



(RESEARCH ARTICLE)



Opioid antagonist Utilization Patterns in United States Emergency Department Visit: A Retrospective Study

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International Journal of Science and Research Archive, 2024, 13(01), 2222–2227

Publication history: Received on 22 August 2024; revised on 28 September 2024; accepted on 01 October 2024

Article DOI: <https://doi.org/10.30574/ijrsra.2024.13.1.1856>

Abstract

Background: The aim of this study was to determine if emergency department (ED) visits due to opioid overdose are affected by patient demographics, geographic location, and type of insurance used for payment.

Methods: The type of opioid reversal agent used in the ED was assessed, including patient age, ethnicity, gender, insurance payer, and geographical region of the United States.

Results: Patients from the South (48.8%), above 50 years old (44.1%), and the White population (44.9%) had the greatest number of opioid overdose cases versus their comparable demographics. There was a statistically significant difference amongst various regions included in, with the South having the largest number of patients receiving opioid reversal agents ($p = 0.001$). There was a statistically significant difference between various payment forms, with most patients of both genders paying out-of-pocket ($p = 0.003$). There were no significant differences between male and female patients in terms of which antidote was received ($p = 0.595$).

Conclusions: Policy and healthcare changes are necessary to prevent intentional opioid overdose and its etiology.

Keywords: Opioid Antagonists; Emergency Department visits, Antidote, Utilization patterns

1. Introduction

The opioid crisis is a global public health emergency. In the United States, more than 130 Americans are dying each day due to unintentional opioid overdose.^{1,2} Naloxone, a safe and effective medication, is commonly used to reverse opioid overdoses, often preventing fatalities¹. Opioid overdose deaths disproportionately affect men compared to women^{2,3}. Although women are more likely to be prescribed opioids due to a lower pain threshold¹. Opioid misuse is most prevalent in urban areas, where Medicaid, Medicare, workers' compensation, and commercial insurance typically cover opioid reversal agents.² The number of states mandating insurance coverage for naloxone has steadily increased from 2014 to 2018^{2,4}.

Opioid use disorder, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), involves the overuse of opioids, leading to significant impairment or distress. Opioid drugs include both natural and semi-synthetic prescription medications like morphine, as well as illicit drugs such as heroin. Patients with substance use disorders are among the highest users of healthcare services, incurring disproportionately high costs and frequently requiring hospital readmissions^{6,7}.

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Opioid overdose reversal is critical to prevent deaths due to opioid overdose. Rapid methods of opioid detoxification are manifested by the use of opioid antagonists such as naloxone, naltrexone, or nalmefene, to precipitate opioid withdrawal by displacing exogenous opioids from the receptor sites. As an opioid antagonist, naloxone blocks the euphoric effects of opioids, diminishing the reinforcing effects of prescription opioids and other narcotics, potentially extinguishing the association between conditioned stimuli and opioid use. Given its life-saving potential, investigating the utilization patterns of opioid antagonists in emergency department settings is crucial to ensuring timely intervention and reducing opioid-related mortality rates in high-risk populations.

Emergency department (ED) visits for suspected opioid overdoses rose by 30% in the U.S. from July 2016 to September 2017⁸. The opioid crisis was declared a nationwide Public Health Emergency on October 27, 2017. ED data complement mortality data because they capture nonfatal overdoses, and they provide critical information on opioid use-related treatments, such as opioid use disorder treatment, detoxification for safe opioid withdrawal, and management of adverse effects^{8,9}. This study aims to explore the utilization patterns of opioid antagonists like naloxone in U.S. emergency departments, providing insights into how effectively healthcare systems are responding to the opioid crisis and addressing the needs of patients in overdose situations.

Opioids are natural or synthetic chemicals that interact with opioid receptors on the nerve cells in the body and brain to reduce pain perception. Prescription pain relievers include oxycodone (OxyContin®), hydrocodone (Vicodin®), morphine, and others. Along with pain relief, opioids may cause euphoria, drowsiness, and other side effects. The major risk with high doses is respiratory depression. According to the American Medical Association, an estimated 3 to 19% of people who take prescription pain medications develop an addiction¹⁰. Understanding the physiological effects of opioids and their high addiction potential is key to contextualizing the increased demand for opioid reversal agents like naloxone in emergency department settings, which this study investigates.

