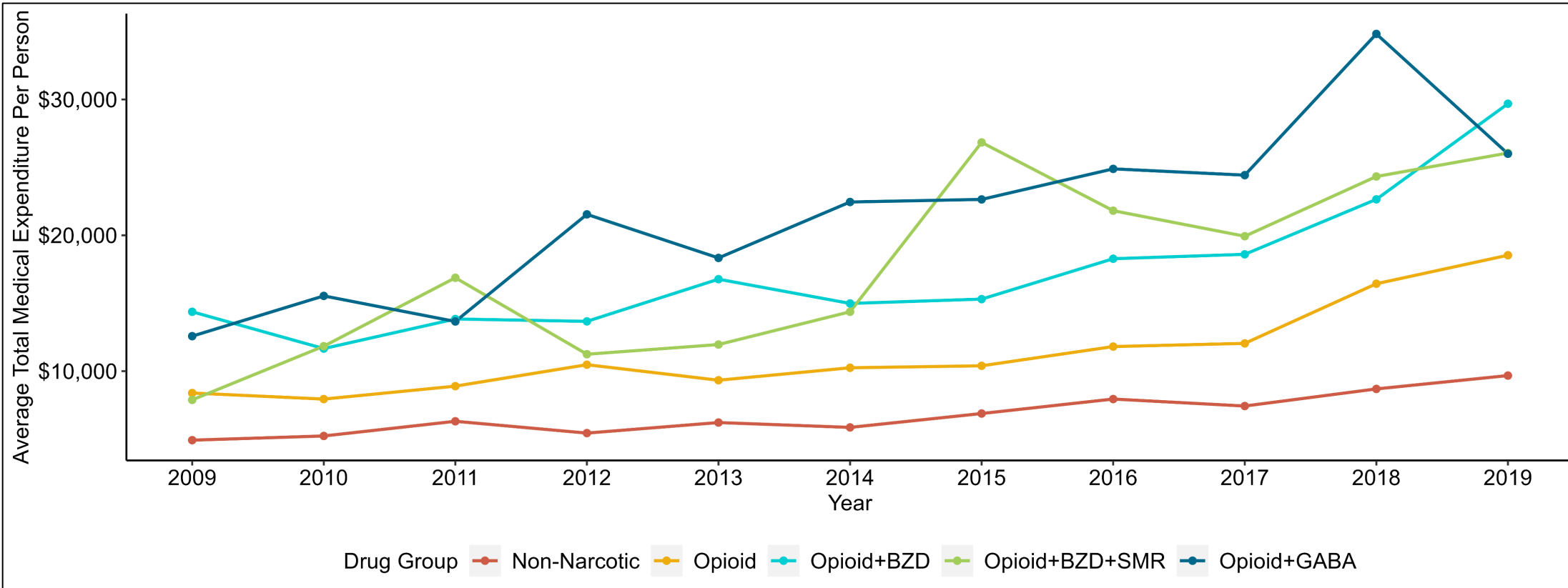


Table 1: Estimated Average Marginal Effects (\$) of Healthcare Expenditures and Incidence Rate Ratios of Resource Utilization Categories of Drug Groups compared to Non-Narcotic Only Users, 2009-2019

	Outcome	Opioid-Only	Double Threat	Triple Threat	Opioid-Gaba
Expenditures	Total Medical Expenditure	+5,228**	+8,789**	+9,878**	+11,684**
	Inpatient Expenditure	+1,918**	+2,594**	+2,665**	+3,897**
	Outpatient Expenditure	+950**	+699**	+518**	+687**
	Office-Based Visit Expenditure	+741**	+1,429**	+1,485**	+1,849**
	ED Expenditure	+253**	+322**	+397**	+258**
Resource Utilization	Prescription Drug Expenditure	+117**	+2,560**	+3,270**	+3,334**
	Number of Inpatient Discharges	2.02**	2.69**	2.39**	2.93**
	Number of Outpatient Visits	1.56**	1.80**	1.65**	2.02**
	Number of Office-Based Visits	1.24**	1.92**	2.12**	2.01**
	Number of ED Visits	1.68**	1.97**	1.97**	1.75**
	Number of Prescription Medications	0.94**	1.87**	2.74**	1.92**

**p<0.05

Conclusions

- Compared to non-analgesic users, the number of opioid users has gone down since 2015, but group expenditures have increased. This may have been driven by an increase in outpatient and office-based visits, suggesting a shift from more emergent care to proactive outpatient-based care.
- Double and triple threat users demonstrated very high rates of inpatient and ED use and expenditure compared to non-opioid only users. These patients may be older with lower socioeconomic status and have multiple comorbidities. We hypothesize these patients may be experiencing higher rates of adverse events due to compounded drug effects. Policies should focus on centralizing the management of these patients.
- Opioid-gaba users had the highest total medical expenditure compared to non-opioid users with exceedingly high inpatient use and prescription medication use. We hypothesize this drug combination may be gaining traction over time to supplant opioid use for chronic pain. The compounded effects of both drugs may also be associated with the rise in inpatient and ED use observed

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