

# Impact of opioid classifications and use on overall Medicaid expenditures among adult ( $\geq 21$ years) enrollees in Oklahoma

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## Background

- The use and cost of abuse-deterrent opioid formulations versus generic alternatives to reduce diversion is an area of concern and much debate.<sup>1-2</sup>
- However, little is known about the impact of opioid use (based on existing classifications) on overall Medicaid expenditures.<sup>3-5</sup>
- Areas of most concern and debate are:
  - How different opioid classified medications are used in patient care, and
  - The additional costs of these formulations.

## Objectives/Specific Aims

- Examine the relationship between overall Medicaid expenditures and brand abuse-deterrent or tamper-resistant extended-release opioids (ADTR) vs. similar generic alternatives (GA).
- Examine potential modifying and confounding effects of selected socio-demographic (age, gender and race/ethnicity), clinical (Charlson comorbidity scores [CCS], opioid dependence [OD], and comorbidities of addiction [CA]) and resource use factors (number of prescribers, prescriptions and ER visits).

## Methods

- A cross-sectional study design was used.
- Study participants were Oklahoma Medicaid enrollees ( $\geq 21$  years) with at least one paid pharmacy claim for long-acting opioids between September 2013 and August 2014.
- Enrollees who were classified as chronic pain patients were placed in either the ADTR or GA opioid groups if they had a proportion of days covered (PDC)  $\geq 0.6$  for products within that group.
- Descriptive statistics were used to summarize the distribution of demographics, Medicaid expenditures, and resource use by opioid type.
- Multivariable linear regression models were used to examine the relationship between overall Medicaid expenditures and type of opioids used while controlling for potential modifying and confounding factors.
- Cost outcomes (overall healthcare costs, medical costs and prescription costs) were log transformed to meet linear regression modeling assumptions.

## Results

**Table 1a. Descriptive Summary of Oklahoma Medicaid Enrollee Demographic, Healthcare Costs and Resource Use by Opioid Classification for September 2013 through August 2014**

	GA (N=541)	ADTR (N=397)	p-value <sup>4</sup>
<b>Demographics</b>			
Age : mean(SD) <sup>1</sup>	49(9)	50(10)	0.27
Male: n (%) <sup>2</sup>	196(36%)	151(38%)	0.57
Race: n (%) <sup>2</sup>			
Caucasian	461(85%)	311(78%)	0.03
African-American	41(8%)	48(12%)	
Asian	38(7%)	37(9%)	
Other[excluded]	1(<1%)	1(<1%)	
CCS: n (%) <sup>2</sup>			<0.01
0	278(51%)	159(40%)	
1	128(24%)	110(28%)	
2	49(9%)	60(15%)	
3	86(16%)	68(17%)	
Opioid Dependence: n(%) <sup>2</sup>			<0.01
No	473(87%)	370(93%)	
Yes	68(13%)	27(7%)	
PDC: Median (IQR) <sup>3</sup>	0.93(0.15)	0.97(0.05)	<0.01

<sup>1</sup>Independent sample t test <sup>2</sup>Chi-square test of independence <sup>3</sup>Wilcoxon independent two sample test <sup>4</sup>Non-significant variables not included in table: urban, comorbidities of addiction, number of overall prescribers, number of overall prescriptions, number of emergency department visits.

## Results

**Table 1b. Descriptive Summary of Oklahoma Medicaid Enrollee Demographic, Healthcare Costs and Resource Use by Opioid Classification for September 2013 through August 2014, Continued**

	GA (N=541)	ADTR (N=397)	p-value <sup>4</sup>
<b>12-Month Summary of Costs per Enrollee in US dollars: Median (IQR)<sup>3</sup></b>			
Rx Costs	\$3,854 (5,097)	\$12,167 (10,745)	<0.01
Opioid Rx Costs	\$1,532 (1,747)	\$9,922 (7,138)	<0.01
Medical Costs	\$9,306 (17,187)	\$10,015 (19,622)	0.38
Healthcare Costs	\$15,043 (22,996)	\$24,979 (34,971)	<0.01
<b>12-Month Summary of Resource Use per Enrollee: Median (IQR)<sup>3</sup></b>			
No. Opioid Prescribers	13 (1)	13 (2)	0.02
No. Narcotic Rx	26 (5)	27 (3)	<0.01

<sup>1</sup>Independent sample t test <sup>2</sup>Chi-square test of independence <sup>3</sup>Wilcoxon independent two sample test <sup>4</sup>Non-significant variables not included in table: urban, comorbidities of addiction, number of overall prescribers, number of overall prescriptions, number of emergency department visits.

