Unintended Consequences of the CDC's 2016 *Guideline for Prescribing Opioids for Chronic Pain* for Individuals with Sickle Cell Disease

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Introduction

- **Sickle cell disease (SCD)** is a ***rare***, inherited blood disorder disproportionately affects ***African Americans***.
  - Approximately 100,000 Americans have SCD[1]
  - 90% of patients are African American[2]
- **Vaso-occlusive crisis (VOC), hallmark of SCD**
  - **Disease-specific guidelines** (e.g., NHLBI, ASH) **recommend opioid analgesics** to control VOC pain.[3-6]
  - Patients with SCD often face restrictive access to opioid therapy[7,8]
- ***"Opioid epidemic"* and subsequent *guidelines* on opioid prescribing may *exacerbate the barriers* to needed opioid therapy.[8]**
- CDC has been seeking evaluations of ***intended* and *unintended impacts of the guideline*** on clinician and patient outcomes.[9]
- However, the evidence on the impact of the CDC guideline on those with **SCD** is limited

Objectives

1: To evaluate the effect of ***CDC's 2016 Opioid guideline*** on ***opioid prescribing level*** among patients with SCD.

2: To evaluate the effect of ***CDC's 2016 guideline*** on **pain-related *health outcomes*** among patients with SCD.

Methods

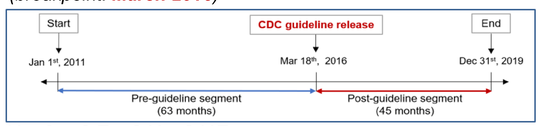
Data source: IBM® **MarketScan®** commercial claims data from 01/01/2011 to 12/31/2019

Inclusion & exclusion criteria

• ≥ 3 inpatient or outpatient visits with SCD diagnoses within 5 years; No cancer diagnosis; Age ≥ 1 year old

Study design and analysis

- ***Interrupted time series design with segmented regressions*** *(breakpoint:* ***March 2016****)*



- $Y_t = \beta_0 + \beta_1 T_t + \boldsymbol{\beta_2} X_t + \boldsymbol{\beta_3} X_t T_t + e_t$
- **β2**: one-time change **immediately** at the time of guideline release
- **β3**: difference in the pre- and post-guideline **trends**

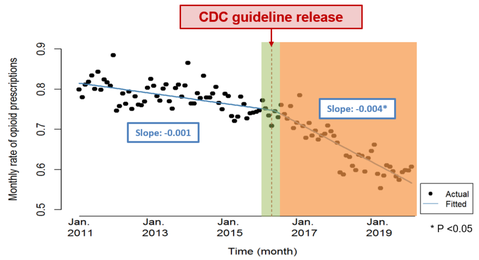
Study outcomes

- Monthly **rate of opioid prescriptions** dispensed
- Mean number of **days supplied** per opioid prescription
- Mean **total morphine milligram equivalent (MME)** per patient
- Mean **daily MME** per opioid prescription
- Monthly rates of VOC-related **emergency department (ED) visits**
- Monthly rates of VOC-related **hospitalizations**

Results

Study population characteristics (N=14,979): Mean age 25.9 (±16.9); 56.9% female; 69% with opioid use

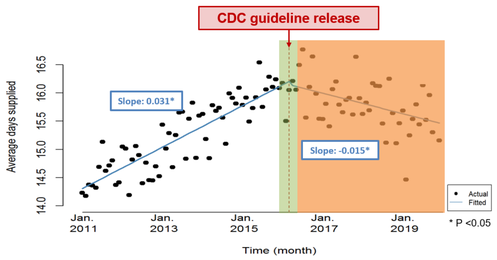
Monthly rate of opioid prescriptions



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
- 0.008	- 0.035	0.020	0.572	***- 0.003***	***- 0.004***	***- 0.002***	***<0.001***

➢ *Significant* ***decrease*** *in the monthly opioid prescription rate*

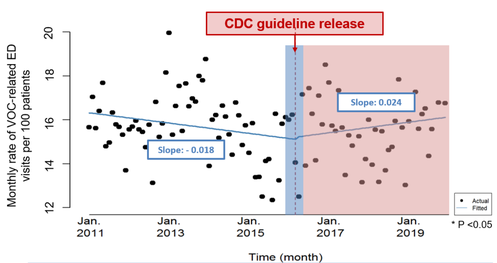
Mean days supplied per prescription



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
- 0.078	- 0.354	0.199	0.579	***- 0.045***	***- 0.055***	***- 0.036***	***<0.001***

