

Table 1
Dosing and treatment outcomes for pediatric patients receiving PCZ.

Dose PCZ initially received	# patients	# received concomitant diphenhydramine	Treatment failures	Akathisia/dystonia
0.10 mg/kg	202 (52%)	79 (39%)	22 (11%)	7 (4%)
0.15 mg/kg	89 (23%)	64 (72%)	7 (8%)	3 (3%)
0.20 mg/kg	99 (25%)	89 (90%)	4 (4%)	6 (6%)

antiemetics. Given the frequent use of antiemetics for gastroenteritis in children and adolescents, studies are needed in these age groups to demonstrate safety and efficacy of their use for this condition.

Lindsey Ouellette MPH¹

Michigan State University College of Human Medicine, Department of
Emergency Medicine, Grand Rapids, MI, United States

Bryan Judge MD²

Michigan State University College of Human Medicine, Department of
Emergency Medicine, Grand Rapids, MI, United States
Spectrum Health - Michigan State University Emergency Medicine
Residency Program, Grand Rapids, MI, United States

Angela Zamarripa MD²

Helen DeVos Children's Hospital, Department of Emergency Medicine,
Grand Rapids, MI, United States

Patrick McFadden MD²

Spectrum Health - Michigan State University Emergency Medicine
Residency Program, Grand Rapids, MI, United States

Jeffrey Jones MD*

Michigan State University College of Human Medicine, Department of
Emergency Medicine, Grand Rapids, MI, United States
Spectrum Health - Michigan State University Emergency Medicine
Residency Program, Grand Rapids, MI, United States

* Corresponding author at: 15 Michigan St NE Suite 701,
Grand Rapids, MI 49503, United States.

E-mail address: Jeffrey.Jones@spectrumhealth.org

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¹ 15 Michigan St NE, 736-B, Grand Rapids, MI 49503, United States of America.

² 15 Michigan St NE Suite 701, Grand Rapids, MI 49503, United States of America.

Public interest in medication-assisted treatment for opioid used disorder in the United States



Opioid-related drug overdose deaths (OD) in the United States (U.S.) continue to increase yearly [1]. Emergency departments (EDs) are the frontline for the overdose epidemic, as well as provide acute treatment for those with opioid withdrawal [2,3]. Evidence-based treatment for Opioid Use Disorder (OUD) exists for managing overdose and withdrawal, as well as for ongoing care with medication-assisted therapy (MAT) [4,5]. Given that emergency physicians are frontline providers in the epidemic, EDs have developed MAT programs for identification, management, and transitions of care [6,7]. However, a paucity of data exists regarding population-level interest in MAT. Internet search queries, as a form of public health ‘surveillance’ and infodemiology [8,9], have previously been used to identify national interest in public health interventions [10–12]. To-date, however, no study has assessed public interest in MAT using this methodology. Therefore, this study sought to assess national interest in MAT and its association with OD across the nation to contextualize the needed expansion of ED-based MAT programs.

We assessed publicly available Google Trends (<https://trends.google.com>) data for the U.S. from January 2004 to December 2018. A preliminary survey of Google Trends was conducted prior to analysis to identify the most frequently searched terms within each category of MAT (drug name; Appendix). If all search terms within each category were positively associated, the most frequently searched term was used for analysis. The final set of terms analyzed included the terms “Naloxone”, “Buprenorphine”, “Buprenorphine/Naloxone”, “Naltrexone”, and “Methadone Clinic”.

Data is reported on Google Trends as a relative search volume (RSV), which is divided by the total searchers in a time range for a selected geographic region (e.g., state), and is then scaled 0 to 100. A value of 100 is peak popularity for the search term. Google discards repeated—i.e., additional—searches by the same person over a short interval of time. At the time of this study, Google’s search engine market share among all search engines was approximately 86.9% [13].

The publicly available Multiple Causes of Death from CDC WONDER (<https://wonder.cdc.gov/wonder/help/mcd.html#>) was used to identify crude rate of deaths attributed to opioids between 2004 and 2017, using methods previously described [1].

For the data analysis, RSV of search terms was averaged monthly and yearly at the national level. At the state level, the RSV of search terms were totaled and averaged into a single number generated over the inclusion time period. Crude OD rates were averaged by state and by year. Spearman’s rank-order correlation was used to assess the association between RSV and OD. All statistical analyses were run using R (GUI 1.70 El Capitan build). These analyses based on public, aggregate data did not require Institutional Review Board approval.

Between 2004 and 2017, ‘Methadone Clinic’ had the greatest RSV, followed by ‘Buprenorphine/Naloxone’, ‘Buprenorphine’, ‘Naltrexone’, and ‘Naloxone’. Average aggregate RSV per year increased 4.2-fold; from 18.9 in 2004 to 80.8 in 2017 (Fig. 1). Concomitantly, recorded ODs increased from a national average of 10.5 ODs per

100,000 in 2004, to 23.1 ODs per 100,000 in 2017; a 2.2-fold difference. There was a strong positive association between the annual averaged RSV of search terms and the crude rate of OD over the 13-year period ($r_s = 0.995$; 95% confidence interval [CI], 0.985–0.998).

