Brief Report

Content Analysis of E-cigarette News Articles Amidst the 2019 Vaping-Associated Lung Injury (EVALI) Outbreak in the United States

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Abstract

Introduction: News media can shape public perceptions about e-cigarettes, particularly in the context of ongoing uncertainty from the recent outbreak of e-cigarette or vaping product use-associated lung injury (EVALI). This study aimed to characterize news articles published about e-cigarettes in 2019, including before and during the EVALI outbreak.

Aims and Methods: Using 24 e-cigarette-related search terms, we gathered all articles published in leading print and online U.S. news sources in 2019 from databases (i.e., *Factiva*, *Access World News*) and archival web sites (i.e., www.newspapers.com). We conducted a content analysis of e-cigarette themes and statements, identifying differences in themes between articles that did and did not mention EVALI.

Results: Of the 1643 e-cigarette news articles published in 2019, 62% mentioned EVALI. Frequency of e-cigarette articles peaked in September ($n = 532$) at the height of the EVALI outbreak. Among all articles discussing e-cigarettes, the most prevalent main topics were policy/regulation (45%) and health effects (35%). Articles that mentioned EVALI frequently discussed youth e-cigarette use (40%) and JUUL (33%). Compared to non-EVALI articles, EVALI articles were more likely to discuss health effects ($p < .001$) but less likely to discuss policies/regulations, except for flavor bans (47% of EVALI articles vs. 39% of non-EVALI articles, $p = .002$). EVALI articles were also less likely to discuss e-cigarettes being less risky than cigarettes ($p = .005$).

Conclusions: E-cigarette news coverage was prevalent in 2019, and patterns in frequency and content reflected major events (i.e., EVALI). In turn, news media can shape public perceptions, and even policy, about e-cigarettes and must continue to be monitored.

Implications: E-cigarette news coverage in 2019 was high, driven in large part by news coverage of the EVALI outbreak. Indeed, the peak in e-cigarette news articles in September directly coincided with the peak in EVALI cases in the United States. Of note, articles that mentioned EVALI frequently discussed youth e-cigarette use, JUUL, and flavor bans, which may have triggered national and state-level policy responses, and likely influenced public perceptions (including misperceptions) regarding the harms of e-cigarettes.

Introduction

Vaping devices – also known as e-cigarettes, vaporizers, or vapes – are battery powered devices with liquid that commonly contains nicotine (sometimes flavored), but can also contain tetrahydrocannabinol (THC), the main psychoactive constituent of marijuana.[1] Nicotine e-cigarette use continues to be widespread, and is the most commonly used tobacco/nicotine product among youth and young adults.[2,3] Additionally, e-cigarette use among adults, especially daily use,[4] tends to be highest among former and current cigarette smokers.[3] Simultaneously, marijuana vaping is also common among youth[1] and about one in ten adults report use, primarily for medical use.[5]

Information from various sources can influence individuals' perceptions of harm, particularly when it comes to issues that are surrounded by uncertainty, such as e-cigarettes and, more recently, the e-cigarette, or vaping, product use-associated lung injury (EVALI) outbreak.[6] The first known cases of EVALI emerged in April 2019 with cases peaking mid-September. Nearly two of three cases were among people under the age of 35, and 16% of cases were among youth younger than 18 years.[7] Early and frequently repeated communications from the Centers for Disease Control and Prevention (CDC) called on individuals to stop using *all* e-cigarette and vaping products – that is those that contain nicotine or THC.[8] Ultimately, investigations revealed that the EVALI outbreak was predominantly associated with vaping THC. Indeed, 82% of EVALI patients reported using a vaping device containing THC,[9] the majority of whom reported using THC-containing products acquired from informal sources such as friends, family members, in-person dealers, or online sources.[9] With added evidence, the CDC refined its recommendations to not use THC-containing e-cigarette or vaping products, particularly from informal sources.[10] In a recent study examining perceptions prior to and following the EVALI outbreak, it was found that after exposure to EVALI information, there was a notable increase in the number of respondents who perceived e-cigarettes to be more harmful than cigarettes.[8] It was also found that there was a slight decrease in perceived risk of nicotine-containing e-cigarettes following a shift in CDC messaging over the course of the outbreak that moved towards more focused warnings about THC-containing vapor products.[8]

Given that news media continues to play a large role in shaping public perceptions about e-cigarettes,[11,12] this study aimed to analyze e-cigarette-related news media articles in 2019 with special attention paid to the news coverage around the time of the EVALI outbreak, in order to characterize and better understand the type of information that was presented to the U.S. public.

