Impact of the COVID-19 pandemic on pediatric utilization patterns in claims data

Alan Andryc, Rachel Weinstein, Steven Sacavage, Marsha Tharakan, Rupa Makadia

Background

The COVID-19 pandemic has changed the personal and professional lives of many across the United States. Stay-at-home orders changed the dynamic of healthcare utilization particularly for pediatric patients as schools, and day-cares closed for most of the public[1]. These public health measures helped mitigate the spread of the COVID-19 virus but may have changed how other pathogens spread amongst children which may result in consequences such as changes in drug utilization and prevalence of conditions. Additionally, healthcare utilization patterns have likely shifted due to guideline changes, suspension or delays in elective care and care seeking behaviors[2]. Children aged 0 to 5 account for a larger rate of healthcare utilization than other pediatric age groups which include well visits, acute respiratory conditions, and vaccinations(3). Observational data can help illustrate the changes between pre and pandemic utilization patterns by providing insight into changes in diagnoses, prescriptions dispensed, procedure utilization. This study aims to characterize and compare the impact the COVID-19 pandemic had on pediatric (aged 0-5) healthcare utilization within the United States (US) using adjudicated administrative health claims data.

Methods

The database used in this study is the Optum[©] De-Identified Clinformatics® Data Mart Database – Socioeconomic Status) (Optum SES) dataset. The population of interest are persons between the ages of 0 and 5 (inclusive) with a continuous enrollment period of 0 days prior to index. The index event is defined by the latest healthcare visit for each person. The population is stratified by two time periods:

- A visit dated between 2020-02-29 and 2020-12-31 represents "pandemic-time", a time in which public health mitigation measures were in place such as: masking recommendations, travel restrictions and school and office closures. The end date (2020-12-31) was set based on the visit data available.
- A visit dated between 2018-02-28 and 2018-12-31 represents "pre-pandemic-time" and is used as a baseline comparator. The same months were kept consistent to account for cyclic health-related events and healthcare utilization.

Cohorts were characterized using the OHDSI ATLAS solution[4]. Physician visit counts by month were compared for pre-pandemic and pandemic time by counting the total number of visits by month for all persons in each cohort.

Custom features were created to ensure that only data from pandemic-time or pre-pandemic-time was utilized for each characterization analysis for drugs eras, condition occurrences and visit utilization. Standardized mean differences were calculated among matching covariates in both cohorts.

Results

A total 1,204,448 persons were identified from both cohorts, 642,924 (53.3%) persons in the pandemic cohort compared to 785,638 (65.2%) persons within the pre-pandemic cohort. There were 224,114 (18.6%) persons who had time in both cohorts.

We see an overall decrease in visits (month-over-month) during pandemic cohort when compared to pre-pandemic cohort (Figure 1).
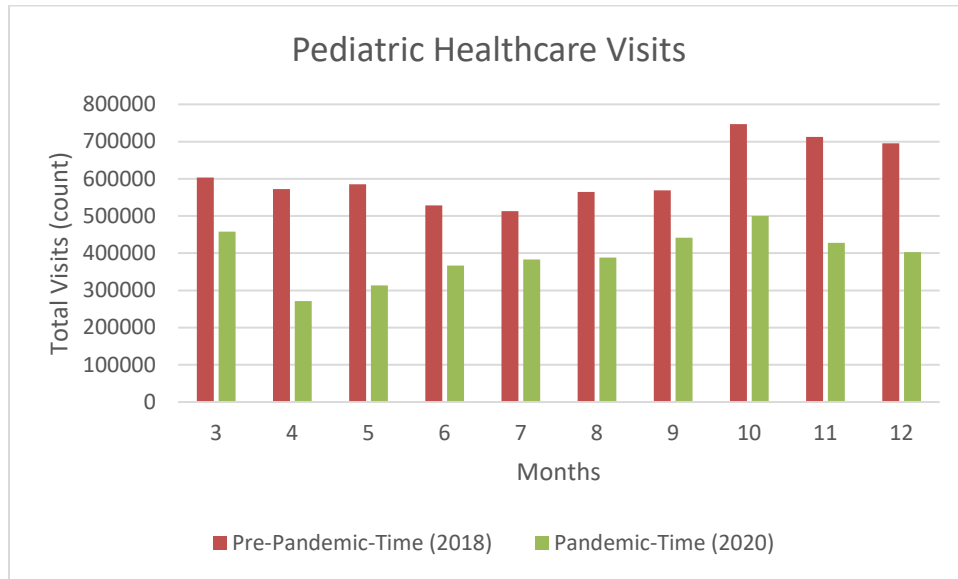
Figure 1: Comparison of total visits for the 1,204,448 persons in the study

The gender distribution for males and females is similar with 51.43% males and 48.57% females for pre-pandemic cohort and 51.39% and 48.61% for pandemic cohort. The age distribution is also similar between cohorts, with a median age of 2 years old and average age of 2.4.

There were 7510 distinct condition covariates that were identified amongst both cohorts. A proportional decrease was seen in 3787 conditions in the pandemic cohort compared to pre-pandemic cohort. Fever reports decreased from 140,604 (17.90%) to 76,032 (11.83%), with a standard mean difference of -.108. Similar decreases were seen in Acute upper respiratory infection (24.71% to 10.42%), Cough (14.58% to 7.73%) and Otitis Media (11.40% to 4.72%) all having absolute standard mean differences greater than 0.1.