West Virginia (WV), the most affected state, searched the selected terms associated with OUD treatment most frequently (RSV = 100) and recorded the greatest rate of OD (32.3 per 100,000), which was over 5-fold (RSV = 19.2) and 2.7-fold (OD = 12.2 per 100,000) more often than residents of Hawaii,

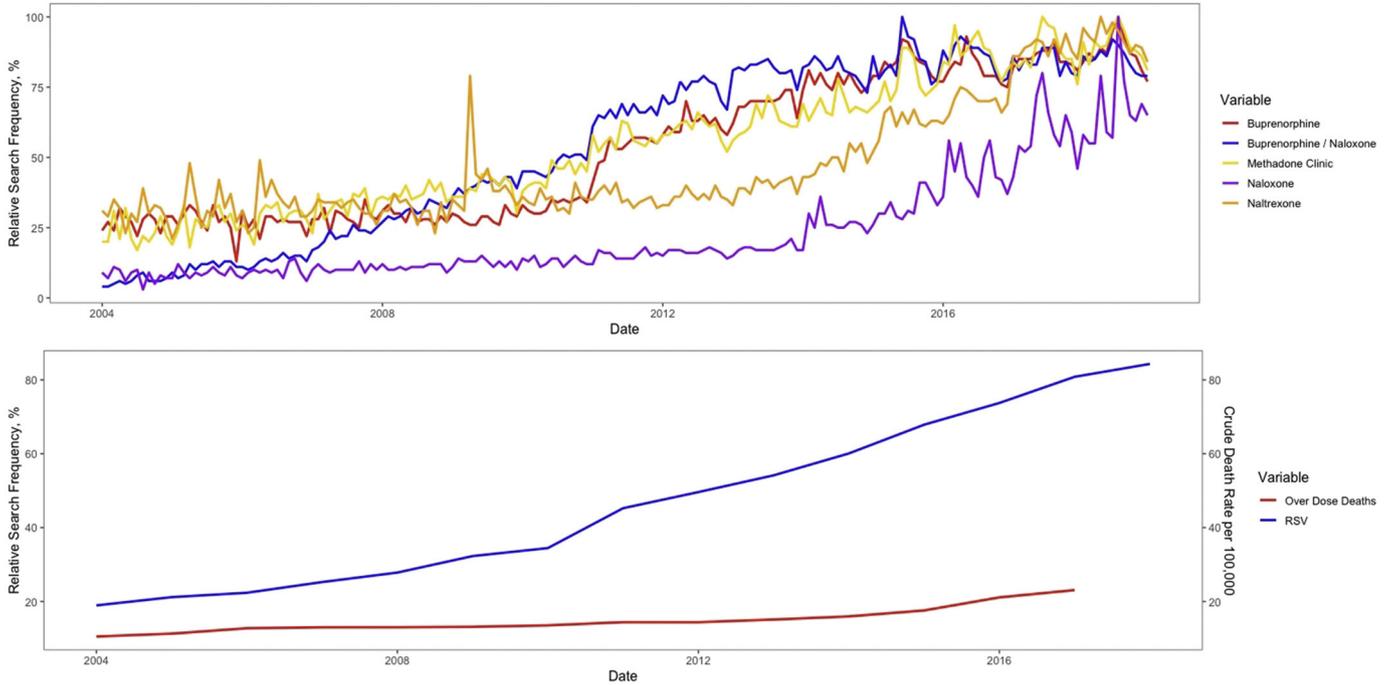


Fig. 1. Trends in relative search volume (RSV) of search term and opioid overdose deaths (OD).Top Figure represents the monthly RSV of selected terms between January 2004 to December 2018. Bottom Figure represents RSV of search terms collapsed onto a single number that was averaged per year, and Crude OD rates averaged per year.