METHODS

Data Sample

E-cigarette articles were obtained through the online databases *Factiva* and *Access World News* as well as the archival web site www.newspapers.com. All news, feature, advice, and opinion articles were included if they contained at least one of 24 e-cigarette related terms in the headline (singular and plural forms of "electronic cigarette," "ecigarette," "e-cigarette," "e-cig," "ecig," "vaping," "vape," "vaporizer," "e-liquid," "e-juice," "electronic nicotine delivery device," "JUUL," "JUULing") and appeared in one of four national wire services (Associated Press, CNN Wire, Reuters, UPI News Track), top 34 circulating newspapers, and five leading online news sources (ABC News, CBS News, CNN News, Huffington Post, NBC News), as determined by the Pew Research Center and Alliance for Audited Media's Media Intelligence Center.[13,14] Duplicate articles (e.g., wire stories published in newspapers) were excluded from the sample.

Coding and Analysis

A coding sheet and guide were developed, following procedures described in a previous study.[14] Articles were coded for the overall main topic, or the main issue driving the story, generally presented in the headline/leading paragraphs (i.e., e-cigarette prevalence/trends, policy/regulation, health effects, cessation, industry activities/retail, or other). Articles were also coded for statements on specific topics pertaining to e-cigarette prevalence, policy/regulation, health benefits, and health risks. Given the emergence of the EVALI outbreak in mid-2019, articles were coded for whether they mentioned EVALI, and if yes, whether the article mentioned death related to vaping, or recommendations from the U.S. Food and Drug Administration (FDA) or CDC on the outbreak. We also coded whether the article mentioned vaping in relation to THC (since this was the primary cause of the illnesses) and whether vaping THC was mentioned in the first or second half of the story (potentially signifying more prominence in the story). Coding was completed manually by three trained research staff members – one primary coder coded 50% of articles while the other two coders each coded 25% of articles. To measure interrater reliability, 10% of randomly selected articles were double-coded, resulting in an average Kappa value of 0.84. Any disagreements among coders were resolved after thorough discussion, before they proceeded with coding the remaining articles. Descriptive statistics identified frequency of topics and chi-square tests were run to identify differences between articles that did and did not discuss EVALI.

Results

A total of 1643 e-cigarette news articles were identified, the majority being news or feature articles (92% vs. 8% opinion pieces). EVALI was mentioned in 62% (n = 1015) of all e-cigarette news articles.

The frequency of e-cigarette articles remained steady in the first half of 2019, but rapidly increased to reach a peak of 532 articles published in September, before gradually decreasing to 119 articles in December (Figure 1). This pattern was largely driven by the frequency of EVALI-related articles, which started appearing midway through the year and increased monthly to reach a peak of 484 articles published in September before gradually decreasing to 88 articles by the end of the year.

Across all e-cigarette news articles, the most prevalent main theme was policy/regulation (44.8%), followed by health effects (35.1%) (Table 1). Specific policies and regulations that were discussed included flavor bans (43.9%), marketing/advertising restrictions (25.4%), age-of-sale restrictions (23.4%), and FDA regulation (23.2%) (Table 1). In general, there were frequent mentions of issues concerning youth e-cigarette use, including youth prevalence (48.3%), JUUL (40.2%), and flavors that appeal to youth (27.3%). Additionally, e-cigarette articles tended to include statements regarding the health risks and benefits of e-cigarettes. About a third of all articles discussed nicotine being addictive or harmful (31.4%), while a fifth of all articles mentioned e-cigarettes were less risky than cigarettes (20.5%) and could be an effective tool for cessation (20.3%).

