

# UC San Diego

## UC San Diego Previously Published Works

### Title

News coverage of the E-cigarette, or Vaping, product use Associated Lung Injury (EVALI) outbreak and internet searches for vaping cessation.

### Permalink

<https://escholarship.org/uc/item/6jg6t0j9>

### Journal

Tobacco control, 30(5)

### ISSN

0964-4563

### Authors

Leas, Eric C  
Nobles, Alicia L  
Caputi, Theodore L  
[et al.](#)

### Publication Date

2021-09-01

### DOI

10.1136/tobaccocontrol-2020-055755

Peer reviewed

## **BRIEF REPORT**

### **News Coverage of the E-cigarette, or Vaping, product use Associated Lung Injury (EVALI) Outbreak and Internet Searches for Vaping Cessation**

#### **Eric C. Leas, Ph.D., M.P.H.**

Assistant Professor, Division of Health Policy, Department of Family Medicine and Public Health, University of California San Diego, La Jolla, California  
Co-Founder, The Center for Data Driven Health at the Qualcomm Institute, University of California San Diego, La Jolla, California

#### **Alicia L. Nobles, Ph.D, M.S.**

Assistant Professor, Division of Infectious Diseases and Global Public Health, Department of Medicine, University of California San Diego, La Jolla, California  
Co-Founder, The Center for Data Driven Health at the Qualcomm Institute, University of California San Diego, La Jolla, California

#### **Theodore L. Caputi, M.P.H.**

Graduate Student, Department of Health Sciences, University of York, York, United Kingdom

#### **Mark Dredze, Ph.D.**

John C. Malone Associate Professor of Computer Science, Johns Hopkins University, Baltimore, MD, USA

#### **Shu-Hong Zhu, Ph.D.**

Professor, Department of Family Medicine and Public Health, University of California San Diego, La Jolla, California

#### **Joanna E. Cohen, Ph.D., M.H.Sc**

Bloomberg Professor of Disease Prevention, Institute for Global Tobacco Control, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA

#### **John W. Ayers, Ph.D., M.A.**

Vice Chief of Innovation, Division of Infectious Diseases and Global Public Health, Department of Medicine, University of California San Diego, La Jolla, California  
Co-Founder, The Center for Data Driven Health at the Qualcomm Institute, University of California San Diego, La Jolla, California

**Corresponding Author:** John W. Ayers, PhD, MA, Department of Medicine, University of California, San Diego, 9500 Gilman Dr, #3115 Qualcomm Institute, La Jolla, CA 92093 ([ayers.john.w@gmail.com](mailto:ayers.john.w@gmail.com)).

**Word Count:** 2312, **Figures:** 2

## **Abstract**

**Background:** In the latter half of 2019, an outbreak of pulmonary disease in the United States resulted in 2807 hospitalizations and 68 deaths, as of February 18, 2020. Given the severity of the outbreak, we assessed whether articles during the outbreak-era more frequently warned about the dangers of vaping and whether internet searches for vaping cessation increased.

**Methods:** Using Tobacco Watcher, a media monitoring platform that automatically identifies and categorizes news articles from sources across the globe, we obtained all articles that (a) discussed the outbreak and (b) primarily warned about the dangers of vaping. We obtained internet search trends originating from the United States that mentioned “quit” or “stop” and “e cig(s),” “ecig(s),” “e-cig(s),” “e cigarette(s),” “e-cigarette(s),” “electronic cigarette(s),” “vape(s),” “vaping,” or “vaper(s)” from Google Trends (e.g., “how do I quit vaping?”). All data were obtained from January 1, 2014 to February 18, 2020 and ARIMA models were used with historical trends to forecast the ratio of observed to expected search volumes during the outbreak-era.

**Results:** News of the vaping-induced pulmonary disease outbreak was first reported on July 25, 2019 with 195 articles, culminating in 44,512 articles by February 18, 2020. On average, news articles warning about the dangers of vaping were 130% (95%PI: -15, 417) and searches for vaping cessation were 76% (95%PI: 28, 182) higher than expected levels for the days during the period when the sources of the outbreak was unknown (July 25 to September 27, 2019). News and searches stabilized just after the US Centers for Disease Control and Prevention reported that a primary source of the outbreak was an additive used in marijuana vapes on September 27, 2019. In sum, there were 12,286 articles archived in

Tobacco Watcher primarily warning about the dangers of vaping and 1,025,000 cessation searches following the outbreak.

