

# Intended and unintended consequences: Changes in opioid prescribing practices following two policies in North Carolina, 2012–2018 – A controlled interrupted time series analysis

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## BACKGROUND

- Clinical indications for opioid initiation commonly include postsurgical, acute, chronic cancer-related, and chronic non-cancer-related pain<sup>1-3</sup>
- Prescription opioid use in patients with postsurgical and acute pain has been associated with new-onset long-term opioid use, opioid use disorder, and overdose<sup>4,5</sup>
- Most policy efforts focus on limiting initial opioid prescription dose and duration for postsurgical and acute pain indications
- Potential misapplication of guidelines, such as abrupt discontinuation or rapid taper of high-dose opioid, may have substantial adverse implications for patient safety<sup>6,7</sup>

## OBJECTIVE

To understand the extent to which unintended prescribing consequences followed implementation of two statewide opioid prescribing policies among privately insured, opioid-naïve individuals in North Carolina between 2012 and 2018.

## METHODS

### Data source and study population

- Deidentified claims data from a large single provider of private health insurance
- Eligibility
  - North Carolina resident
  - Ages 18-64
  - Insured by the provider at any point from January 2012 to August 2018

### Outcomes

- Three indicators of opioid prescribing practices for incident opioid prescriptions
  - Monthly prescribing rate
  - Mean days' supply
  - Mean daily morphine milligram equivalents (MME)
- Control series for temporal trends in rate and days' supply
  - Incident benzodiazepine prescriptions

### Exposures

- State Medical Board investigative initiative
  - Safe Opioids Prescribing Initiative (SOPi)<sup>8</sup> to reduce high-dose and high-volume opioid prescribing, especially for chronic pain
  - May 1, 2016
- Statewide legislative action
  - Strengthen Opioid Misuse Prevention (STOP) Act<sup>9</sup> to limit initial opioid prescriptions for postsurgical and acute pain
  - January 1, 2018

### Pain indication and cancer history

- Pain indication groups based on Current Procedural Terminology (CPT) and International Classification of Diseases (ICD) codes, in hierarchical order of:
  - Postsurgical
  - Acute
  - Chronic
- Cancer history based on all-available lookback of ICD codes
  - Excluded benign neoplasm, non-melanoma skin cancer, neoplasm of uncertain or unspecified behavior, and carcinoma in situ

### Statistical analysis

- Assessed level and trend changes in monthly outcomes of incident opioid prescriptions for postsurgical, acute, and chronic pain, relative to two statewide prescribing policies
  - Prescribing rate and days' supply: controlled interrupted time series (CITS) analyses using autoregressive integrated moving average (ARIMA) models
  - Daily MME: single-series ITS ARIMA model
- Examined outcomes overall and by cancer history

## RESULTS

### Opioid prescribing rate, relative to benzodiazepines

#### Post-medical board initiative

- Minimal immediate changes for all pain indication groups
- Postsurgical prescribing trends increased

#### Post-legislative action

- No declines for acute, postsurgical, and non-cancer pain
- Decline among persons with chronic pain with cancer history