Drug exposures to Influenza virus antigen (H1N1, H3N2, B) increased in both count (222,118 to 262,260) and proportionally (28.27% to 40.79%) when comparing pre-pandemic to pandemic cohorts. A decrease in exposure to Amoxicillin (27.78% to 12.33%) and Albuterol (8.44% to 3.65%) for pre-pandemic and pandemic cohorts. Exposure to Famotidine increased in both count (938 to 8410) and proportion (.12% to 1.31%) for pre-pandemic and pandemic cohorts (Figure 2).
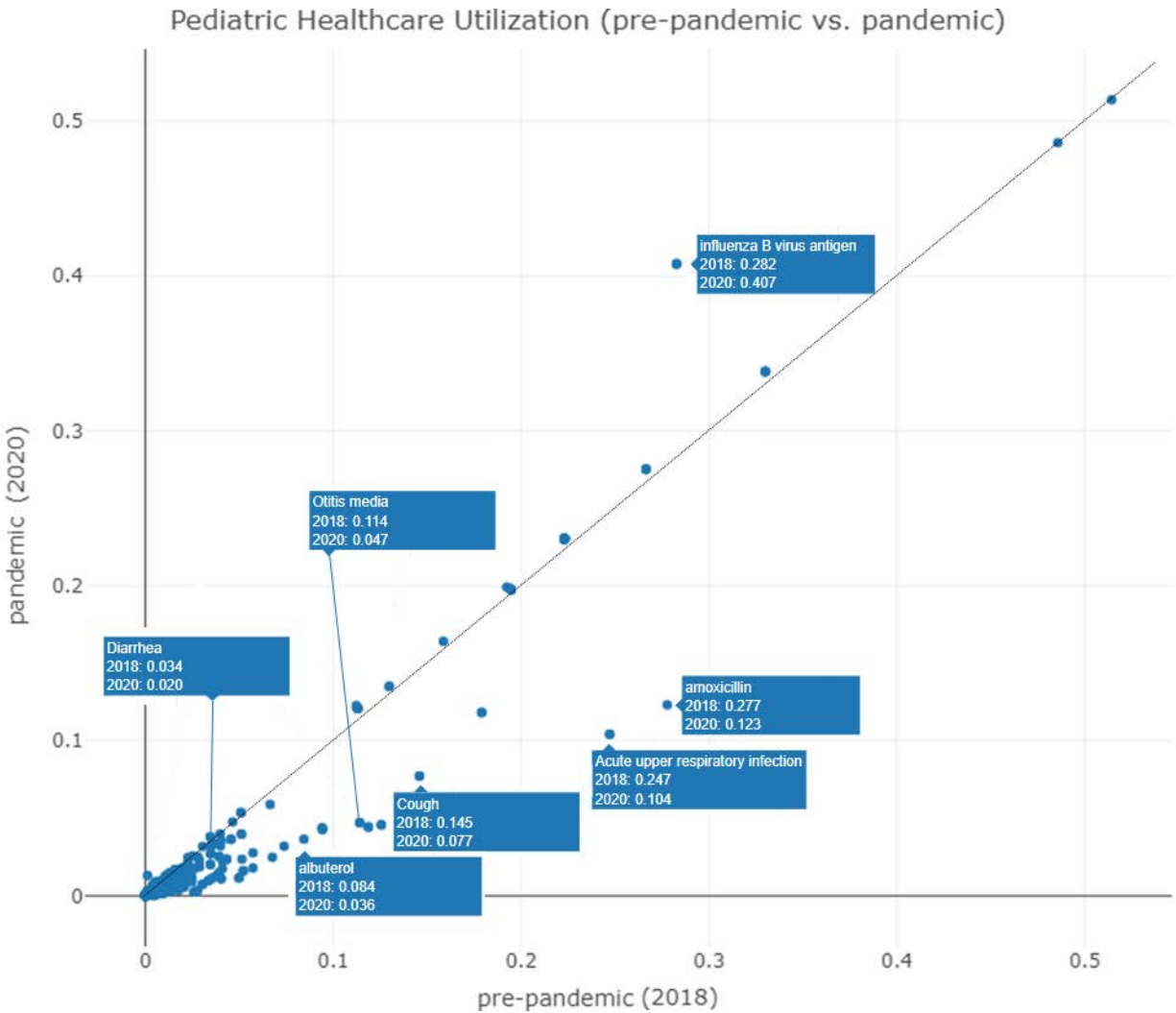
Figure 2: Cohort covariate comparison, standardized mean differences between pre-pandemic and pandemic cohort.

Conclusion

The COVID-19 pandemic impacted individuals and communities across the United States, particularly pediatrics. The comparison of conditions and drugs highlights substantial differences amongst both cohorts. The study showed a decrease in overall visits, and conditions especially those related to respiratory disorders. While we see a decrease in visits and selected conditions, we observe an increase in influenza vaccinations in the pandemic cohort along with use of famotidine which may suggest specific healthcare utilization behaviors changed related to the pandemic itself.

The use of observational data allows for comparison of diagnoses, prescriptions dispensed and physician visit patterns which can change the course of how these data are used and interpreted in other analyses of pandemic period data. We plan to further study the impact of measurements, procedures, and observations between these two cohorts and assess whether the utilization of the pediatric population during the pandemic has permanently impacted how this population will receive care in the future.

References

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3.	Patwardhan A, Ohler A. The Flu Vaccination May Have a Protective Effect on the Course of COVID-19 in the Pediatric Population: When Does Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Meet Influenza? Cureus. 2021;13(1):e12533.