**Conclusions:** The vaping-induced pulmonary disease outbreak spawned increased coverage about the dangers of vaping and internet searches for vaping cessation. Resources and strategies that respond to this elevated interest should become a priority among public health leaders.

### **What This Paper Adds**

For the first time we evaluate collateral population health implications of the recent outbreak of pulmonary disease linked to vaping. Our findings suggested that both news articles warning about the dangers of vaping and internet searches for vaping cessation resources increased particularly in the time period when the source of the outbreak had not yet been linked to an additive used in marijuana vapes. The results highlight a need to meet a demand for resources for vaping cessation that has until now have largely been overlooked.

### **Introduction**

Vaping has exploded in popularity in the United States<sup>1,2</sup> with many hopeful that e-cigarettes could be less harmful than smoking.<sup>3</sup> The strategy the United States has adopted for vaping regulation has been less restrictive than some other countries<sup>4</sup> and, potentially as a result, many US youth have begun using e-cigarettes under the presumption that they are less harmful than cigarettes.<sup>5</sup>

However, a recent outbreak of pulmonary disease in the United States, which peaked in late 2019 and led to 2807 hospitalizations and 68 deaths as of February 18, 2020, may have influenced public perceptions of vaping products.<sup>6</sup> While the investigation of cases is ongoing, the US Centers for Disease Control and Prevention (CDC) primarily linked the outbreak to an additive used in marijuana vaping solutions (Vitamin E Acetate) on September 27, 2019,<sup>7</sup> introducing the potential for two distinct periods when the primary source of the outbreak was unknown and another when the primary source was known.

Given the severity of the outbreak, we hypothesized that media coverage shifted to more frequently warn about the dangers associated with vaping and that the outbreak prompted increased interest in vaping cessation (as expressed internet searches for vaping cessation), especially when the outbreak source was unknown and health concerns may have generalized to all vapes include e-cigarettes. To test these hypotheses, we relied on two data sources: 1) Tobacco Watcher to track media coverage and 2) Google Trends to track internet searches vaping cessation. News media monitoring is an important strategy to assess agenda setting and what ideas are most likely at the top-of-the-mind among the public to plan responses,<sup>8</sup> including for tobacco control.<sup>9</sup> Internet search query trends reveal what the public is potentially thinking or doing based upon the content and timing of their queries<sup>10</sup> and can serve as a rapid response data resource especially when no other data are available.<sup>11-13</sup>

## **Methods**

Tobacco Watcher ([www.tobaccowatcher.org](http://www.tobaccowatcher.org)) is a global media monitoring platform that automatically identifies and categorizes tobacco related articles from over 374,000 news websites. We searched the archive (including more than 950,000 articles from sources all throughout the world) using the “Analyses” feature to describe trends in **a**) outbreak coverage, which we defined as articles containing “vaping” with either “lung,” “respiratory,” “illness,” or “outbreak” and **b**) articles primarily warning about the dangers of vaping by using Tobacco Watcher’s automatic “warning” categorization (e.g., articles that are believed to primarily warn about the dangers of product use) in combination with articles primarily about vaping products.<sup>14</sup> We tracked Google searches ([www.google.com/trends](http://www.google.com/trends)) originating from the United States that mentioned “quit” or “stop” in combination with “e cig(s),” “ecig(s),” “e-cig(s),” “e cigarette(s),” “e-cigarette(s),” “electronic cigarette(s),” “vape(s),” “vaping,” or “vaper(s)” as indicators of internet searches for vaping cessation (e.g., “how do I quit vaping?”). News and searches were obtained from January 1, 2014, to allow for historical trends to inform our forecasts for expected volumes during the outbreak, through February 18, 2020, the last day of available data when analyses were performed.

Both news and searches were measured on a relative scale for statistical analyses. Rates of news were calculated as the number of articles matching our search criterion (keyword searches or labeled as warning) on a given day divided by the total number of articles in Tobacco Watcher occurring on the same day (expressed as percent). Search rates provided by Google were calculated as the number of searches occurring in the US that matched the search criterion on a given day divided by the total number of searches on the same day (expressed as per 10

million). Total counts of news were calculated by summing the number of articles matching the search criteria for the outbreak period in Tobacco Watcher and Google search counts for the outbreak period were estimated using the rates provided by Google and estimates of total search volume derived from [ComScore.com](https://www.comscore.com).