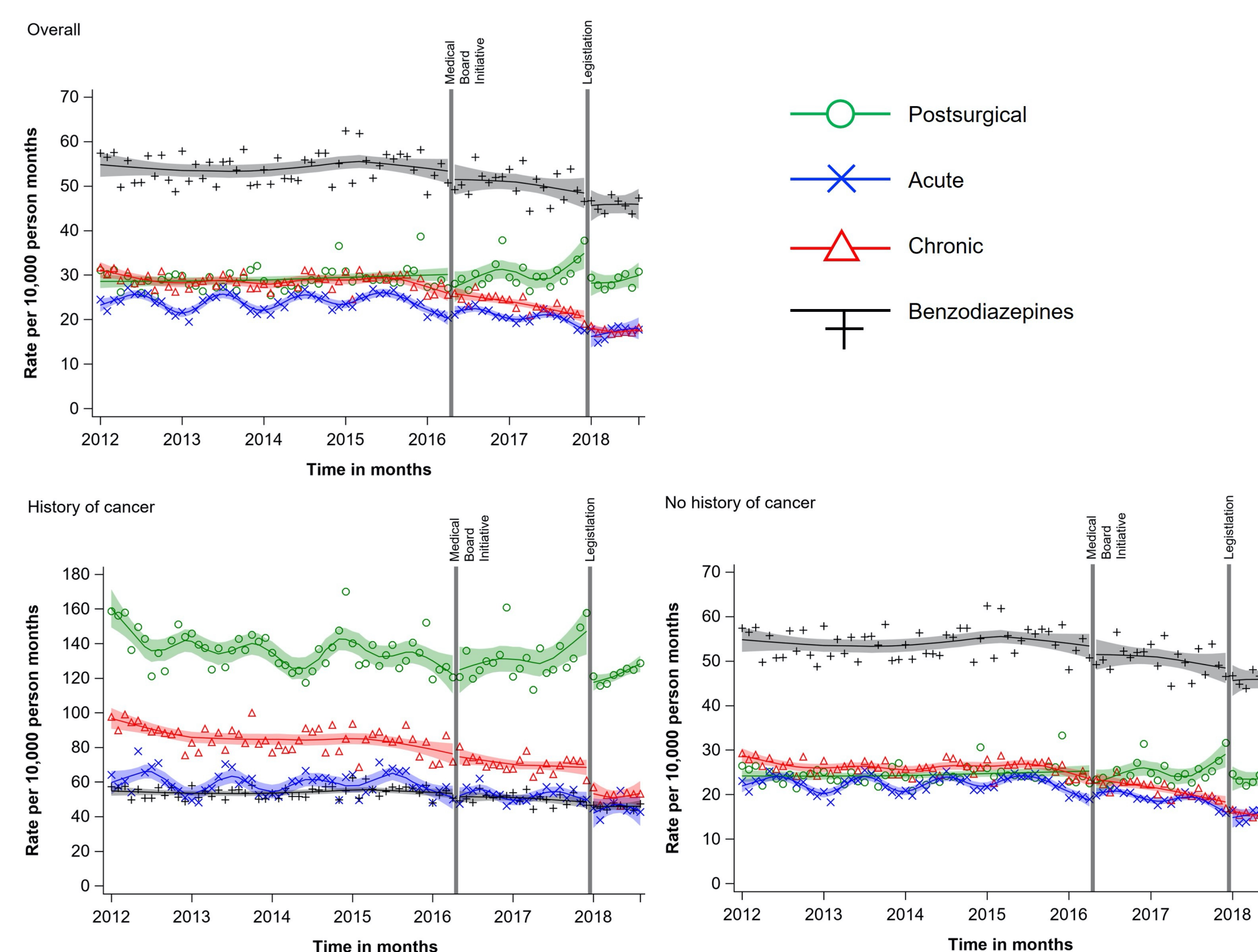


Figure 1. New prescription opioid rates, per 10,000 person-months, by pain indication overall and within cancer history status.

### Opioid mean days' supply, relative to benzodiazepines

#### Post-medical board initiative

- Fairly constant trends for all pain indication groups

#### Post-legislative action

- Modest declines among those with acute and postsurgical pain
- Sharper declines in persons with chronic pain