EVALI vs. Non-EVALI articles

There were several noticeable differences between articles that did and did not mention EVALI. Most notably, the main theme was
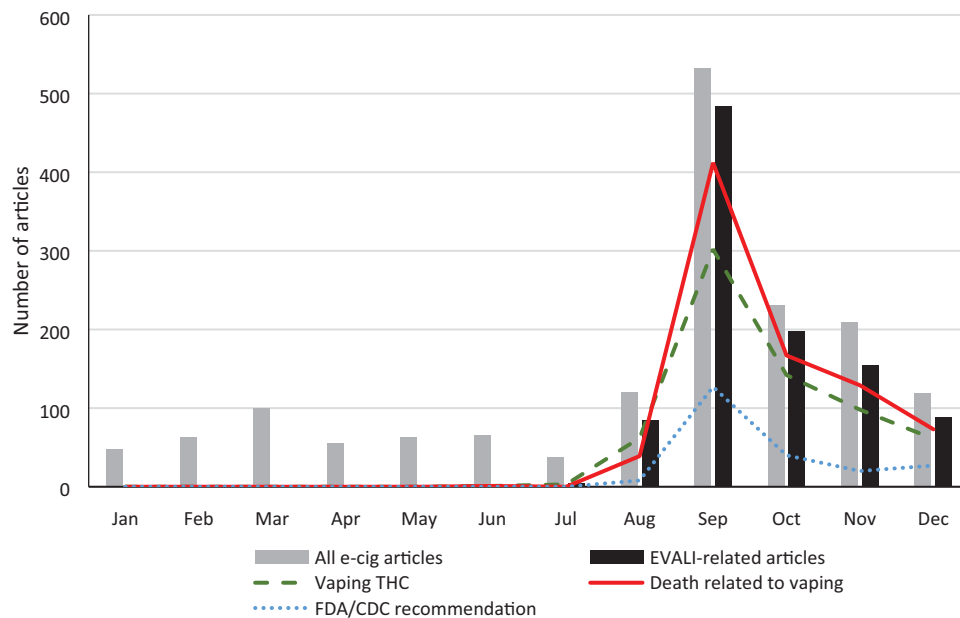
Figure 1. EVALI-related articles by month. Line graphs indicate EVALI-specific content only coded among EVALI-related articles. *Note:* In September 2019, CDC issued recommendations to broadly "refrain from using e-cigarette/vaping products, especially those with THC." In December 2019, CDC refined their recommendations to "not use e-cigarette, or vaping, products that contain THC" specifically.

significantly more likely to be health effects in EVALI-related articles compared to non-EVALI articles (47.8% vs. 14.6%, *p* < .001) (Table 1). On the other hand, the main theme was significantly less likely to be policy/regulation in EVALI-related articles compared to non-EVALI articles (40.6% vs. 51.6%, *p* < .001). Consequently, specific policies and regulations were also less likely to be mentioned, with the exception of flavor bans (47.0% among EVALI articles vs. 39.0% among non-EVALI articles, *p* = .002). Furthermore, EVALI-related articles were significantly less likely than non-EVALI articles to mention specific topics concerning youth use, such as youth prevalence (39.5% vs. 62.4%, *p* < .001) and JUUL (32.6% vs. 52.5%, *p* < .001).

When discussing the health risks of e-cigarettes, EVALI-related articles were less likely than non-EVALI articles to discuss the addictiveness/harmfulness of nicotine (26.1% vs. 40.0%, *p* < .001), but were more likely to discuss quality concerns about manufacturing (32.4% vs. 4.3%, *p* < .001). Unsurprisingly, EVALI articles were less likely than non-EVALI articles to discuss the potential health benefits of e-cigarettes, such as being less risky than cigarettes (18.3% vs. 24.0%, *p* = .005) and being an effective tool for cessation (17.1% vs. 25.3%, *p* < .001).

