

# Opioid-related Emergency Department Visits During COVID-19 in a Large Health System

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**Objective:** Multiple states have reported increases in opioid overdose deaths during the coronavirus disease 2019 (COVID-19) pandemic, however little is known about opioid-related presentations to the emergency department (ED).

**Methods:** This was a time series analysis of visits to 7 EDs in greater Chicago, Illinois from October 20, 2019 to July 25, 2020. We compared the number of ED visits for opioid-related diagnoses in the time period preceding the World Health Organization pandemic declaration (prepandemic period, October 20, 2019–July 3, 2020) to the time period following the World Health Organization pandemic declaration (pandemic period, March 8, 2020 to July 25, 2020) using a single-group interrupted time series analysis with Newey-West standard errors. We also present data on alcohol-related ED visits for comparison.

**Results:** We evaluated a total of 177,405 visits across the 7 EDs during the study period. The mean number of weekly ED visits in the prepandemic and pandemic periods was 4841 and 4029 weekly visits, respectively. In the interrupted time series analysis, there was no significant immediate effect of the pandemic start on opioid-related ED visits ( $-0.44$  visits per 1000 ED visits, 95% CI  $-2.47$  to  $1.58$ ,  $P = 0.66$ ), however, there was a significant immediate effect of the pandemic start on alcohol-related ED visits ( $-4.1$ , 95% CI:  $-8.25$  to  $-0.01$ ,  $P < 0.05$ ).

**Conclusions:** Despite reductions in overall ED visit volumes and alcohol-related visits during COVID-19, the number of opioid-related visits was not significantly reduced during the early pandemic. These data reinforce the need to provide comprehensive treatment services for opioid use disorder during the co-occurring COVID-19 and opioid crises.

**Key Words:** alcohol, COVID, emergency department, opioid  
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Addiction medicine providers have expressed concerns that the coronavirus disease 2019 (COVID-19) pandemic will further exacerbate the consequences of the opioid crisis in the United States.<sup>1</sup> The initial effect of the pandemic created widespread disruptions in the treatment of opioid use disorder (OUD), including in the provision of traditional outpatient services, prescription filling capabilities,<sup>2</sup> and jail-based treatment programs.<sup>3</sup> Additionally, recent survey data suggest that the pandemic and subsequent lockdowns may have created a negative psychological environment that has put many people with substance use disorders at risk for intensification of substance use.<sup>4,5</sup> The exact toll of these changes has yet to be calculated, however a recent national study of out-of-hospital cardiac arrests indicated an increase in opioid-related mortality compared to the prior year.<sup>6</sup>

The impact of these outpatient treatment disruptions and increased psychosocial stressors on opioid-related visits to the emergency department (ED) is not yet known. This is an important knowledge gap to address as the ED remains an important care setting for patients with OUD and the provision of OUD treatment services.<sup>7,8</sup> The above factors may have led to a greater burden of OUD-related presentations funneled toward emergency care during the early stages of the pandemic. In Kentucky, emergency medical service (EMS) calls for opioid overdoses increased significantly during the COVID-19 pandemic while EMS calls for other conditions stayed unchanged or decreased.<sup>9</sup>

Despite reports of increasing opioid overdose morbidity and mortality, ED visits for all major diagnoses have decreased substantially in the setting of an approximate 40% reduction of ED visit volumes nationally.<sup>10–12</sup> To further investigate these divergent trends, we sought to characterize trends in ED visits specifically for opioid-related diagnoses in a large urban health system.

## METHODS

We conducted a time series analysis of visits to 7 hospital EDs in a large health system located in Chicago, IL. These 7 EDs include 1 urban academic hospital, 5 suburban community hospitals, and 1 free-standing ED. We included ED visits for opioid-related diagnoses from October 20, 2019 to July 25, 2020 to evaluate visit trends before and

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after the World Health Organization pandemic declaration on March 11, 2020. This study was approved by the Northwestern University Institutional Review Board.