In August 2019, a study showed that overall national rates for naloxone co-prescription with opioids increased among Medicare Part D patients^{11,12}. Naloxone administration records from Emergency Medical Services (EMS) offer a valuable data source to track opioid overdose trends on a national level, providing insights into both fatal and nonfatal events^{11,12}. Examining how often naloxone is prescribed or administered during ED visits will help assess whether public health recommendations, such as the co-prescription of naloxone with opioids, are effectively being implemented to curb opioid-related deaths.

A study by Jones et al. found racial differences in overdose response training and take-home naloxone (THN) possession among Black and White clients of a syringe service program¹³. Black nonclients were least likely to possess THN, suggesting a need for targeted outreach to this population to increase naloxone access. This study will further contribute to understanding geographic and demographic disparities in naloxone use in emergency departments, with a particular focus on identifying vulnerable populations that may benefit from increased access to opioid antagonists.

In this retrospective study, we aim to assess the prevalence of opioid antagonist use in U.S. emergency departments. Specifically, we will evaluate the relationship between patient payment methods and opioid reversal agents prescribed, investigate geographical differences in opioid antagonist utilization, and analyze how age demographics affect the usage of these agents.

2. Material and method

In this retrospective research, a total of 2,546 patients presenting to the ED after an opioid overdose, meeting the criteria for psychoactive substance related disorders (ICD-10 code: F19.20), were extracted from the 2018 National Ambulatory Medical Care (NHAMCS) survey. This would include only patients intentionally using opioid medications. This data was checked for integrity and exported into the Statistical Package for Social Sciences software (SPSS®). The data were analyzed using descriptive analysis and chi-square tests at an alpha significance level of 0.05. Patients missing any data regarding age, gender, US geographical region, ethnicity, payment method, or opioid used prior to antidote administration were excluded from data analysis.

3. Results

These study findings were limited to ED visits in 2018 and by the operational definitions of the study, including information on age, gender, United States geographical region, ethnicity, and the reported opioid that was used that necessitated antidote use. Patients from the South (48.8%), patients above 50 years old (44.1%), and White patients (44.9%) had the greatest number of opioid overdose cases compared to their comparable demographics. More females

than males reported to the ED for opioid abuse (55.7%). The majority of patients were self-pay (40.7%). Of those who had insurance, most patients had Medicaid coverage (22.6%). There was a statistically significant difference amongst various regions, with the South having the largest number of patients receiving opioid reversal agents ($p = 0.001$). There was a statistically significant difference between various payment forms, with most patients of both genders paying out-of-pocket ($p = 0.003$). There were no significant differences between males and females in terms of which antidote was received ($p = 0.595$).

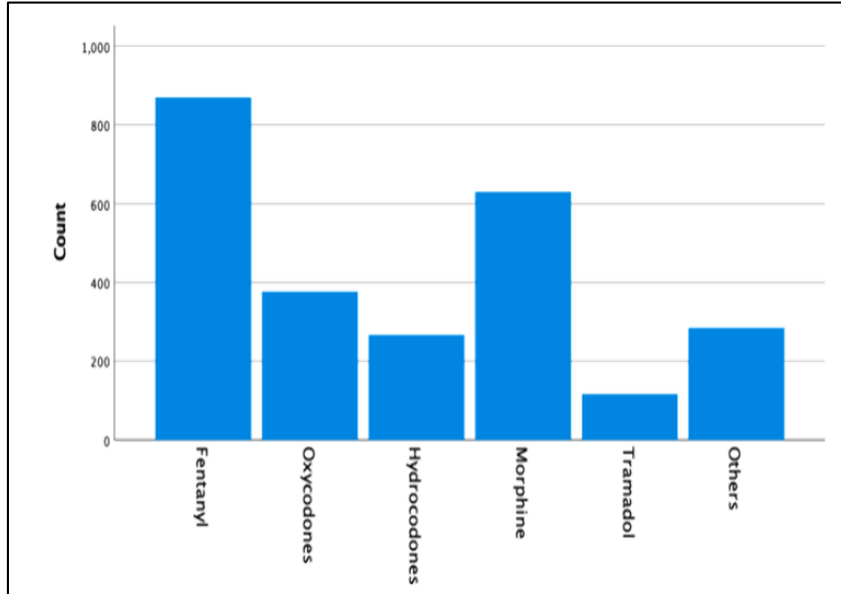


Figure 1 Opioid Used Necessitating Antidote (n = 2,546)