Articles that mentioned EVALI further discussed specific topics related to the lung disease. In particular, 81% of the EVALI articles mentioned death with regards to vaping, while references to FDA or CDC recommendations were only present in 22% of EVALI articles. About two-thirds of EVALI-related articles referred to vaping THC. However, 31% of these articles (and 20% of all EVALI articles) placed these mentions only in the second half of the story (Table 1).

Discussion

This content analysis of e-cigarette news articles from 2019 showed that patterns in news media frequency and content reflected changes observed in major events (i.e., EVALI) and government policies/recommendations. Coverage of e-cigarette news was high – almost

three times the amount of that in 2018 (1643 unique articles in 2019 vs. 577 in 2018).[14] In terms of article frequency over the year, there was a noticeable peak in overall e-cigarette articles as well as EVALI-related articles in September 2019. As expected, this timing coincided with the September peak in EVALI cases throughout the United States, building on findings from our previous work that similarly showed associations between e-cigarette news coverage and major events.[14]

The EVALI outbreak had several characteristics that made it a newsworthy topic – it was novel, impacted young people, and included elements of drama and controversy (e.g., unexpected fatalities, e-cigarettes as under-regulated products, illicit and black-market THC products). Both the seriousness of the issue and the prominence of its coverage in the media (which is known to have "agenda setting effects")[15] likely influenced policy responses around the country. For example, numerous states passed "emergency bans" on vaping products around the time of the EVALI peak, including those that specifically banned flavored e-cigarettes and nicotine e-cigarette products like JUUL,[16] even though flavors and nicotine-containing e-cigarettes were not implicated as causing EVALI. Indeed, we found that discussion of flavor bans was more frequent in EVALI-related articles than non-EVALI articles.

Furthermore, it has been argued that issues surrounding EVALI have been conflated with concerns about the high prevalence of youth vaping, leading to broad bans and initial recommendations against all vaping products.[8] Our study found that topics related to youth e-cigarette use were frequently discussed across e-cigarette articles, including among EVALI-related stories, and notably, JUUL was referenced in about one-third of EVALI-related articles. The conflating of EVALI and youth concerns, as well as different types of vaping products and terminology, may also have contributed to public misperceptions regarding EVALI. In fact, one study found that more than twice as many participants believed e-cigarettes like JUUL to be responsible for EVALI versus THC products (66% vs. 28%).[17]

Table 1. Prevalence of E-cigarette Themes and Topics

	All articles (N = 1643)	EVALI articles (N = 1015)	Non-EVALI articles (N = 628)	
	n (%)	*n* (%)	*n* (%)	p
Type of article				
News/feature	1505 (91.6)	940 (92.6)	565 (90.0)	.061
Op-Ed	137 (8.3)	75 (7.4)	62 (9.9)	.077
Main topic/theme				
Policy/regulation	736 (44.8)	412 (40.6)	324 (51.6)	<.001
Health effects	577 (35.1)	485 (47.8)	92 (14.6)	<.001
Industry activities/retail	129 (7.8)	50 (4.9)	79 (12.6)	<.001
Prevalence/trends	112 (6.8)	30 (3.0)	82 (13.1)	<.001
Cessation	40 (2.4)	14 (1.4)	26 (4.1)	<.001
Other	49 (3.0)	24 (2.4)	25 (4.0)	.061
Youth use				
Youth prevalence	793 (48.3)	401 (39.5)	392 (62.4)	<.001
Mentions JUUL	661 (40.2)	331 (32.6)	330 (52.5)	<.001
Flavors appeal to youth	448 (27.3)	270 (26.6)	178 (28.3)	.441
Encourage youth use/gateway	251 (15.3)	92 (9.1)	159 (25.3)	<.001
Product characteristics				
Flavors	466 (28.4)	255 (25.1)	211 (33.6)	<.001
Nicotine content	100 (6.1)	31 (3.1)	69 (11.0)	<.001
Policy/regulation				
Flavor bans	722 (43.9)	477 (47.0)	245 (39.0)	.002
Marketing/advertising restrictions	417 (25.4)	265 (26.1)	152 (24.2)	.389
Age-of-sale restrictions	384 (23.4)	172 (16.9)	212 (33.8)	<.001
FDA regulation	381 (23.2)	178 (17.5)	203 (32.3)	<.001
Smoke free air laws	102 (6.2)	45 (4.4)	57 (9.1)	<.001
Taxation	99 (6.0)	51 (5.0)	48 (7.6)	.03
Warning labels	47 (2.9)	21 (2.1)	26 (4.1)	.014
Health risk statements				
Nicotine is addictive/harmful	516 (31.4)	265 (26.1)	251(40.0)	<.001
Quality concerns about manufacturing	356 (21.7)	329 (32.4)	27 (4.3)	<.001
Exposure to toxins/carcinogens	209 (12.7)	138 (13.6)	71 (11.3)	.176
Health effects unknown	189 (11.5)	109 (10.7)	80 (12.7)	.217
Not effective for cessation	43 (2.6)	10 (1.0)	33 (5.3)	<.001
Prevents quitting	14 (0.9)	2 (0.2)	12 (1.9)	<.001
Health benefit statements				
Less risky than cigarettes	337 (20.5)	186 (18.3)	151 (24.0)	.005
Effective tool for cessation	333 (20.3)	174 (17.1)	159 (25.3)	<.001
EVALI-specific content[a]				
Vaping THC		669 (65.9)		
Mentioned in first half of article	–	462 (45.5)	–	–
Mentioned in second half of article	–	207 (20.3)	–	–
Death related to vaping	–	821 (80.9)	–	–
FDA/CDC recommendation	–	222 (21.9)	–	–