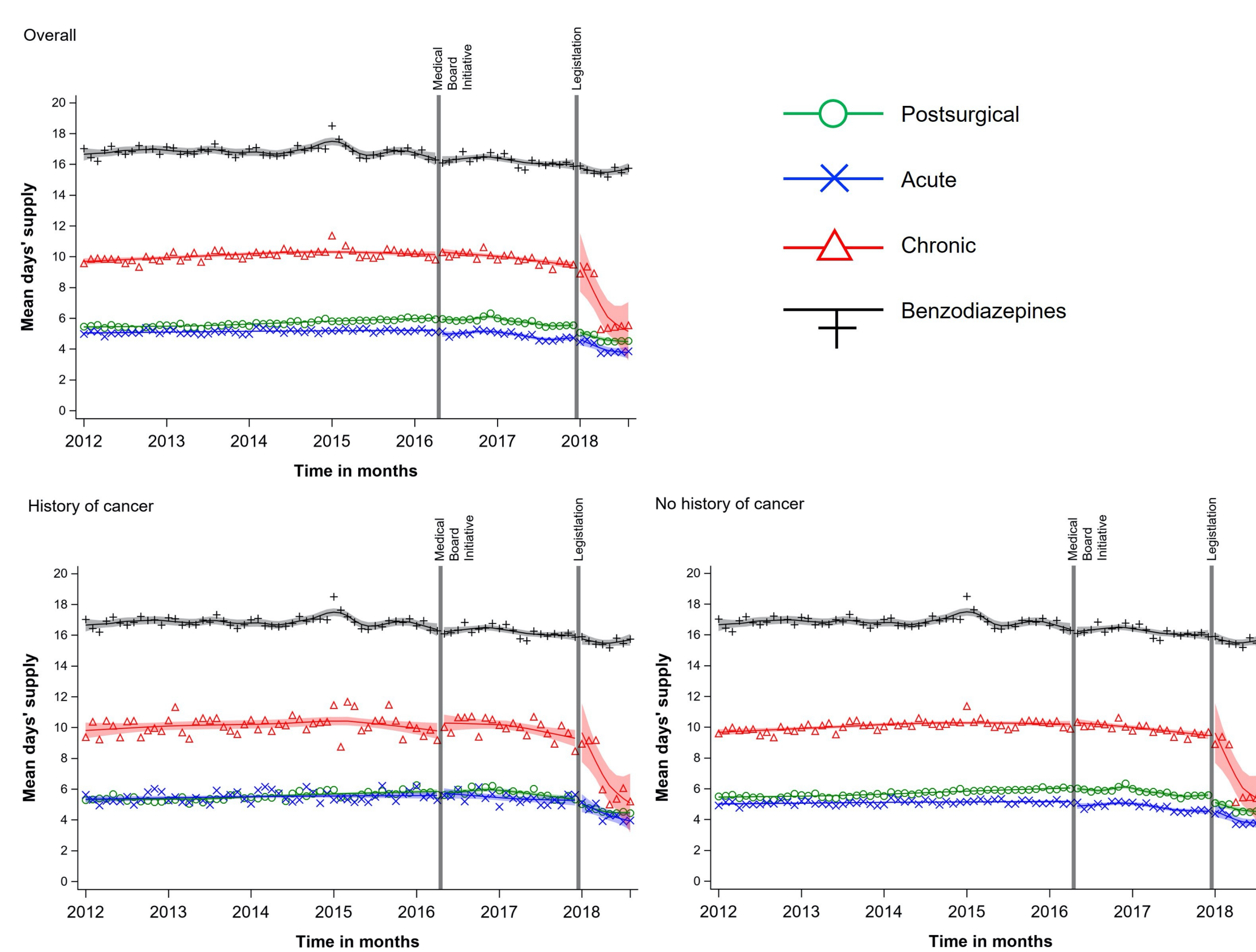


Figure 2. Mean days' supply of new opioid prescriptions, by pain indication overall and within cancer history status.