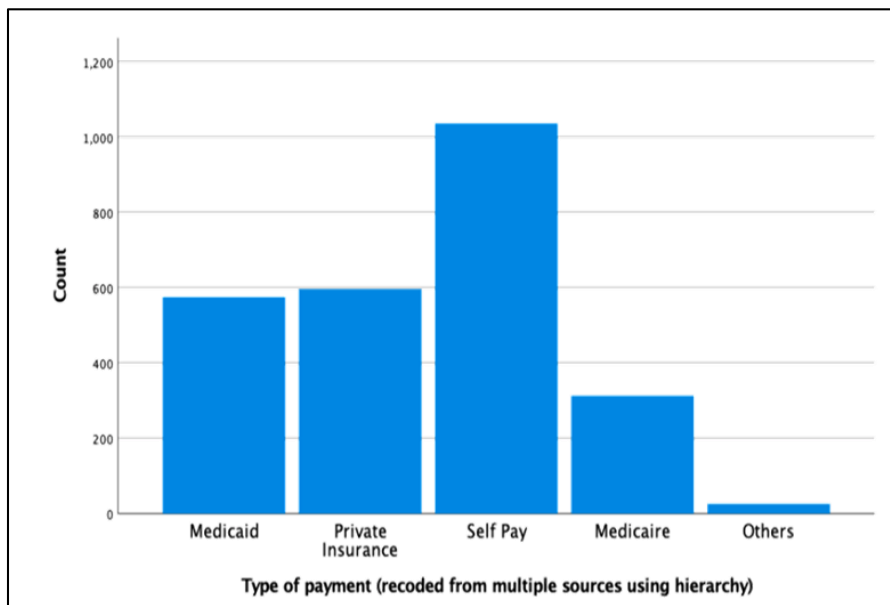


Figure 2 Insurance Payers Used in U.S. EDs for Opioid Antagonists (n = 2,546)

Opioid overdose was seen across all demographics and it varied by different characteristics of those demographics. Over 40% of patients (n = 2,546) elected to self-pay for their ED visit in which an opioid antagonist was used. Stigma associated with opioid overdose; confidentiality concerns from family, friends, employers, and insurance; and awareness of insurance coverage may have contributed to this observation. The age group of patients 50 years and older (44.1%) represented the majority of the cases. This may be explained by greater access to opioids, resources to pay for

them, greater mental health disorder prevalence, and varying tolerance threshold for opioid adverse effects on the geriatric population. One limitation of this retrospective study is that findings were limited to ED visits in 2018 that were included in the NHAMCS survey.

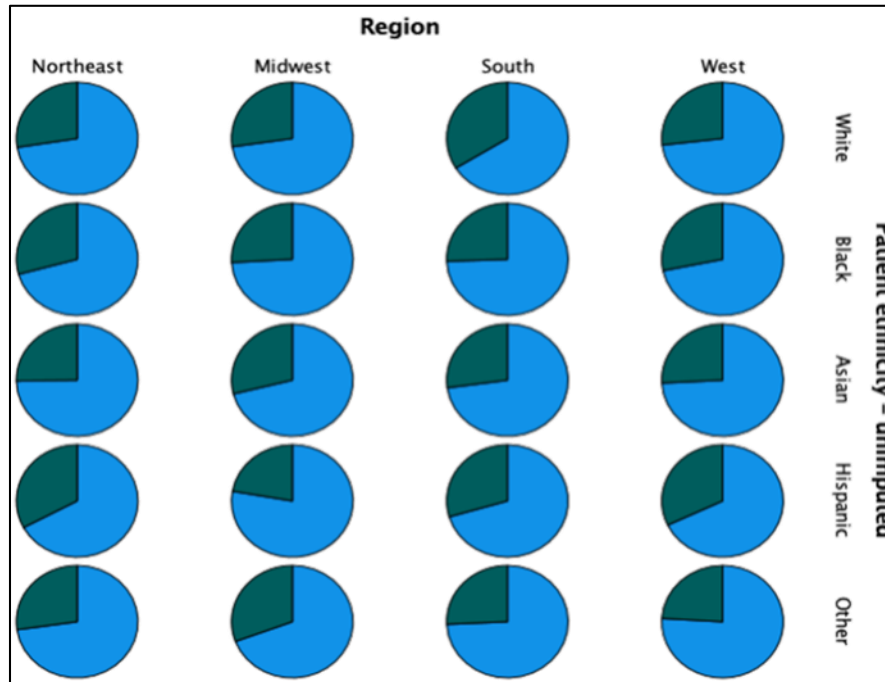


Figure 3 Region and Ethnicity Spread of Opioid Antagonist Use (n = 2,546)

The green area of each pie chart represents the patients of the given ethnicity within each region.