Opioid-related diagnoses were identified using the Agency for Healthcare Research and Quality Clinical Classifications Software Refined (AHRQ-CCSR) system (see Supplement, <http://links.lww.com/JAM/A274>). As a single ED visit may be assigned multiple diagnosis codes, we limited study inclusion to ED visits with an ICD-10 code of interest within the first three diagnosis codes. We also present data on alcohol-related ED visits, given that alcohol is the most frequent substance use-related reason for ED visits and the possible impact of bar and restaurant closures during the early pandemic period. Opioid- and alcohol-related ED visits were adjusted for total ED visit volumes to present the number of diagnosis-related visits per 1000 total ED visits.

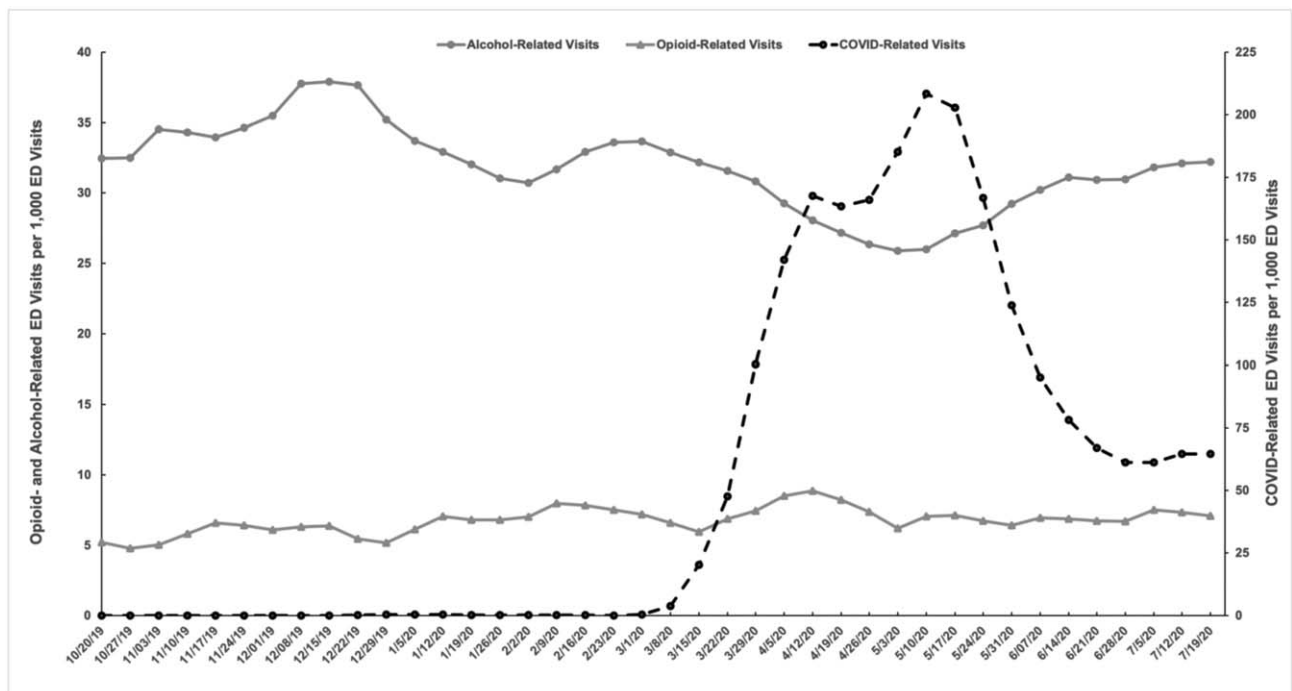
We then evaluated weekly trends of ED visits for opioid- and alcohol-related disorders over the 40-week study period using single-group interrupted time series analyses with ordinary least squares regression and Newey-West standard errors; we selected lag intervals based on Cumby-Huizinga tests for autocorrelation. We specified the intervention period as the week that contained the COVID-19 pandemic start on March 11, 2020 (week 20) and considered the pandemic to have a significant effect if either the immediate effect coefficient or the change in postintervention trend over time coefficient was statistically significant at  $P < 0.05$ . Statistical analyses were performed in Stata v14.2 using the `itsa` and `actest` packages.