### Opioid mean daily MME

#### Post-medical board initiative

- Immediate declines in acute and postsurgical pain groups
- No declines in chronic pain group

#### Post-legislative action

- Declines among person with postsurgical pain
- No trend changes in persons with chronic pain

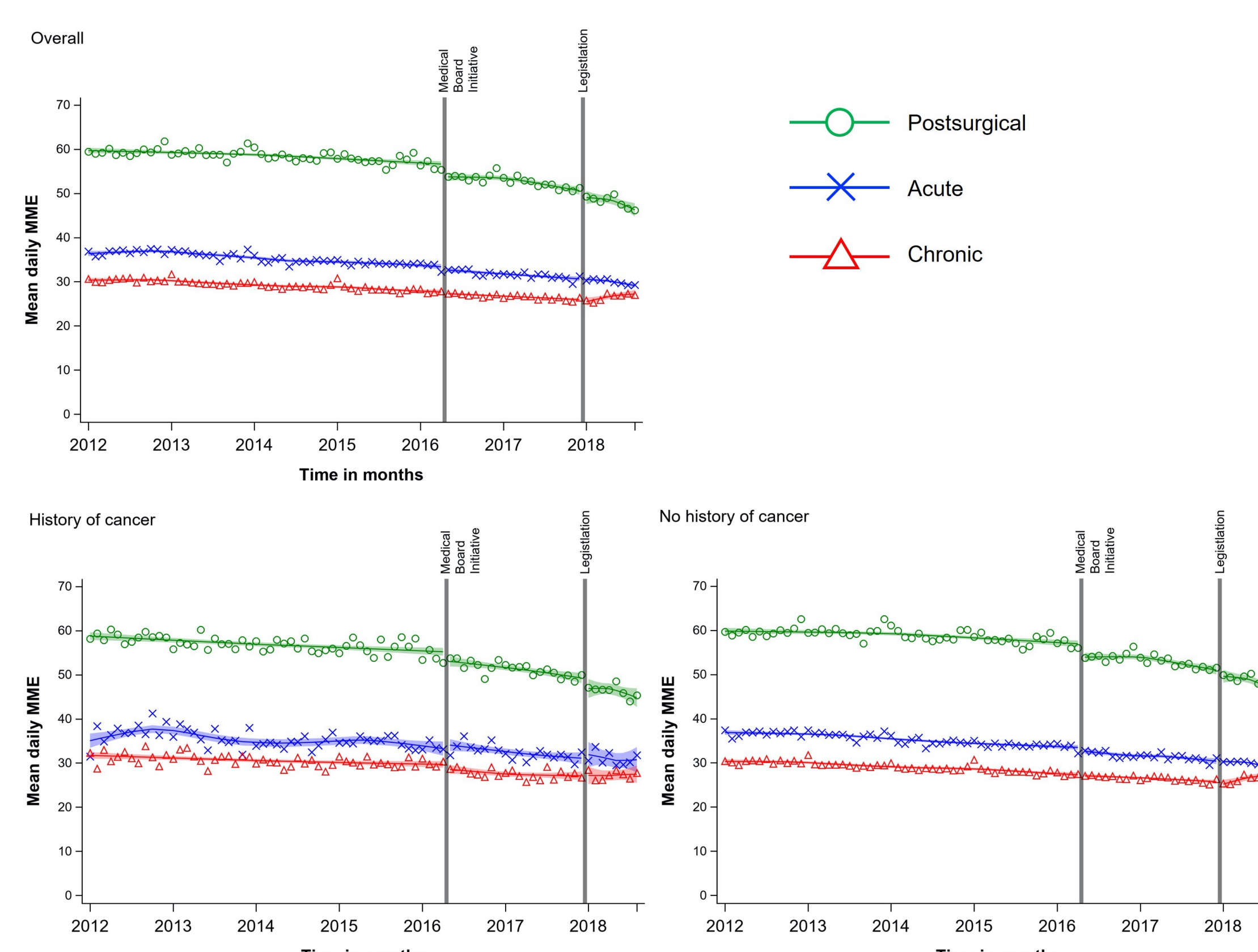


Figure 3. Mean daily MME of new opioid prescriptions, by pain indication overall and within cancer history status.