Our analytical approach was quasi-experimental, describing coverage of the outbreak following the first day of outbreak coverage. To define post-period cutpoints, we relied on the CDC's archive of press releases. We considered two periods. First, the period when the source of the outbreak was unknown (through September 27, 2019) and, second, the period when the CDC named Vitamin E Acetate as a primary cause of the outbreak (September 27, 2019 and onward).<sup>15</sup> To test our hypotheses, we applied an ARIMA model<sup>16</sup> to all historical data (from January 1, 2014) to forecast the expected article and search volumes, and computed the ratio of observed to expected volumes along with prediction intervals (PIs), following the first day of outbreak coverage identified in the archive. We summarize the average increases for each period and highlight key days with the largest increases from the expected values in the outbreak-era. We then used the "Smart History" feature of Tobacco Watcher to explore focal stories on key days in the time trend (e.g., a story might appear first in the Associated Press and be republished on dozens of news sites as exact or near duplicates) and described articles within those focal stories by their title and engagement on Facebook (i.e., the total number of shares). All statistical analyses were performed using R version 3.6.1 (R Foundation).

## **Results**

The first news mention of the outbreak archived in Tobacco Watcher was in a July 25, 2019 “The Patch” article entitled “8 Teens Suffer Damaged Lungs After Vaping” (**Figure 1**). 195 articles appeared on the day the first article broke and rapidly increased, peaking with 1089 articles on September 25, 2019, and culminating with 44,512 articles through February 18, 2020. Forty-three percent of these articles were published prior to the CDC identifying a potential cause of the outbreak on September 27, 2019. Two prominent articles during the period were (1) an article entitled “journey of a tainted vape cartridge: from China’s labs to your lungs” published on Leafly (a marijuana news site) that described one man’s illness case study and (2) Wall Street Journal published on September 7, 2019 citing the spread of the outbreak, each shared on Facebook 9,366 and 6,419 times, respectively. Fifty-seven percent of all articles retrieved were published after the cause being officially determined, including the popular Vice story entitled “the vaping crisis has a new villain Dank Vapes” that was shared 3,476 times on Facebook and republished or covered in 83 additional news outlets/sites.

News articles that primarily warned about the dangers of vaping hit record highs following reports of the outbreak, increasing an average of 130% (95%PI: -15, 417) above expected levels during the period when the cause of the outbreak was unknown (**Figure 2 A & B**). For 23 of the 64 days during this same period there were significantly more articles than expected, ranging from 184% (95%PI: 5, 505) more than expected on September 8, 2019 to 540% (95%PI: 136, 1000) more than expected on August 24, 2019. News volumes stabilized near expected levels around the time when CDC identified that the source of the outbreak was likely linked to marijuana vapes (September 27, 2019), although some spikes in news principally



about the dangers of vaping episodically occurred. Overall, news remained slightly elevated during the period when the cause of the outbreak was potentially identified (September 27, 2019 - February 18, 2020; 52%, 95%PI: -44, 317). In sum, there were 12,286 articles primarily warning about the dangers of vaping that were archived in Tobacco Watcher in the entire post-outbreak period (July 25, 2019 to February 18, 2020).

Vaping cessation searches increased an average of 76% (95%PI: 28, 182) above expected levels during the post-outbreak period when the source of the outbreak was unknown (Figure **C & D**). For 35 of the 64 days, queries were significantly greater than expected, ranging from 43% (95%PI: 4, 129) more than expected on August 23, 2019 to 364% (95% PI: 236, 647) more than expected on September 12, 2019. Queries began to stabilize around the time when CDC identified that the source of the outbreak was likely linked to marijuana vapes (September 27, 2019), but remained an average of 32% (95% PI: -5, 119) greater than the expected volumes during this period. In sum, there were 1,025,000 vaping cessation searches in the entire post-outbreak period.