## RESULTS

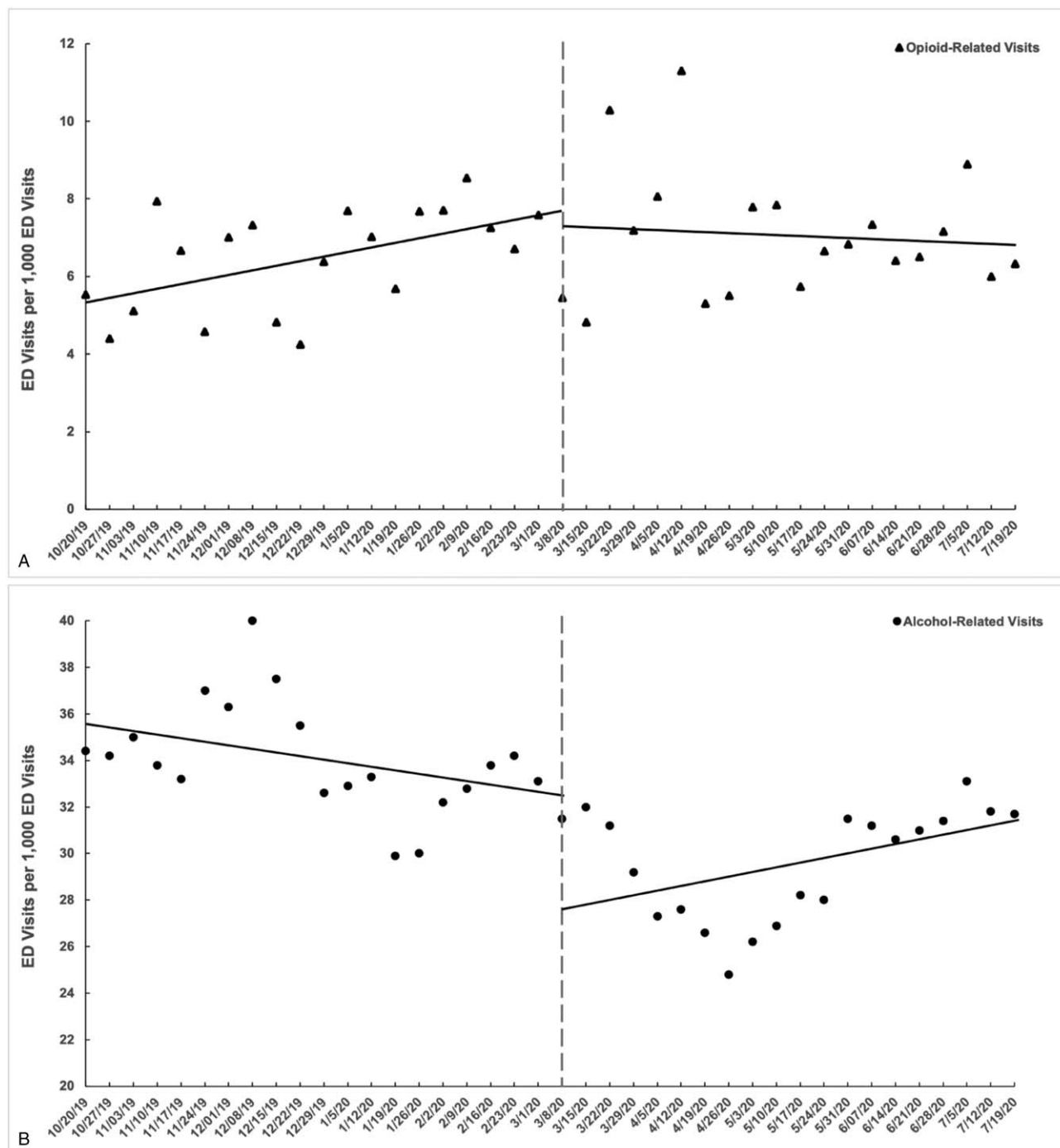
There were 177,405 visits across the 7 EDs during the study period: 96,824 visits in the prepandemic period (October 20, 2019–March 7, 2020, mean 4841 visits/wk) and 80,581 visits in the pandemic period (March 8, 2020–July 25, 2020, mean 4029 visits/wk). Overall ED visit demographics were similar between the study periods (eTable 1). Figure 1 displays the 3-week moving average of ED visits for opioid-, alcohol-, and COVID-related diagnoses. In aggregate, there were 6.4 and 7.1 weekly opioid-related ED visits per 1000 ED visits and 33.9 and 29.7 weekly alcohol-related ED visits per 1000 ED visits in the prepandemic and pandemic periods, respectively.