**Table 2. Expected Mean Summaries of HealthCare Expenditures (Log Scale) by Medicaid Enrollee Characteristics Derived from the Multivariable Linear Regression Models (Significant Main Effects) (N=938)**

	HealthCare \$ Mean (SE)	p-value <sup>1</sup>	Medical \$ Mean (SE)	p-value <sup>1</sup>	RX \$ Mean(SE)	p-value <sup>1</sup>
Opioid Dependence		0.99		0.07		0.06
Yes	9.89 (0.15)		9.35 (0.27)		8.79 (0.17)	
No[reference]	9.89 (0.13)		9.10 (0.24)		8.96 (0.15)	
No. Rx Prescribers <sup>2</sup>	<.01 (<.01)	0.19	0.01(<.01)	<.01	<.01 (<.01)	0.24
No. Opioid Prescribers <sup>2</sup>	0.02 (0.01)	0.15	0.03(0.02)	0.11	<.01 (<.01)	0.80
No. Rx						
10 Rx increase	0.09 (0.01)	<.01	0.11(0.01)	<.01	0.06 (0.01)	<.01
No. Narcotic Rx						
10 Rx increase	0.06 (0.04)	0.15	0.04(0.07)	0.55	0.01 (<.01)	0.02
No. ER Visits		<.01		<.01		0.97
One ER visit[reference]	9.83 (0.14)		8.86(0.24)		8.88 (0.15)	
Two plus visits	10.29 (0.15)		9.60(0.26)		8.87 (0.16)	