## **Discussion**

The vaping-induced pulmonary disease outbreak spawned both record-setting coverage about the dangers of vaping and internet searches for vaping cessation, the latter sustained long after the outbreak was first reported. Vaping cessation searches notably stabilized after the CDC identified that the source of the outbreak was likely linked to an additive used in marijuana vape solutions, which may suggest that much of the initial increase resulted from a generalized concern about

the safety of all vaping products that later subsided. Nonetheless, over a million queries for vaping cessation occurred during this period, highlighting the need for an evidence base that informs clinical practice guidelines and fosters vaping cessation resources responsive to elevated demand.

Consistent with our hypothesis, we observed an uptick in searches following the start of the vaping outbreak, suggesting the outbreak may have motivated many vapers to search for vaping cessation resources. However, while receptive to behavior change,<sup>17</sup> the outbreak-era searchers likely turned up empty-handed. Few free public health sponsored resources exist for vaping (including online help-guides, chat support, or telephone helplines), and the ones that did during the outbreak era had to compete with other for-profit industries that promoted cessation strategies that are counter to the evidence.<sup>18-20</sup> Resources for vaping cessation need to be developed and become available for all Americans. One avenue for accomplishing this is adapting existing resources for cigarette smoking cessation. Future efforts will also need to consider that the majority of vapers are youth and young adults and thus be tailored to serve these populations.

While pharmacotherapies when used in combination with behavioral counseling are considered the gold standard for smoking cessation,<sup>21,22</sup> it is unclear whether these therapies will be similarly effective for vaping cessation. For instance, since vapers can vape multiple substances, including nicotine and marijuana, the types of cessation support may not be universal because the symptoms of withdrawal may not be the same across products. Even for a single vaped substance like nicotine, the variability in dosing across vapes (e.g., high dosage tank devices) makes it

difficult to effectively dose cessation therapies such as varenicline or nicotine replacement therapy.

Once developed, vaping cessation resources must be effectively deployed, including promotion through social media, targeted search engine advertisements, and earned news media. For instance, using the search trends we analyzed, health agencies could execute targeted search query advertisements to promote new vaping cessation resources akin to the behavioral marketing practices currently and successfully used by businesses. Furthermore, it is critical that we educate vapers and the public at large even now about the dangers of vaping and the availability of resources to foster cessation to create an echo effect that builds on their organically elevated interest in vaping cessation. Campaigns might create a culture that is more accepting of the dangers of vaping and encourages strategies to quit vaping.

There is added complexity given that the pulmonary disease outbreak the CDC has primarily attributed the outbreak to an additive in marijuana vapes, and many may have been prompted to quit vaping nicotine because of an unrelated event. This unintended positive effect (albeit at a substantial cost to those who died from the vaping illness outbreak) raises unaddressed but critically important questions about the unintended negative effects the marijuana vape industry has on tobacco control. Marijuana products are neither federally regulated for safety (even prior to the vaping illness outbreak 52 persons were poisoned by marijuana-derived products sold at one Utah outlet<sup>23</sup>) or marketing claims (retailers are allowed to make false health and safety claims and even target children).<sup>24</sup> For instance, national retail giant MedMen even sells marijuana branded high school varsity

jackets calling back to the dark ages of tobacco control when children wore tobacco-branded clothing to public schools in the absence of any regulation.<sup>23</sup> There is potential that the “wild west” of marijuana regulation might engender growth in nicotine vaping as those subjected to false claims from the marijuana industry attribute those to nicotine products as well.<sup>24</sup> Even evidence from the vaping illness outbreak suggests these two might be related as many teens with pulmonary disease reported dual use of marijuana and nicotine vapes.<sup>7</sup>

We should note a few potential limitations of our analysis. We could not identify the specific type of vaping products discussed in news or indicated in searches, although searches mirror many behavioral trends<sup>25</sup> including tobacco cessation.<sup>26</sup> Also, sources of news could not be limited to US news sources using Tobacco Watcher. However, in this day and age, US consumers are frequently exposed to articles coming from international news sources (e.g., *BBC* or *The Guardian*), so the global reach of Tobacco Watcher may actually be a strength. We could not determine the potential audience size for the news articles that we studied, since these readership numbers are proprietary information that news providers frequently do not share or mask in a way where the audience for any one article is unknown.