In the interrupted time series analysis (Fig. 2), the prepandemic rate of opioid-related ED visits showed a baseline increase of 0.12 per 1000 ED visits per week (95% CI: 0.04–0.19). There was no significant immediate effect of the pandemic start on opioid-related ED visits (−0.44, 95% CI: −2.47 to 1.58,  $P = 0.66$ ) or change in the pandemic rate of opioid-related ED visits after the pandemic start (−0.14, 95% CI: −0.30 to 0.02,  $P = 0.08$ ).

The prepandemic rate of alcohol-related ED visits showed a baseline decline of −0.17 per 1000 ED visits per week (95% CI: −0.34 to 0.01). There was a significant immediate negative effect of the pandemic start on alcohol-related ED visits (−4.1, 95% CI: −8.25 to −0.01,  $P < 0.05$ ) and a nonsignificant compensatory increase in the pandemic rate of alcohol-related ED visits after the pandemic start (0.32, 95% CI: −0.01 to 0.64,  $P = 0.06$ ).



**FIGURE 1.** Visits for opioid-, alcohol-, and COVID-19-related diagnoses at 7 emergency departments. Three-week moving average of visits to 7 hospital emergency departments (ED) for opioid- and alcohol-related diagnoses (primary Y-axis), and COVID-19-related diagnoses (secondary Y-axis). ED visits were assigned to opioid- or alcohol-related classifications using the Agency for Healthcare Research and Quality Clinical Classification Software Refined (AHRQ-CCSR).



**FIGURE 2.** A: Interrupted time-series analysis of opioid-related ED visits per 1000 ED visits before and after the start of the COVID-19 pandemic. B: Interrupted time-series analysis of alcohol-related ED visits per 1000 ED visits before and after the start of the COVID-19 pandemic. Dashed vertical black line indicates the date of the World Health Organization coronavirus disease 2019 (COVID-19) pandemic declaration (week of March 8, 2020).

**DISCUSSION**

In this interrupted time series analysis of 7 Chicago-area EDs during the COVID-19 pandemic, we found that the weekly rate of ED visits for opioid-related diagnoses was not significantly altered following the start of the COVID-19 pandemic. In comparison, ED visits for

alcohol-related diagnoses demonstrated a significant immediate decline following the pandemic start, followed by a compensatory increase in alcohol-related ED visits during the pandemic period.

There are several plausible explanations for the relative stability of opioid-related ED visits during the COVID-19

pandemic compared to the decrease in alcohol-related presentations. Given that alcohol is typically purchased from stores or restaurants/bars and consumed socially, widespread business closures and cancellation of social events during the early stages of COVID-19 may have contributed to a reduction in alcohol-related ED visits. In comparison, patterns of opioid use largely center on illicit opioids,<sup>13</sup> which are sold on the black market and not subject to government-mandated business closures. Additionally, although reductions in visits for other major diagnoses (eg, cardiac diagnoses) could be attributed to public avoidance of hospital settings due to fear of contracting COVID-19,<sup>12</sup> this decision calculus is less likely to impact ED presentations for opioid-related diagnoses, as emergency care for an acute opioid overdose is typically initiated by bystanders.

These study findings are somewhat in tension with reports of increased opioid-related mortality and EMS calls for opioid-related complaints during the COVID-19 pandemic. This may be due in part to geographic heterogeneity among multiple study locations (eg, Kentucky, greater Chicago) or the use of varying endpoints among studies. It is possible, for example, that an increasing number of 911 calls for opioid-related complaints are declared as deaths at the scene, which would contribute to an increased incidence of opioid-related mortality but would not translate to an increased volume of ED visits. Indeed, a recent national study of EMS calls found a significant increase in overdose-related cardiac arrests in the field.<sup>6</sup>

Our study findings indicate that despite reductions in ED visits for many medical conditions,<sup>12</sup> including alcohol-related ED visits, opioid-related visits remained relatively constant during the COVID-19 pandemic in this medical system. These data reinforce the importance of maintaining evidence-based resources for OUD treatment and harm reduction in the ED – such as peer recovery coaches, take-home naloxone, and ED-initiated buprenorphine – even during the unprecedented pressures that COVID-19 is placing on emergency care systems. This is important now more than ever, as hospitals and health systems face critical decisions regarding resource allocation and weigh the costs and benefits of continuing existing clinical services.

