

Preliminary Analysis of Self-Reported COVID-19 Vaccination Side Effects on Twitter

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Background

Social media has been a valuable resource during the COVID-19 pandemic for users to share their personal experiences and learn from others. Many took to Twitter to share their COVID symptoms^{1,2} and their side effects due to the COVID-19 vaccines^{3,4}. We are interested to know the frequency of self-reported side effects experienced following vaccination against COVID-19. To support these efforts, we would like to assess the feasibility of leveraging Twitter data to ultimately determine the prevalence of COVID-19 vaccination self-reported side effects.

Methods

We curated a list of keywords related to COVID-19 vaccinations, including vaccine manufacturers and vaccine series. The keywords were used to identify relevant tweets in English across the US from Dec 15, 2020, to Jan 10, 2022, using Twitter's v2 API via an iterative process. We filtered out tweets that were outliers, pertaining to stocks/widely shared news articles, and cleaned the data. We used a bag-of-words approach in our analysis and employed an NLP tool called CLAMP⁵ for identifying medically relevant named entities. These were stored in the *note_nlp* table in OMOP format. We used public records to determine release dates for vaccine eligibility across each state and compared them with the frequency of tweets from corresponding regions. We ran descriptive analysis on the data across vaccines, series, vaccine release, and regions.

Results

Preliminary results indicated in Figure 1 shows the top 10 COVID-19 side effects among the tweets against significant events pertinent to the US federal vaccine guidelines. A significant spike on Aug 10, 2021, was due to a tweet⁶ calling on vaccinated twitter users to share their experience with the COVID-19 vaccine.

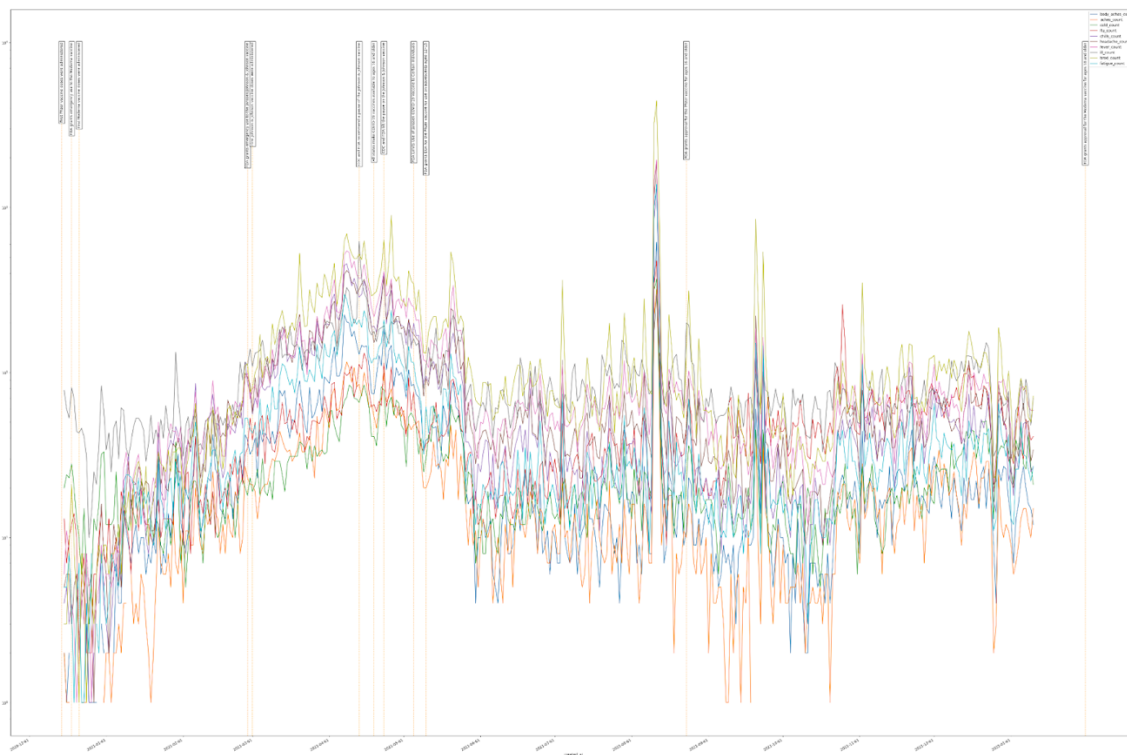


Figure 1. Most tweeted COVID-19 vaccine side effects from Dec 15, 2020, to Jan 10, 2022.

Figure 2 shows a word cloud of the COVID-19 vaccine side-effects from the tweets for the same time period. Larger sizes indicate higher prevalence. We see that fever, tired, flu, chills, headache and fatigue were top reported side-effects.

Figure 2. Word cloud of COVID-19 vaccine side effects from Dec 15, 2020 to Jan 10, 2022 based on their frequency.

We were able to leverage Twitter data to assess the frequency of self-reported side effects following vaccination against COVID-19. We were able to filter and clean the source data and extract medically relevant named entities into the OMOP *note_nlp* table. We compared the frequency of the resulting named entities across vaccine release dates against public records for vaccine release and ran descriptive analysis on the data. In future work, we plan to further normalize terms in the tweets and compare characterizations of self-reported side-effects in tweets to EHR and FDA Vaccine Adverse Event Reporting System (VAERS) data.

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