To date, public health’s attention on vaping products has been largely discordant. While some have viewed vapes as cigarette smoking cessation aids,<sup>27</sup> others have suggested that vaping is a gateway to initiation of smoking combustible cigarettes,<sup>28</sup> and others have pointed to the potential dangers of vaping (including adverse events like the outbreak).<sup>29</sup> As a result, there have been few calls for

resources to foster vaping cessation. Following the outbreak of vaping illnesses there has been widespread speculation about its potential public health implications<sup>30</sup> and our study supplants speculation with data. Given the inherent lack of resources available to help vapers quit, fostering vaping cessation must become a public health priority, especially to meet the record setting demand for vaping cessation resources. Moreover, our study also raises important questions about the future of tobacco control in the era of unregulated marijuana retailing.

### **Acknowledgements**

This research was funded in part by the Tobacco Related Diseases Research Program (28KT-004), Burroughs Wellcome Fund (Innovation in Regulatory Science), and Bloomberg Initiative to Reduce Tobacco Use. Dr. Leas acknowledges salary support from grant R01CA234539 from the National Cancer Institute at the National Institutes of Health and grant 28IR-0066 from the Tobacco Related Diseases Research Program. Mr. Caputi acknowledges support from the Marshall Scholarship program. Dr. Nobles acknowledges salary support from grant T32DA023356 from the National Institute of Drug Abuse. Dr. Zhu acknowledges support from the California Department of Public Health.

### **Conflicts**

Drs. Ayers, Cohen and Dredze are co-creators of Tobacco Watcher ([www.tobaccowatcher.org](http://www.tobaccowatcher.org)). Dr. Zhu is the founder of the California Smoker's Helpline. Drs. Ayers and Dredze own equity in a company that previously had contracts with the California Smoker's Helpline in the past five years. Dr. Leas and

Dr. Nobles have been paid data science advisors to Tobacco Watcher in the past five years.