Limitations of this study include its retrospective design, focus on a single geographic area, and limited study period which did not allow for seasonal adjustment. Although Chicago is a major urban center with a significant burden of opioid-related morbidity and mortality, the specific patterns of ED visits and opioid use in the greater Chicago area and within the 7 EDs in our health system may not be generalizable to other settings. Our use of ICD-10 codes also limits the study findings, as the specific diagnosis codes assigned to an ED visit are dependent on the ED physician's documentation and coding practices.

## CONCLUSIONS

In this retrospective study of 7 EDs in the greater Chicago area, opioid-related ED visits were not significantly reduced during the early stages of the COVID-19 pandemic despite substantial reductions in overall ED visit volumes and alcohol-related ED visits specifically.

These data, in conjunction with multiple state reports of increased community opioid overdose mortality during the same time period, reinforce the need to provide comprehensive treatment services for OUD during the COVID-19 pandemic.

## REFERENCES

1. Wakeman SE, Green TC, Rich J. An overdose surge will compound the COVID-19 pandemic if urgent action is not taken. *Nat Med*. 2020; 26(6):819–820.
2. Nguyen TD, Gupta S, Ziedan E, et al. Assessment of filled buprenorphine prescriptions for opioid use disorder during the coronavirus disease 2019 pandemic. *JAMA Intern Med*. 2020;21:e207497.
3. Bandara S, Kennedy-Hendricks A, Merritt S, Barry CL, Saloner B. Early effects of COVID-19 on programs providing medications for opioid use disorder in jails and prisons. *J Addict Med*. 2020;14(1):e257–e260.
4. Czeisler ME, Lane RI, Petrosky E, et al. Mental health, substance use, and suicidal ideation during the COVID-19 pandemic - United States, June 24-30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(32):1049–1057.
5. Hochstatter KR, Akhtar WZ, Dietz S, et al. Potential influences of the COVID-19 pandemic on drug use and HIV care among people living with HIV and substance use disorders: experience from a pilot mhealth intervention. *AIDS Behav*. 2021;25(2):354–359.
6. Friedman J, Beletsky L, Schriger DL. Overdose-related cardiac arrests observed by emergency medical services during the US COVID-19 epidemic. *JAMA Psychiatry*. 2020;3:e204218.
7. D'Onofrio G, O'Connor PG, Pantalon MV, et al. Emergency department-initiated buprenorphine/naloxone treatment for opioid dependence: a randomized clinical trial. *JAMA*. 2015;313(16):1636–1644.
8. Vivolo-Kantor AM, Seth P, Gladden RM, et al. Vital signs: trends in emergency department visits for suspected opioid overdoses - United States, July 2016-September 2017. *MMWR Morb Mortal Wkly Rep*. 2018;67(9):279–285.
9. Slavova S, Rock P, Bush HM, Quesinberry D, Walsh SL. Signal of increased opioid overdose during COVID-19 from emergency medical services data. *Drug Alcohol Depend*. 2020;214:108176.
10. Hartnett KP, Kite-Powell A, DeVies J, et al. Impact of the COVID-19 pandemic on emergency department visits - United States, January 1, 2019-May 30, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69(23):699–704.
11. Jeffery MM, D'Onofrio G, Paek H, et al. Trends in emergency department visits and hospital admissions in health care systems in 5 states in the first months of the COVID-19 pandemic in the US. *JAMA Intern Med*. 2020;180(10):1328–1333.
12. Kim HS, Cruz DS, Conrardy MJ, et al. Emergency department visits for serious diagnoses during the COVID-19 pandemic. *Acad Emerg Med*. 2020;27(9):910–913.
13. Wilson N, Kariisa M, Seth P, Smith Ht, Davis NL. Drug and opioid-involved overdose deaths - United States, 2017–2018. *MMWR Morb Mortal Wkly Rep*. 2020;69(11):290–297.