

Trends in Adverse Event Reporting for Pediatric Vaccines

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My project leverages CDC/FDA data to uncover trends in reporting of vaccine-related adverse events

The Situation

- The Food and Drug Administration (FDA) and Centers for Disease Control and Prevention (CDC) maintain the Vaccine Adverse Event Reporting System (VAERS)¹
- Providers, patients, and caregivers can file reports of adverse events (AEs) they suspect are connected to administration of certain vaccines
- Reports are not medically confirmed
- In the run-up to the 2016 US presidential election, vaccinations became a key debate topic, with several candidates taking a stance against mandatory vaccinations in some form²
- This emboldened the anti-vaccination movement, which conceivably could have impacted adverse event reporting trends²

Key Questions

1

How has the frequency and severity of reported adverse events changed over the last 5 years? Is there any evidence that the trends could be related to the anti-vaccination movement resurgence?

2

What are the most common reported symptoms for events of each severity category, and how have they changed with time? Do the trends support the idea that the anti-vax movement has influenced reporting?

3

For specific vaccines on pediatric vaccine schedule, what proportion and absolute number of related adverse events are serious vs. non-serious?



Answered in current
version of app

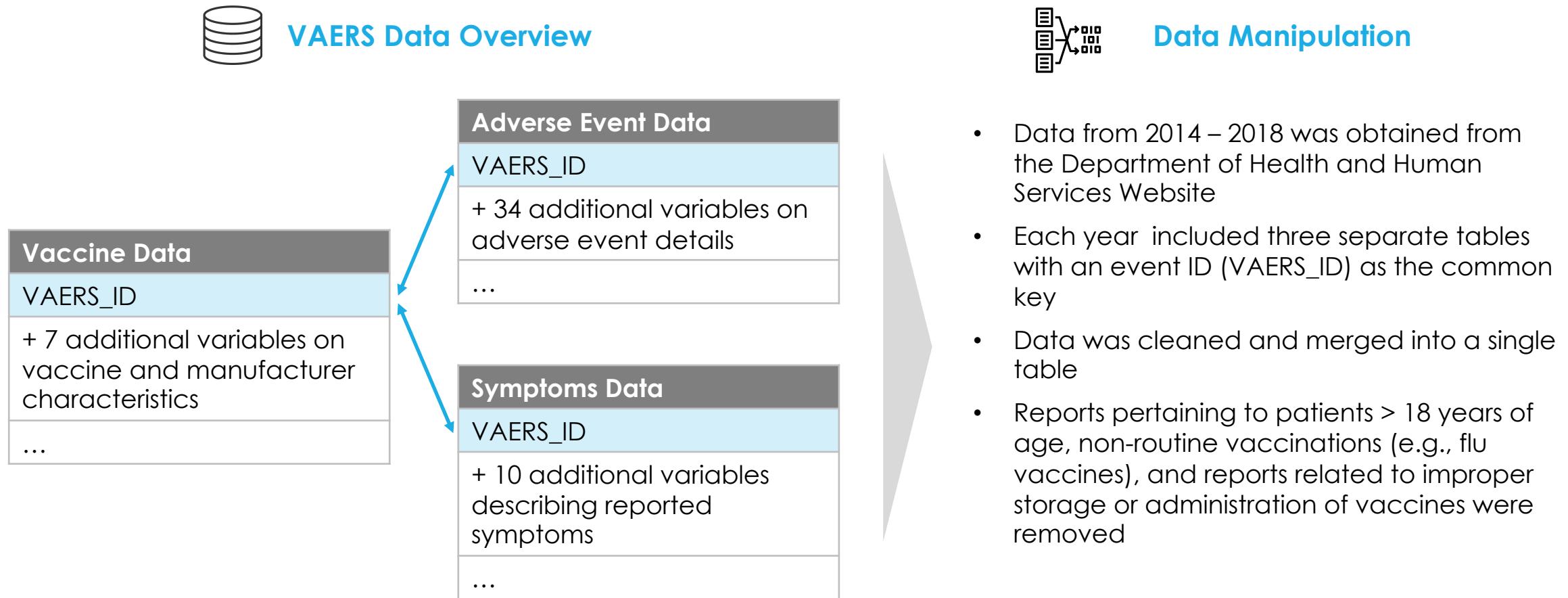


Answered in next
iteration of app

¹<https://vaers.hhs.gov/data.html>

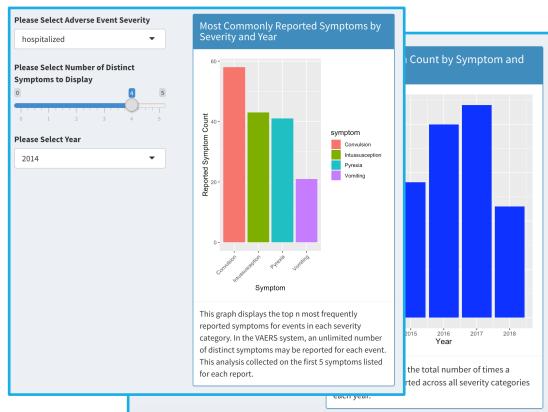
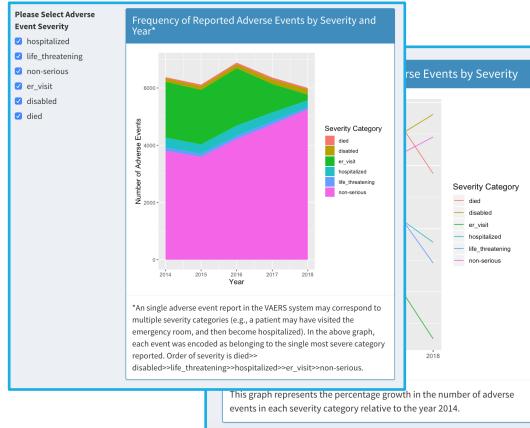
²<https://www.washingtonexaminer.com/news/vaccination-controversy-puts-politicians-on-the-spot>

VAERS data from three separate tables was merged and cleaned to prepare it for analysis



By exploring the Shiny App, users may notice a spike in reports citing vaccine-related Autism

The Shiny App



Tab 1

- Answer key Q #1
- Contains area plot showing overall frequency of AEs by severity category
- Second graph shows change in frequency by category relative to 2014

Tab 2

- Answer key Q #2
- Contains plot showing n number of most common symptoms by category
- Second graph shows change in frequency of symptom reports over time

Conclusions

- Users may notice that there is a steep decline in the number of reports indicating that an emergency room visit was necessary, offset by steep rise in non-serious reports indicating the same symptoms.
 - This likely reflects a broader trend in healthcare utilization away from the emergency room setting, but further confirmation is needed
- Users might also notice a consistent rise post-2015 in reports mentioning disability, particularly Autism
- As there is no factual link between vaccines and Autism, I posit that reporting trends were influenced by the anti-vax movement resurgence

Additional work can bolster the research questions conclusions and improve the UI

Functional Improvements

- Prune unnecessary columns from final dataset to improve app performance
- On tab 1, order the area plot layers and legend in order of severity category
- On tab 1, relabel severity categories to make it more clear what they refer to
- On tab 2, make search by autocomplete and case-insensitive

Additional Analysis

- Add an additional tab that allows users to select a specific vaccine and display information on
 - The proportional breakdown of severity categories for reports mentioning the vaccine
 - 5 year total and year-over-year change in frequency of reports related to the vaccine
- This information may be valuable on its face to concerned new parents, but also will allow users to bolster research question conclusions by checking if vaccines falsely linked to developmental disability see an abnormal change in reports