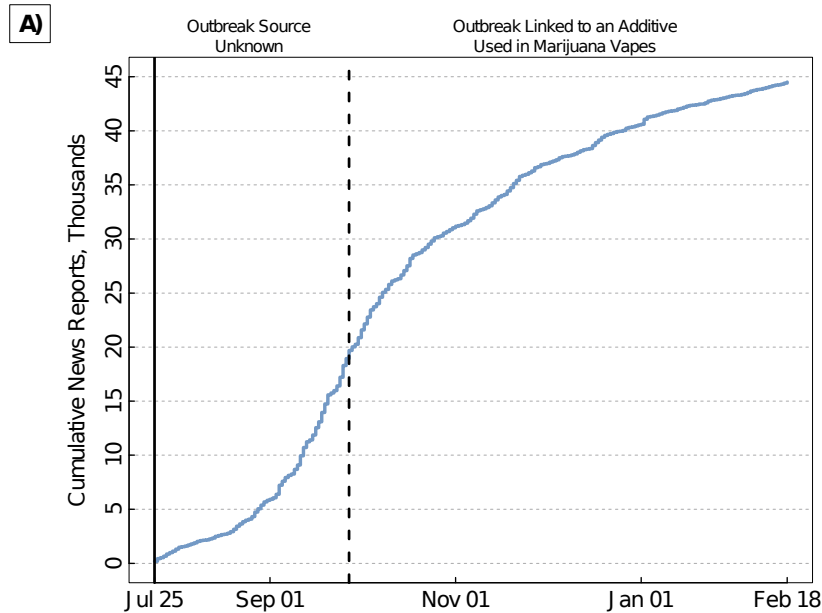
## References

1. Ayers JW, Ribisl KM, Brownstein JS. Tracking the rise in popularity of electronic nicotine delivery systems (electronic cigarettes) using search query surveillance. *American journal of preventive medicine*. 2011;40(4):448-453.
2. Ayers JW, Althouse BM, Allem J-P, Leas EC, Dredze M, Williams RS. Revisiting the rise of electronic nicotine delivery systems using search query surveillance. *American journal of preventive medicine*. 2016;50(6):e173-e181.
3. Cahn Z, Siegel M. Electronic cigarettes as a harm reduction strategy for tobacco control: A step forward or a repeat of past mistakes? *J Public Health Pol*. 2011;32(1):16-31. doi:10.1057/jphp.2010.41
4. Kennedy RD, Awopegba A, León ED, Cohen JE. Global approaches to regulating electronic cigarettes. *Tobacco Control*. 2017;26(4):440-445. doi:10.1136/tobaccocontrol-2016-053179
5. Strong DR, Leas E, Elton-Marshall T, et al. Harm perceptions and tobacco use initiation among youth in Wave 1 and 2 of the Population Assessment of Tobacco and Health (PATH) Study. *Preventive Medicine*. 2019;123:185-191. doi:10.1016/j.ypmed.2019.03.017
6. Health CO on S and. Outbreak of Lung Injury Associated with the Use of E-Cigarette, or Vaping, Products. Centers for Disease Control and Prevention. Published February 25, 2020. Accessed May 22, 2020. [https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html)
7. Blount BC, Karwowski MP, Morel-Espinosa M, et al. Evaluation of Bronchoalveolar Lavage Fluid from Patients in an Outbreak of E-cigarette, or Vaping, Product Use-Associated Lung Injury - 10 States, August-October 2019. *MMWR Morb Mortal Wkly Rep*. 2019;68(45):1040-1041. doi:10.15585/mmwr.mm6845e2
8. Ayers JW, Westmaas JL, Leas EC, et al. Leveraging big data to improve health awareness campaigns: a novel evaluation of the Great American Smokeout. *JMIR public health and surveillance*. 2016;2(1).
9. Davis RM. *The Role of the Media in Promoting and Reducing Tobacco Use*. U.S. Dept. of Health and Human Services, National Institutes of Health, National Cancer Institute; 2008. Table of contents only <http://www.loc.gov/catdir/toc/fy1001/2008412745.html>

10. Ayers JW, Althouse BM, Dredze M. Could behavioral medicine lead the web data revolution? *JAMA*. 2014;311(14):1399-1400. doi:10.1001/jama.2014.1505
11. Leas EC, Althouse BM, Dredze M, et al. Big data sensors of organic advocacy: the case of Leonardo DiCaprio and climate change. *PloS one*. 2016;11(8):e0159885.
12. Leas EC, Dredze M, Ayers JW. Ignoring Data Delays Our Reaction to Emerging Public Health Tragedies Like 13 Reasons Why. *JAMA Psychiatry*. Published online September 25, 2019. doi:10.1001/jamapsychiatry.2019.2755
13. Ayers JW, Althouse BM, Johnson M, Cohen JE. Circaseptan (Weekly) Rhythms in Smoking Cessation Considerations. *JAMA Intern Med*. 2014;174(1):146-148. doi:10.1001/jamainternmed.2013.11933
14. Ayers JW, Dredze M, Leas EC, Caputi TL, Allem J-P, Cohen JE. Next generation media monitoring: Global coverage of electronic nicotine delivery systems (electronic cigarettes) on Bing, Google and Twitter, 2013-2018. *PLoS ONE*. 2018;13(11):e0205822. doi:10.1371/journal.pone.0205822
15. CDC. THC Products May Play a Role in Outbreak of Lung Injury Associated with E-cigarette Use, or Vaping. Centers for Disease Control and Prevention. Published September 27, 2019. Accessed May 22, 2020. <https://www.cdc.gov/media/releases/2019/p0927-thc-vaping.html>
16. Hyndman RJ, Khandakar Y. Automatic Time Series Forecasting: The **forecast** Package for R. *J Stat Soft*. 2008;27(3). doi:10.18637/jss.v027.i03
17. Lambert SD, Loiselle CG. Health information seeking behavior. *Qual Health Res*. 2007;17(8):1006-1019. doi:10.1177/1049732307305199
18. Ayers JW, Althouse BM, Ribisl KM, Emery S. Digital detection for tobacco control: online reactions to the 2009 U.S. cigarette excise tax increase. *Nicotine Tob Res*. 2014;16(5):576-583. doi:10.1093/ntr/ntt186
19. Leas EC, Cohen JE, Ayers JW. A Philip Morris advertisement for its heated tobacco product IQOS sets a troubling precedent. *Tob Control*. Published online February 4, 2020. doi:10.1136/tobaccocontrol-2019-055363
20. Caputi TL, Leas E, Dredze M, Cohen JE, Ayers JW. They're heating up: Internet search query trends reveal significant public interest in heat-not-burn tobacco products. *PLOS ONE*. 2017;12(10):e0185735. doi:10.1371/journal.pone.0185735
21. Leas EC, Pierce JP, Benmarhnia T, et al. Effectiveness of pharmaceutical smoking cessation aids in a nationally representative cohort of American smokers. *JNCI: Journal of the National Cancer Institute*. 2017;110(6):581-587.
22. Prochaska JJ, Benowitz NL. Current advances in research in treatment and recovery: Nicotine addiction. *Sci Adv*. 2019;5(10):eaay9763. doi:10.1126/sciadv.aay9763