➢ *Significant* ***decrease*** *in the number of days supplied per prescription*

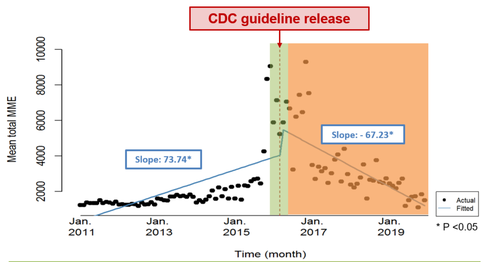
VOC-related ED visits



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
- 0.087	- 1.438	1.265	0.899	0.041	- 0.005	0.088	0.083

➢ ***No significant*** *changes in the monthly rate of VOC-related ED visits*

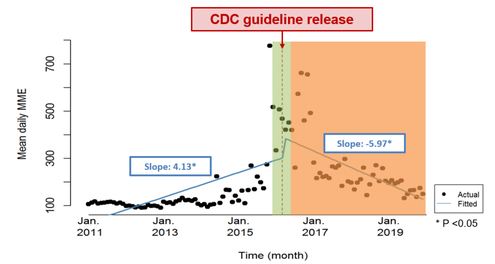
Mean total MME per prescription



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
1,520.5	-47.84	3,088.9	0.060	***- 156.8***	***- 224.4***	***- 89.2***	***<0.001***

➢ *Significant* ***decrease*** *in the total MME per patient*

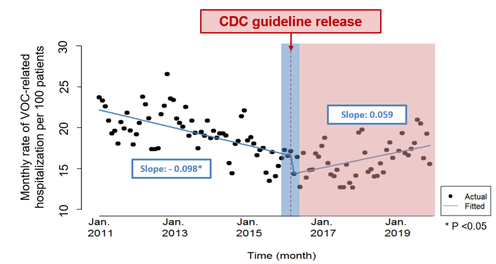
Mean daily MME per prescription



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
102.3	- 12.6	217.3	0.080	***- 10.1***	***- 14.59***	***- 5.615***	***<0.001***

➢ *Significant* ***decrease*** *in the mean daily MME per prescription*

VOC-related hospitalizations



Immediate change				Change over time			
β_2	95% CI		P-value	β_3	95% CI		P-value
- 1.343	- 3.731	1.044	0.267	***0.156***	***0.068***	***0.245***	***0.001***

➢ *Significant* ***increase*** *in the monthly rate of VOC-related hospitalization*

Summary Table

	Study outcomes	Results
Opioid prescribing practice	1. Monthly rate of opioid prescriptions dispensed	***Downward (p<0.001)***
	2. Mean number of days supplied per opioid Rx	***Downward (p<0.001)***
	3. Mean total MME per patient	***Downward (p<0.001)***
	4. Mean daily MME per opioid Rx	***Downward (p<0.001)***
Health outcomes	1. Monthly rates of VOC-related ED visits	No sig. change (p=0.083)
	2. Monthly rates of VOC-related hospitalizations	***Upward (p=0.001)***

Conclusions

- Release of ***the CDC guideline*** was associated with ***a decrease in opioid prescribing practices*** and ***an increase in the monthly rate of pain-related hospitalizations*** among patients with SCD.
  - ➢ The guideline may have ***unintended negative impacts on SCD population.***
- Vulnerability-informed, carefully designed guidelines are warranted to prevent unintended harms to medically underserved populations.
- This is the **first** quantitative analysis of the impact of the 2016 CDC guideline on patients with **SCD** as well as first study that examined the impacts of the guideline on pain-related **health outcomes**.

Limitations

- Study findings may not be generalizable to the patients with SCD who have public (mainly Medicaid) insurance
- Designed as a single group time series due to lack a U.S. control group unexposed to the CDC guideline (*pre-intervention segment serve as control)*
- Unable to assess the appropriateness of individual opioid prescribing

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