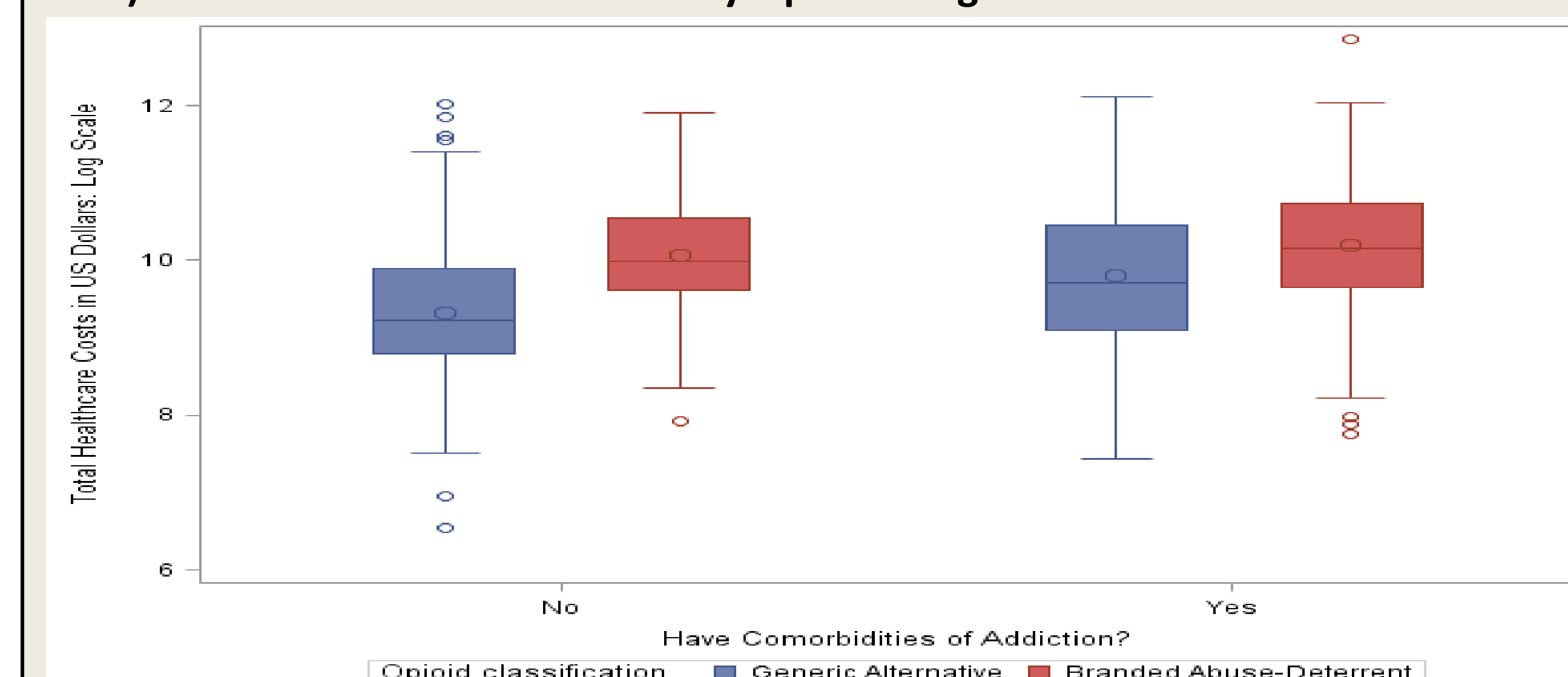
<sup>1</sup>Non-significant variables excluded from table: age, gender race/ethnicity, urban. Interactions on Table 3. <sup>2</sup>Log costs associated with each additional prescriber  
Total variation in log transformed total health care costs explained by the final model: R-squared = 0.44 (p<.01)  
Total variation in log transformed total prescription costs explained by the final model: R-squared = 0.42 (p<.01)  
Total variation in log transformed total medical costs explained by the final model: R-squared = 0.31 (p<.01)  
Median costs = exp [log cost]

**Table 3. Expected Mean Summaries of HealthCare Expenditures (Log Scale) by Opioid Class and Medicaid Enrollee Characteristics Derived from Multivariable Linear Regression Models (N=938)**

