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Evaluating interest in off-label use of disinfectants for COVID-19



In February, 2020, during the initial phase of the COVID-19 pandemic, the US Centers for Disease Control and Prevention (CDC) made recommendations to clean and disinfect frequently-handled objects, which triggered nationwide panic buying of disinfectant products such as Clorox and Lysol. Numerous regulatory agencies and public health organisations (eg, CDC, US Food and Drug Administration, US Consumer Product Safety Commission, and the American Association of Poison Control Centers [AAPCC]) have repeatedly advised against ingestion and other off-label use of disinfectants and cleaning products. However, during a White House press briefing on April 23, 2020, President Trump implied that the White House Coronavirus Task Force should investigate injections of disinfectant as a potential treatment for COVID-19.¹

Health communication research shows that ideological and political affiliations can widen the divide between acquired knowledge and an individual's beliefs regarding public health behaviours and outcomes.² Political leaders, especially the president of the USA, can command media attention and direct public health policy.³ During public health emergencies, imprecise communication of emerging research by government leadership can cast doubt on reputable sources of scientific information.^{2,3} Additionally, as the so-called Spiral of Silence theory purports, those in positions of authority can influence social dynamics and public opinion on controversial issues.⁴ Government leaders who openly question scientific consensus on an important issue can increase anxiety and perceptions of threat among the public, undermining the effect of accurate information and encouraging risky behaviours.³

Rapidly evolving information related to the pandemic has led to confusion regarding appropriate public health measures and behaviours for stopping the spread of COVID-19. People tend to use motivated reasoning, such that new information consistent with their opinions is considered stronger than information inconsistent with previous beliefs (ie, confirmation bias) regardless of its objective accuracy, and individuals have little incentive to spend excessive time and effort in seeking and processing technical information.³ During

a public health emergency, those affected try to reduce uncertainty and the internet provides a way to easily and rapidly search for clarifying information.⁵ Therefore, we hypothesised that there would be an increase in Google search interest regarding off-label use of disinfectants following the President's remarks on April 23, 2020.

Internet search query data, such as Google Trends, are frequently used as proxy indicators of public interest in a given topic area.⁵ Across the USA, we evaluated search interests from January 1, 2020, to May 10, 2020, for the purchase and consumption of disinfectants and for poison control centres, which were included to examine relevant behavioural outcomes from AAPCC and CDC data. Google Trends quantifies "search interest" for a given query as the proportion of search queries for that topic relative to all search queries submitted to Google at that time and location. The resulting numbers are scaled from 0 to 100, with a score of 100 representing peak search interest. When multiple search terms are compared, interest in the less popular search term is interpreted as relative search interest compared with the most popular search term. CIs for each trend were calculated by averaging multiple samples collected daily over a 3-week period (appendix pp 2–7).

The relative search fraction (RSF) values for purchasing (0.17 [95% CI: 0.16–0.18]), drinking (0.09 [95% CI: 0.08–0.1]), or injecting disinfectants (0.00 [95% CI: 0.00–0.00]) and poison control centres (2.19 [95% CI: 2.17–2.21]) were minimal between January, 2020, and February, 2020. Search queries for purchasing disinfectants increased on March 12, 2020 (RSF=7.4 [95% CI: 7.2–7.6]), which coincided with the President's declaration of a national emergency on March 13, 2020. On April 24, 2020, the day after the White House press briefing, RSF for drinking disinfectants was 32.3 (95% CI: 31.9–32.7) and injecting disinfectants was 100 (95% CI: 100–100). RSF for poison control centres peaked a day later on April 25, 2020, (RSF=11.05 [95% CI: 10.8–11.3]), suggesting an increase in interest in poison control centres for either information or assistance following off-label use of disinfectants. Increased interest in search queries for the off-label use of disinfectants and poison control centres persisted for 7 days (appendix p 1).

Published Online
September 28, 2020
[https://doi.org/10.1016/S2589-7500\(20\)30215-6](https://doi.org/10.1016/S2589-7500(20)30215-6)

See Online for appendix

Online search behaviour can involve media-generated interest in current events and intentional information gathering; therefore, we attempted to minimise the potential for media exposure bias in our analysis by using a de-biasing method that incorporates the proportion of news articles generated for each topic over the same period of time.⁶ We found that this method did not appreciably change our results (appendix pp 8–10). We also further attempted to distinguish between media-generated search interest versus interest in off-label use of disinfectants by comparing our search topics with the word “trump” added to each query. We found that at its peak, RSF values for injecting and drinking disinfectants were considerably higher than the same topics with the word “trump.” This further suggests that online searches for off-label use of disinfectants cannot be attributed strictly to media-generated interest (appendix pp 8–10).

We cannot directly attribute off-label use of disinfectants to the observed trends in search queries or to the President’s comments; however, reported toxicity events following the press briefing suggest that the observed peaks are more likely related to off-label use than mere curiosity in the President’s statements. Both CDC⁷ and AAPCC^{8,9} have reported increases in off-label use of cleaners and disinfectants during the COVID-19 pandemic, compared with the same time period in 2018 and 2019. Furthermore, a CDC survey (appendix p 11) found that approximately 40% of respondents reported misusing cleaning products in April, 2020.¹⁰ Our analysis complements AAPCC and CDC figures and shows the usefulness of computational metrics for public interest regarding public health and science communication. More specifically, our data suggests that Google Trends data could be incorporated into a near real-time monitoring system for tracking disinfectant-related poisonings and other public health issues during the COVID-19 pandemic.

Our analysis is limited by insufficient readily available validation data. Consumer sales data were not accessible at the time of writing (July, 2020), although we hope to supplement our findings in a future study. Furthermore, we have sought poison control data from AAPCC to attempt to provide additional support for the results presented in this Comment.

Our findings show a contemporaneous relationship between President Trump’s remarks and online

search trends, expanding upon previous analysis of the President’s statements on public health behaviours and in concordance with the Spiral of Silence theory.^{2,4} The White House press briefings are intended to provide the latest COVID-19 updates from the USA government; thus, accurate science communication is of paramount importance. Following the press briefing on April 23, 2020, there was an over 3000% overnight increase in search interest for off-label use of disinfectants (appendix p 12). Public officials have a responsibility to communicate issues that are evidence-based and positively affect public salience, especially during public health emergencies. As previous research has shown, “clear and evidence-orientated communication regarding pandemics can positively affect the public’s awareness”^{7,2} and promote public health during a pandemic. Misleading information related to off-label use of any substance might adversely affect public knowledge and behaviour, and experts in science and public health should work to counteract harmful communication of health information via all venues and platforms.

This Comment was supported in part by grant T32HD040128 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, National Institutes of Health. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The authors have not been paid to write this Comment by a pharmaceutical company or other agency. JMR had full access to all the data in the study and had final responsibility for the decision to submit for publication. The authors thank Neko M Castleberry, Brittany Blizzard, Katelyn Ringrose, and Margaret Cunningham for their assistance in reviewing a previous version of the Comment. We declare no competing interests.

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