4. Discussion

These findings demonstrate significant regional disparities, which may be attributable to varying levels of access to naloxone or differences in healthcare coverage across U.S. states. According to National Center for Health Statistics (NCHS) data from the Centers for Disease Control and Prevention (CDC), approximately 100,306 drug overdose deaths were reported in the United States during the 12-month period ending in April 2021, an increase of 28.5% from the 78,056 deaths during the same period the year before^{14,15}. This alarming rise in opioid overdose deaths highlights the ongoing public health crisis and the urgent need for continued efforts in prevention and intervention. As the rate of overdose deaths continues to escalate, healthcare systems, particularly EDs, are placed under increasing strain to manage the influx of opioid-related cases.

In addition to the rise in opioid overdose deaths, ED visits due to opioid use have also seen a significant increase over the past decade. According to NCHS data analysis from 2005 through 2014, it is estimated that the rate of ED visits due to opioid use increased 99.4% from 89.1 per 100,000 population in 2005 to 177.7 per 100,000 population in 2014¹⁶. This trend indicates that not only are opioid overdoses leading to fatalities, but they are also contributing to a higher demand for acute medical care in EDs across the country.

Naloxone, an opioid antagonist, remains a critical tool in combating opioid overdoses. Injectable naloxone can be administered intramuscularly, intravenously, or intradermally¹⁷. Its rapid action in reversing opioid overdose has made it the standard intervention in both prehospital and hospital settings. Despite its effectiveness, naloxone's distribution and usage remain uneven across different regions and populations, which poses a challenge for ensuring timely interventions.

The co-prescription of naloxone with opioid medicine was recommended in the 2016 CDC guidelines¹⁸. However, implementation of these guidelines has been inconsistent, and many patients at risk of overdose still do not have easy access to naloxone. Expanding naloxone access, particularly in high-risk populations, remains a key public health priority.

A study found that after Ohio implemented a law allowing pharmacists to dispense naloxone without a prescription, the rate of naloxone orders dispensed through Ohio Medicaid increased by 2328%, from 191 in the pre-policy period to 4637 post-policy¹⁹. This demonstrates the positive impact of policy changes aimed at increasing naloxone availability. Policies that allow greater access to naloxone, particularly in communities heavily affected by opioid use, are essential for reducing the morbidity and mortality associated with opioid overdoses.

The findings of this study further emphasize the importance of addressing regional disparities in opioid overdose and naloxone utilization. Patients from the Southern region, who represented the largest demographic receiving naloxone, require targeted public health interventions, including awareness campaigns, provider training, and expanded naloxone access. Additionally, the high prevalence of opioid overdoses among older adults suggests that prevention efforts should be tailored to this demographic, which may be underrepresented in current opioid harm reduction strategies.

In conclusion, while naloxone remains an effective intervention for opioid overdose, more needs to be done to ensure equitable access to this life-saving medication. The results of this study highlight the need for continued policy efforts to expand naloxone availability, particularly in high-risk regions and among vulnerable populations. Future research should explore the long-term outcomes of naloxone distribution policies and their impact on reducing opioid-related morbidity and mortality.

5. Conclusion

Health systems should prioritize the development of a streamlined, standardized protocol for administering opioid antagonists, particularly naloxone, in suspected opioid overdose cases. Expanding naloxone access, especially in high-risk regions and populations, is essential for reducing morbidity and mortality. These findings can inform future policy decisions aimed at improving access to life-saving interventions, particularly in underserved areas.

Future Research

This study addresses key questions related to opioid antagonist utilization in EDs but also highlights the need for further research. Future studies should focus on conducting prospective research with health systems across the U.S., exploring the effectiveness of opioid antagonist interventions and their long-term health outcomes. Additionally, research should assess how socioeconomic factors, such as healthcare access and insurance, influence opioid overdose interventions, guiding efforts to reduce healthcare disparities. These insights will be crucial for informing policy and optimizing clinical practices to combat the opioid crisis.

Compliance with ethical standards

Disclosure of conflict of interest

The authors have no conflicts of interest to disclose.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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