p-Values indicate significance levels for differences between EVALI and non-EVALI articles.
[a]EVALI-specific content was only present and coded for in articles that mentioned EVALI.

Indeed, it is important to note that while the news media may be informed by government actions/recommendations and public discourse, what the news media reports and emphasizes can subsequently influence public perceptions about e-cigarettes, particularly during novel (and therefore uncertain) events like EVALI. In our study, we found that deaths caused by EVALI were frequently mentioned in EVALI-related news articles (more than three times as often as FDA or CDC recommendations). Additionally, we found that references to e-cigarette health risks were more prevalent than references to potential benefits, which may be unsurprising given the prominence of EVALI. In fact, compared to previous years, there was a notable decrease in the number of articles referring to e-cigarettes as less harmful than cigarettes (21% in 2019 vs. 35% in 2015).[14] In light of the EVALI outbreak, studies have begun describing the likely influence of the lung disease and EVALI-related news on risk perceptions.[8,18,19] For example, one qualitative study found that exposure to EVALI news was associated with reduced interest in e-cigarettes among young adult non-smokers (a potentially unintended positive effect) but was also associated with increased harm perceptions and reduced receptivity to switching to e-cigarettes among adult current smokers (a potentially negative unintended effect).[19] Population-level research has also suggested increases in perceptions that e-cigarettes are equally or more harmful than traditional cigarettes after EVALI,[8] even outside of the United States.[18] Future research should examine the persistence of EVALI concerns on e-cigarette perceptions and use intentions.

In summary, this study confirms that e-cigarette news coverage was extremely high in 2019, due in large part to EVALI news coverage.

Although study findings are derived from only one year's worth of articles, the range of dates was sufficient in capturing changes in news frequency and content before and after the EVALI outbreak, offering insight into the available information that the public could have been exposed to. Moreover, these analyses highlight that news coverage of a crisis can trigger policy responses that are sometimes not particularly pertinent to the original crisis. The news media is uniquely placed to act as a channel for conveying science to the general public and should continue to be monitored to understand potential changes in public discourse and perceptions surrounding e-cigarettes. Future research should examine whether and how references to EVALI continue to percolate in the news media.

Supplementary Material

A Contributorship Form detailing each author's specific involvement with this content, as well as any supplementary data, are available online at https://academic.oup.com/ntr.

Funding

Declaration of Interests

The authors declare no conflict of interest.

Data Availability

Data underlying this article will be shared on reasonable request to the corresponding author.

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