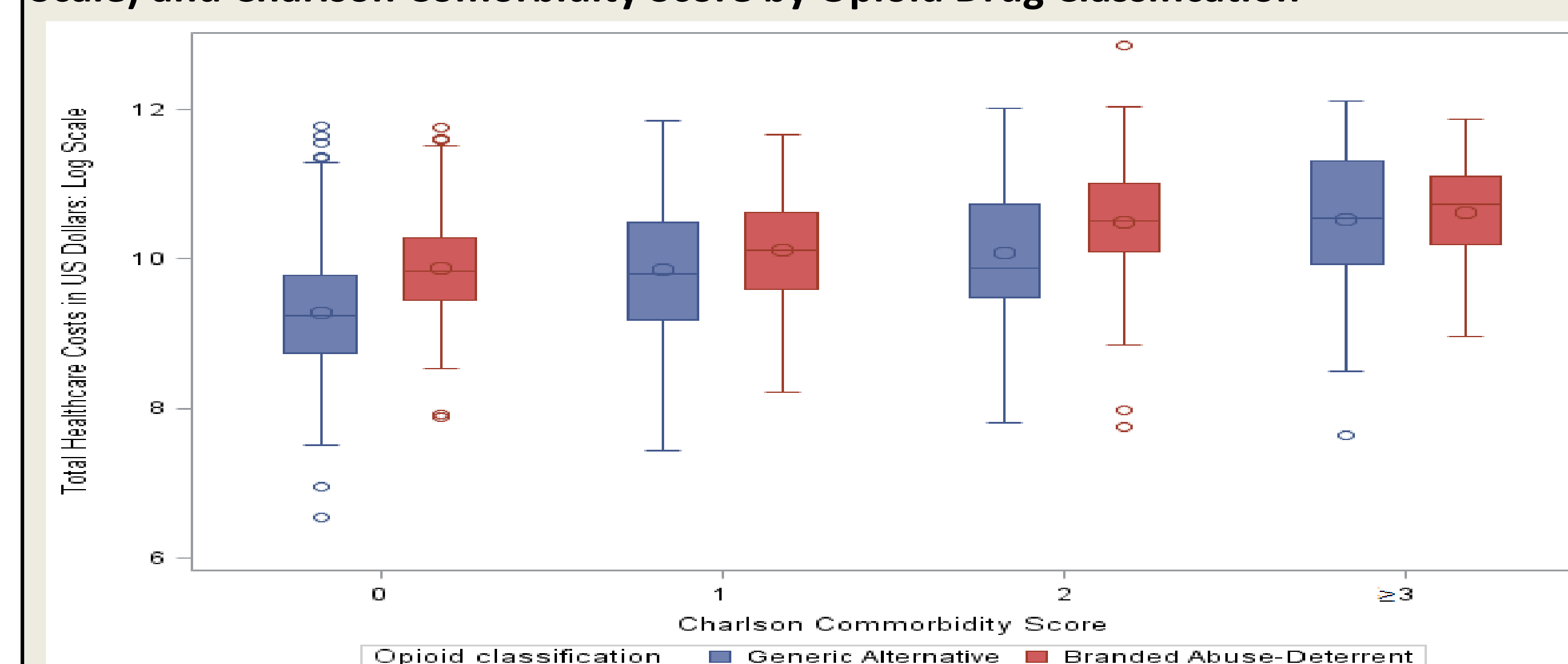
	HealthCare \$			Medical \$			RX \$		
	GA (N=541) Mean (SE)	ADTR (N=397) Mean (SE)	p-value <sup>1</sup>	GA (N=541) Mean (SE)	ADTR (N=397) Mean (SE)	p-value <sup>1</sup>	GA (N=541) Mean (SE)	ADTR (N=397) Mean (SE)	p-value <sup>1</sup>
CCS									
0	9.38 (0.14)	10.06 (0.15)	<.01	-	-	-	8.07 (0.16)	9.29 (0.16)	<.01
1	9.78 (0.15)	10.17 (0.15)	<.01	-	-	-	8.46 (0.16)	9.35 (0.16)	<.01
2	10.01 (0.17)	10.36 (0.17)	0.02	-	-	-	8.45 (0.19)	9.23 (0.18)	<.01
3+	10.24 (0.16)	10.52 (0.17)	0.03	-	-	-	8.66 (0.17)	9.49 (0.18)	<.01
CA									
No	9.76 (0.15)	10.35 (0.16)	<.01	8.91 (0.26)	9.33 (0.28)	0.02	-	-	-
Yes	9.94 (0.14)	10.19 (0.14)	<.01	9.39 (0.25)	9.27 (0.25)	0.20	-	-	-

<sup>1</sup>Tukey adjustments used for account for Type I error inflation due to multiple group comparisons

**Figure 1. Boxplot Showing the Relationship Between Total Healthcare Costs (Log Scale) and Addiction Comorbidities by Opioid Drug Classification**