Table 1. Association of two statewide policies on the prescribing rate, mean days' supply, and mean daily MME of initial opioid prescriptions, by pain indication overall

Outcomes <sup>a</sup>	pre-Medical Board Initiative		post-Medical Board Initiative		post-Legislation	
	Trend <sup>b</sup> (95% CI)	Absolute difference <sup>c</sup> (95% CI)	Change in trend <sup>d</sup> (95% CI)	Absolute difference <sup>c</sup> (95% CI)	Change in trend <sup>d</sup> (95% CI)	
Prescribing rate <sup>a</sup>						
Postsurgical	0.08 (-0.44, 0.59)	1.66 (-1.25, 4.57)	-3.45 (0.89, 6.01)	-0.73 (-6.75, 5.29)	-0.44 (-13.22, 12.35)	
Acute	-0.39 (-0.82, 0.04)	1.45 (-1.09, 3.99)	0.20 (-2.04, 2.45)	0.67 (-4.84, 4.18)	2.01 (-9.69, 13.71)	
Chronic	-0.59 (-0.85, -0.33)	1.14 (-0.45, 2.73)	-0.94 (-2.35, 0.47)	0.01 (-3.71, 3.74)	1.12 (-6.83, 9.07)	
Days' supply <sup>a</sup>						
Postsurgical	0.16 (0.05, 0.27)	0.40 (-0.09, 0.89)	-0.14 (-0.59, 0.31)	-0.23 (-0.93, 0.46)	-0.74 (-2.36, 0.88)	
Acute	0.05 (-0.05, 0.15)	0.29 (-0.17, 0.75)	-0.03 (-0.44, 0.39)	0.15 (-0.53, 0.83)	-1.07 (-2.61, 0.46)	
Chronic	0.13 (0.03, 0.24)	0.38 (-0.14, 0.90)	-0.37 (-0.83, 0.09)	0.40 (0.44, 1.25)	-6.92 (-8.75, -5.09)	
Daily MME						
Postsurgical	-0.72 (-0.93, -0.50)	-2.39 (-3.44, -1.34)	-1.34 (-2.27, -0.40)	-1.18 (-2.92, 0.55)	-2.80 (-6.52, 0.91)	
Acute	-0.89 (-1.02, -0.76)	-0.70 (-1.35, -0.07)	-0.39 (-0.94, 0.17)	0.28 (-0.76, 1.32)	-1.11 (-3.33, 1.12)	
Chronic	-0.70 (-0.80, -0.59)	-0.42 (-0.94, 0.10)	-0.16 (-0.62, 0.30)	-0.50 (-1.36, 0.35)	3.82 (1.98, 5.65)	

a. New prescription opioid patient population includes person-months where the individual has been insured continuously for >=6 months and has no opioid prescription in the prior 6 months  
b. Trends calculated per year  
c. Differences and trend changes relative to benzodiazepine prescribing  
d. Prescribing rates per 10,000 insured person-months

## CONCLUSIONS

- Between 2016 and 2018, North Carolina introduced two statewide opioid prescribing policies intended to reduce overprescribing
- Mixed evidence on the potential impact of the two policies
- Where observed, declines were most often in a group not intended to be impacted by the policy
- State Medical Board investigative initiative
  - Intended to curtail opioid prescribing at high doses and volume, especially for chronic pain
  - No observed changes in mean daily MME for chronic pain
  - Observed declines in mean daily MME for postsurgical and acute pain
- Statewide legislative action
  - Intended to address "overprescribing" of opioids, most directly through limiting initial outpatient prescriptions' days' supply for acute and postsurgical pain
  - No observed declines in prescription rates for acute, postsurgical, and non-cancer pain
  - Observed prescribing decline among cancer patients with chronic pain
- Need for clearer evidence-based policies on volume and dose for the initiation of opioid prescriptions, by pain indication and cancer status, to ensure impacts on intended populations and avoid impacts on unintended populations

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