23. Horth RZ, Crouch B, Horowitz BZ, et al. *Notes from the Field: Acute Poisonings from a Synthetic Cannabinoid Sold as Cannabidiol — Utah, 2017–2018*. *MMWR Morb Mortal Wkly Rep*. 2018;67(20):587-588. doi:10.15585/mmwr.mm6720a5
24. Ayers JW, Caputi T, Leas EC. The Need for Federal Regulation of Marijuana Marketing. *JAMA*. Published online May 16, 2019. doi:10.1001/jama.2019.4432
25. Goel S, Hofman JM, Lahaie S, Pennock DM, Watts DJ. Predicting consumer behavior with Web search. *PNAS*. 2010;107(41):17486-17490. doi:10.1073/pnas.1005962107
26. Ayers JW, Althouse BM. “Tips From Former Smokers” Can Benefit From Considering All Available Data. *Am J Prev Med*. 2015;49(6):e133-e134. doi:10.1016/j.amepre.2015.08.005
27. Wagener TL, Siegel M, Borrelli B. Electronic cigarettes: achieving a balanced perspective. *Addiction*. 2012;107(9):1545-1548. doi:10.1111/j.1360-0443.2012.03826.x
28. Leventhal AM, Strong DR, Kirkpatrick MG, et al. Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *JAMA*. 2015;314(7):700-707. doi:10.1001/jama.2015.8950
29. Grana R, Benowitz N, Glantz SA. E-cigarettes: a scientific review. *Circulation*. 2014;129(19):1972-1986. doi:10.1161/CIRCULATIONAHA.114.007667
30. Hammond D. Outbreak of pulmonary diseases linked to vaping. *BMJ*. 2019;366. doi:10.1136/bmj.l5445





**B)**

**8 Teens Had 'Seriously Damaged' Lungs After Vapin...**

07/25/2019 Patch.com

Children's Hospital reported eight teens had "seriously damaged" lungs and required hospitalization in July. Each admitted to vaping. Jul 25, 2019 12:53 pm ET Officials say they believe prolonged exposure to vaping chemicals could lead to more serious health issues. (Image Via Shutterstock)

MILWAUKEE, WI — Eight teenagers were hospitalized with seriously-damaged lungs in July at Children's Hospital, and state health officials say each of the cases involves vaping. The state is currently investigating the possible causes of these illnesses, but all patients reported vaping in the weeks and months prior to being hospitalized. "While an exact cause is unknown, the number of patients in such a s... [\[Read more\]](#)