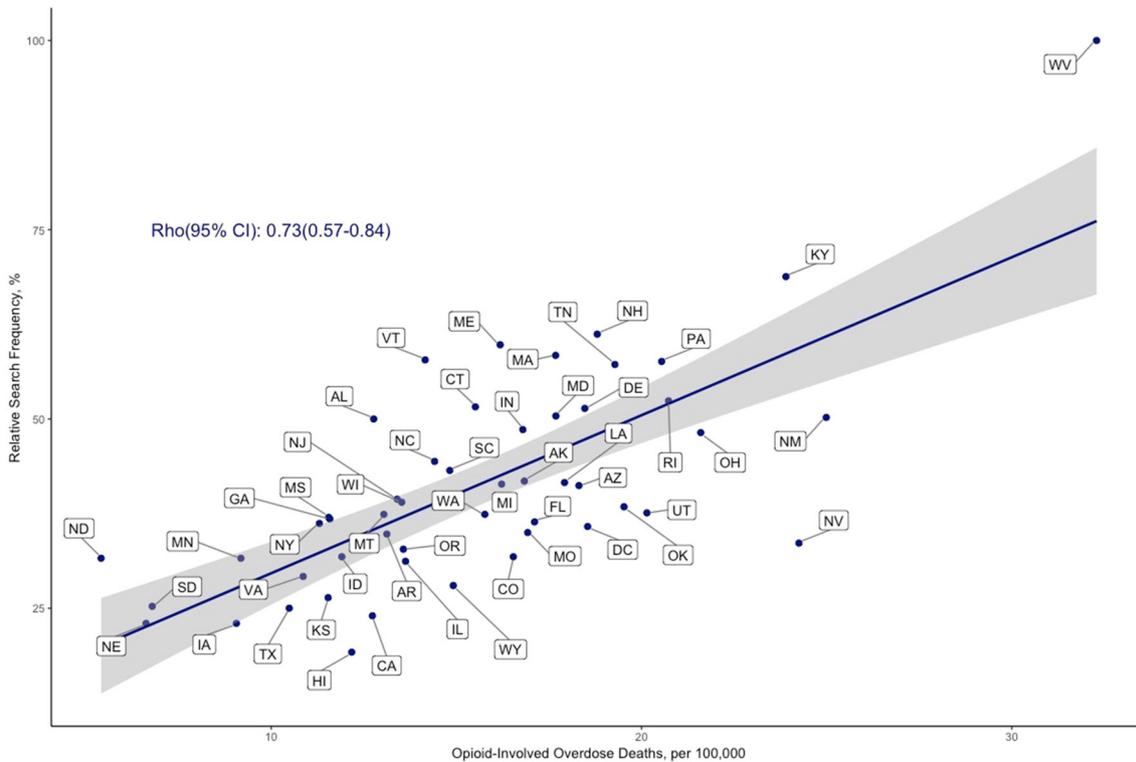


Fig. 2. Relative search volume (RSV) of search term and opioid overdose deaths (OD) vs. state.Abbreviations: Rho, Spearman’s Rho; CI, confidence interval.RSV of search terms were comprised of a single number generated over the 13-year period averaged across terms per State. Crude OD rates were averaged by state over the same timer period.

10 April 2019

which had the lowest RSV, respectively. North Dakota had the lowest OD rate (6.0-fold less than WV), and its residents searched for related terms 3.2-fold less than WV. There was a strong positive association between the 13-year RSV average of search terms and the crude rate of OD by state ($r_s = 0.73$; 95% CI, 0.57–0.84; Fig. 2).

U.S. search engine queries for MAT increased substantially over the last 14 years, and were associated with increasing prevalence of OD nationally and as it varies by state. Using the report by Andrilla et al. that described the geographic distribution of providers with a Drug Enforcement Administration waiver for prescribing buprenorphine to treat OUD, many of the states with an increased rate of OD and low RSV frequency (Fig. 1) were in States with a dearth of waived providers [14].

This study was limited by its inability to isolate searches from persons with OUD, which limits our ability to make strong inferences about individual behavior [15]. Despite this, the strong association between Internet searches and OD over 14 years of data suggests those primarily or peripherally afflicted by the opioid epidemic may be a driver for RSV frequency.

Given this increasing interest in MAT over time and recent findings of the low prevalence of facilities in the U.S. that offer MAT [16], expansion of ED-based MAT programs is justified.

Sources of support

None.

Declarations of interest

The authors declare no conflicts of interest.

Author contributions

JN, AZ, RP, AR conceived the study. JN, AZ were responsible for data collection. JN, AZ, RP, AR provided statistical advice on study design, and JN, AZ analyzed the data. JN drafted the manuscript, and all authors contributed substantially to its revision. JN takes responsibility for the paper as a whole.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajem.2019.04.021>.

Joshua D. Niforatos MTS
Cleveland Clinic Lerner College of Medicine, Case Western Reserve
University, Cleveland, OH, United States of America

Corresponding author at: Cleveland Clinic Lerner College of
Medicine, 9500 Euclid Avenue, Na/21, Cleveland, OH 44195, United
States of America.

E-mail address: jxn187@case.edu

Alexander R. Zheutlin
University of Michigan School of Medicine, Ann Arbor, MI, United States
of America

Richard M. Pescatore DO
Department of Emergency Medicine, Crozer-Keystone Health System,
Upland, PA, United States of America

Ali S. Raja MD, MBA, MPH
Department of Emergency Medicine, Massachusetts General Hospital/
Harvard Medical School, Boston, MA, United States of America

<https://doi.org/10.1016/j.ajem.2019.04.021>

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Stop the bleed training outreach initiatives targeting high school students: It takes a community to save a life



Over the last several years, there has been an increase in mass shootings in the United States [1–3]. Although emergency response times are often <15 min in major cities, there is valuable time that is not always utilized, while the victims wait for emergency