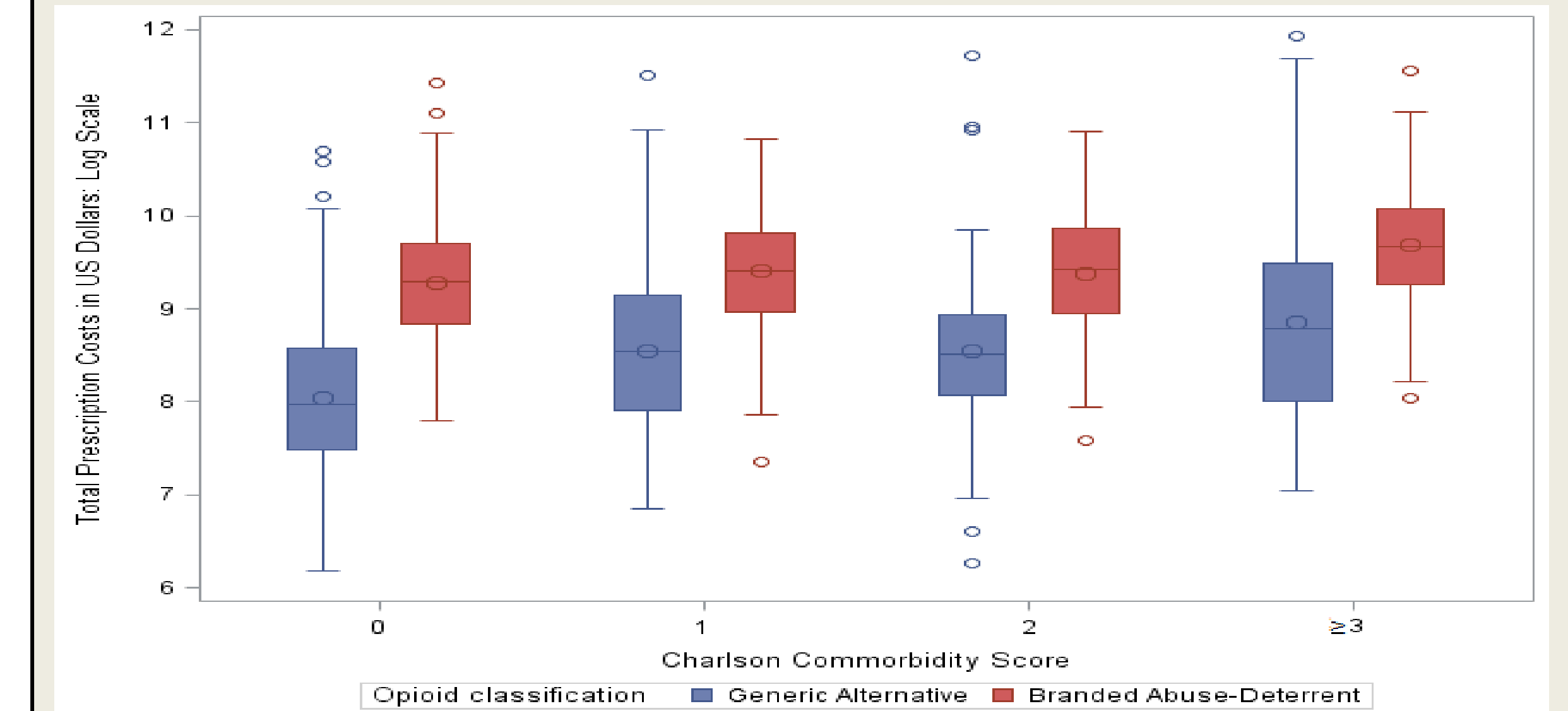


**Figure 2. Boxplot Showing the Relationship Between Total Healthcare Costs (Log Scale) and Charlson Comorbidity Score by Opioid Drug Classification**

