Countering anti-vaccination influences from social media with conversation

August 10 2020

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The flu vaccine is considered one of the great achievements in public health, and each year it prevents millions of people from getting sick and thousands of deaths. Even so, social media messages abound with skepticism and falsehoods about vaccination.

What effect, if any, do these social media messages have on actual vaccination behavior?

A new study on this underexplored subject, using big data and survey results from the 2018-19 flu season, finds strong associations between regional social media messages and vaccination attitudes and behavior. But when there are negative associations between social media content and vaccination, real-life discussions with family and friends appear to eliminate them.

The study, published in the journal *Vaccine*, analyzes 115,330 geolocated tweets about the flu and vaccination along with data from a survey of 3,005 U.S. adults conducted from September 2018 to May 2019. The research was done by Man-pui Sally Chan and Dolores Albarracín of the University of Illinois at Urbana-Champaign and Kathleen Hall Jamieson, director of the Annenberg Public Policy Center (APPC) of the University of Pennsylvania.

"What we find is that some online discussions appear to have a negative influence on people's attitudes and vaccine behavior—which makes the people exposed to them less likely to get a flu shot," said Albarracín, who is also an APPC distinguished research fellow. "That's the case if they do not have real-world discussions about vaccination with family and friends. But if they discuss it with others, that effect goes away."

COVID-19 concerns

The researchers said the study has important implications for the COVID-19 pandemic.

"What's going to happen when we have a COVID-19 vaccine?" Albarracín asked. "If public health officials don't offer clear, consistent messaging on vaccination, whatever circulates on Twitter—however

crazy it is—may have an impact. We cannot trivialize it."

In addition, she said, the finding that discussing vaccines with family and friends appeared to eliminate negative effects from social media should encourage public health officials to promote real-world conversations about the benefits of vaccination. "We should be inviting families and communities to have open discussions on these issues. You don't necessarily have to tell people what to do, but that at least puts the issue on the table."

Vaccination and social media

In analyzing the more-than-100,000 tweets, the researchers used unsupervised machine learning to identify 10 topics among flu- and vaccine-related tweets. "Tweets, including retweets, are informative about popular topics and conversations within a community," the researchers noted. Those tweets, which were geotagged, were linked to U.S. counties.

The tweets were analyzed against individual responses gathered in five waves of U.S. survey data from the 2018-19 flu season. The respondents (ranging from 1,591 to 3,005 per wave) answered questions about vaccine attitudes, vaccination, and real-life discussions about vaccination.

The researchers found that two of the 10 Twitter topics, which they named "Vaccine Science Matters" and "Vaccine Fraud and Children," were prospectively associated with attitudes and behaviors—that is, they anticipated the views and behaviors reported by survey respondents:

- "Vaccine Fraud and Children": The language of this topic included the terms "child" and "kid" and "worldwide." It also included tweets describing kidney pathology and references to

what are now known to be falsified claims of vaccine fraud made in 2014. In U.S. counties where the tweets on this topic were prevalent, among respondents with no discussions with family and friends, this topic when seen in November-February was associated with negative vaccine attitudes in February-March and negative vaccination behavior in February-March and April-May.

- "Vaccine Science Matters": Counties associated with tweets using these terms (including "vaxwithme" and "ivax" and "cancer") in November-February were positively correlated with vaccination attitudes in February-March.
- In addition, a third topic, the conspiracy theory "Big Pharma," was associated with negative vaccination attitudes concurrent with the tweets.

The researchers said that while the study found "strong to very strong associations" between the social media topics and vaccine attitudes and behavior, the associations do not necessarily imply causation and await experimental results. But they also said that the results offer important insights—for example, that tweets could be used to convey factual information about vaccines and thereby positively influence attitudes and encourage vaccination.

Chan, the study's lead author, said, "Combating the current 'infodemic' online is critical, but so is getting communities to talk about vaccines in daily life."

More information: Man-pui Sally Chan et al, Prospective associations of regional social media messages with attitudes and actual vaccination: A big data and survey study of the influenza vaccine in the United States, *Vaccine* (2020). DOI: 10.1016/j.vaccine.2020.07.054

Provided by Annenberg Public Policy Center of the University of Pennsylvania