Warnings

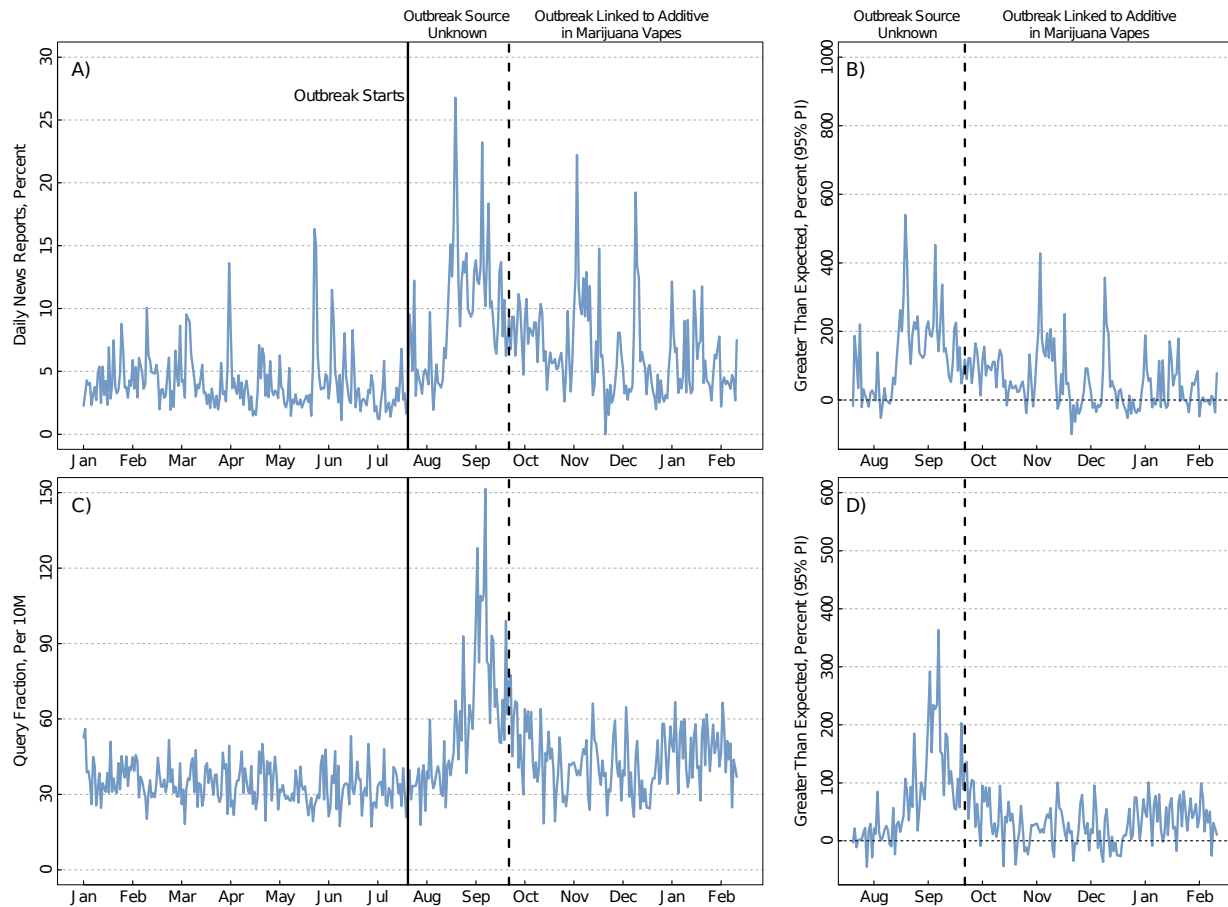
- United States North America
- English
- E-Cigarettes

Share Feedback

**Figure 1. News media timeline of the outbreak of vaping-induced pulmonary disease**

A, The cumulative article counts for news articles that mentioned “vaping” and “lung,” “respiratory,” “illness,” or “outbreak” as archived on Tobacco Watcher ([www.tobaccowatcher.org](http://www.tobaccowatcher.org)). B, The first news article describing the outbreak of vaping-induced pulmonary disease as preserved on the Tobacco Watcher platform. The article is accessible at the following link:

<https://tobaccowatcher.globaltobaccocontrol.org/articles/2aa6f72e-0ea0-3b66-93d8-9b8f55fda5cd/#related-coverage>



**Figure 2. Changes in news and internet searches following the outbreak of vaping-induced pulmonary disease**

A, Observed daily trend for news articles primarily warning about vaping from January 1, 2019 to February 18, 2020. B, The ratio of the observed to the forecasted expected daily trend for news articles primarily warning about vaping and the 95% PI of this ratio, which incorporates the uncertainty of the forecast and is shaded in light blue, for the period from the start of the outbreak (July 25, 2019) to the end of the interval (February 18, 2020). C, Observed daily trend for vaping cessation Google searches from January 1, 2019 to February 18, 2020. D, The ratio of the observed to the forecasted expected daily trend for vaping cessation Google searches and the 95% PI of this ratio, which incorporates the uncertainty of the forecast and is shaded in light blue, for the period from the start of the outbreak (July 25th, 2019) to the end of the interval (February 18, 2020). 95% PI = 95% Prediction Interval; Note: Trends from January 1, 2014 prior to July 25, 2019 were used to develop a forecast of expected values for the outbreak-era (presented in panels B & D), but trimmed in the time series we presented in panels A & C to improve the visibility of the trend.