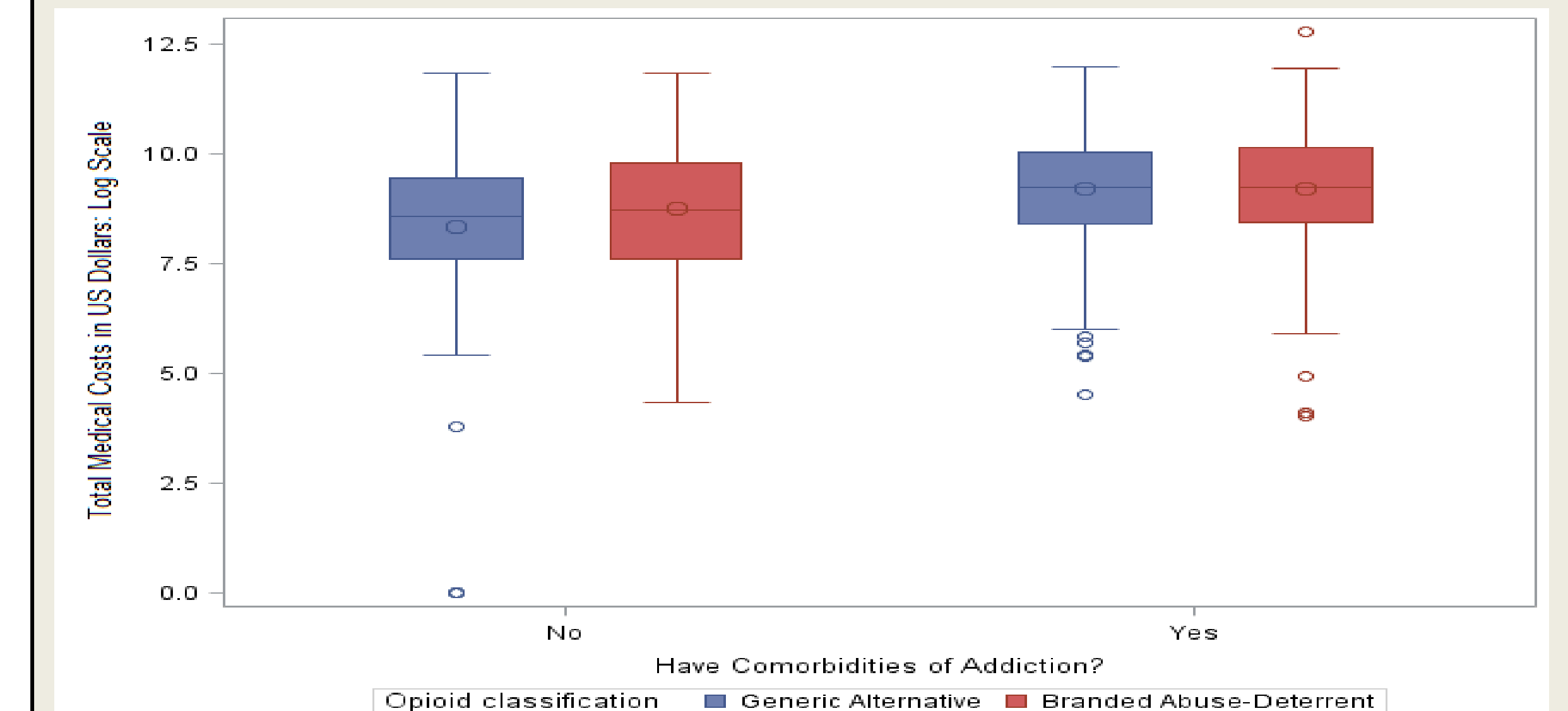


## Results

**Figure 3. Boxplot Showing the Relationship Between Total Prescription Costs (Log Scale) and Charlson Comorbidity Score by Opioid Drug Classification**



**Figure 4. Boxplot Showing the Relationship Between Total Medical Costs (Log Scale) and Addiction Comorbidities by Opioid Drug Classification**



## Conclusions

- Prescription costs constitute a significant portion (35%) of the overall Medicaid expenditures for these members.
- The use of ADTR is the biggest driver of overall Medicaid expenditures due to the high price of the branded products compared to generic alternatives.
- Indicators of potential misuse were not present (e.g. number of prescribers).
- Overall healthcare costs between opioid types vary depending on patient CCS and CA.
- Medical costs and prescription costs between opioid types vary depending on CA and CCS respectively.
- Differences in CCS and CA and ADTR vs. GA may result from prescriber selection of ADTR for those with known dependency or potential for extended use.
- Further research is required to determine if initiation on ADTR lowers incidence of opioid dependence and reduces misuse and abuse.

## Limitations

- Causal inference is not possible from results given study design limitations.
- Results only provide a snapshot of cost correlates in 2013/14; different results may be obtained in a different reference period.

## References

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## Disclosure Statement

- Nancy Nesser and Shellie Keast disclose employment or contractual employment with the Oklahoma Health Care Authority.
- The remaining authors have no financial disclosures related to this work.