

COVID-19 Vaccine Administration Pathways in US Administrative Claims

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Background: The ATLAS Cohort Pathways tool is useful for data visualization of patient journeys. This tool is also valuable as an assessment of data quality and identification of potential implausible treatment pathways. The COVID-19 vaccine administration schedule provides a set of predictable utilization pathways based on mRNA vaccines requiring a two-dose series at a recommended dosing interval with subsequent booster recommendation and Ad26.COV2.S with a single dose followed by a recommended booster.

Methods: We utilized HealthVerity COVID-19 Database, IBM® MarketScan® Commercial Claims and Encounters Database (IBM_CCAE), and Optum De-Identified Clinformatics® Data Mart Database – Date of Death (DOD) (OPTUM_DOD) to assess COVID-19 vaccine treatment pathways. We defined three incident cohorts of COVID-19 vaccine exposure by brand (Pfizer, Moderna, and Janssen) defined as a first dose with no prior COVID-19 vaccine and characterized subsequent vaccine utilization. This was a descriptive study aimed to explore heterogeneity across data resources and vaccine brands. Additionally, we explored the time between 1st dose and 2nd dose for mRNA and booster dose regimens of 2nd dose to 3rd dose for the mRNA vaccines and 1st dose to 2nd dose for Ad26.COV2.S vaccine.

Results: We identified 16,196,838, 8,197,987, 3,595,373, 1st dose COVID-19 vaccine initiators across HealthVerity, CCAE, and Optum-DoD respectively. Across all data sources <0.14% of index vaccine exposures exhibited multiple brands administered. Among mRNA initiators, 68-79% received a second dose of the same mRNA brand, while 20-31% did not have a record of receipt of a second dose. Table 1 shows index exposures across the three databases. Table 2 shows dose 1 to dose 2 pathways. Figure 1 shows sunburst plots for the three databases for the first 3 doses.

Conclusions: The Atlas cohort pathways tool can be utilized to evaluate data quality and quickly characterize vaccination pathways for expected administration schedules. The tool provides an odyssey to data quality which can identify potential populations that would be excluded in cohort designs. Further exploration will evaluate time between doses in addition to exploring 4th and 5th doses.

Table 1: Summary of Index Vaccine Exposures

Dose 1	HealthVerity	CCAЕ	Optum-DOD
Pfizer	9,733,844	4,978,290	2,176,105
Moderna	5,498,547	2,719,958	1,178,472
Janssen	941,766	497,832	240,058
Multi-Brand Index	22,681	1907	738

Table 2: Summary of Treatment Pathways Dose 1 to Dose 2

Dose 1	Dose 2	HealthVerity	CCAE	Optum-DOD
Pfizer		2,894,216 (29.7%)*	1,381,003 (27.7%)*	457,081 (21.0%)*
Pfizer	Pfizer	6,811,751 (70.0%)*	3,582,314 (72.0%)*	1,715,644 (78.8%)*
Pfizer	Moderna	22,833	14,029	1389
Pfizer	Janssen	1,591	457	148
Pfizer	Multi-Brand	3,473	487	1843
Moderna		1,721,917 (31.3%)*	845,350 (31.1%)*	243,207 (20.6%)*
Moderna	Moderna	3,747,271 (68.2%)*	1,865,299 (68.6%)*	933,216 (79.2%)*
Moderna	Pfizer	23,329	8490	1638
Moderna	Janssen	1973	370	178
Moderna	Multi-Brand	4057	449	233
Janssen		748,885 (79.5%)*	385,197 (77.4%)*	238,201 (99.2%)*
Janssen	Janssen	73,585 (7.8%)*	23,364 (4.7%)*	164 (<1%)*
Janssen	Pfizer	50,965	38,177	965
Janssen	Moderna	66,972	50,979	673
Janssen	Multi-Brand	1359	115	55
Multi-Brand Index		7682	612	316
Multi-Brand Index	Pfizer	4067	568	197
Multi-Brand Index	Moderna	3669	508	118
Multi-Brand Index	Janssen	219	13	0
Multi-Brand Index	Multi-Brand	7044	206	107

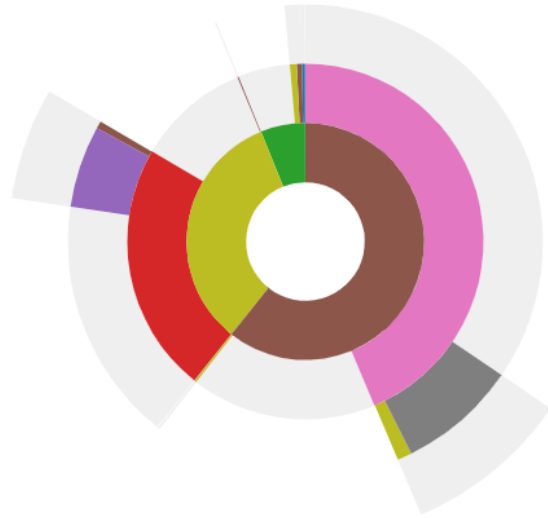
*Percent of Dose 1 by brand

Figure 1: Sunburst Plots

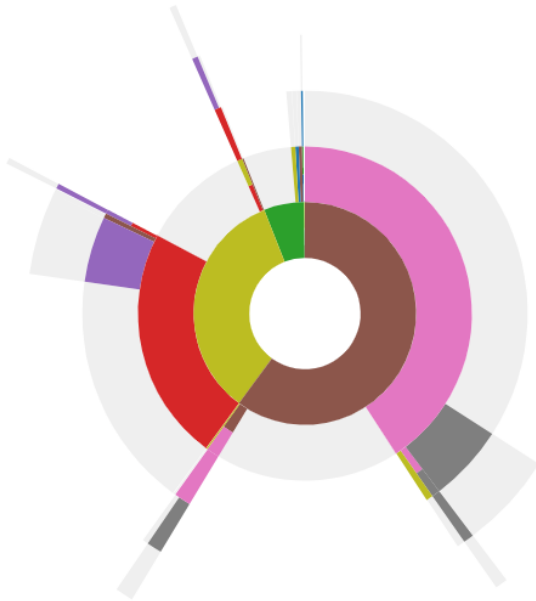
Event Cohorts

- Persons with COVID vaccine exposure to Janssen COVID-19 vaccine (3rd dose)
- Persons with COVID vaccine exposure to Pfizer COVID-19 vaccine
- Persons with COVID vaccine exposure to Janssen COVID-19 vaccine (2nd dose)
- Persons with COVID vaccine exposure to Moderna COVID-19 vaccine (3rd dose)
- Persons with COVID vaccine exposure to Janssen vaccine
- Persons with COVID vaccine exposure to Pfizer COVID-19 vaccine (3rd dose)
- Persons with COVID vaccine exposure to Moderna COVID-19 vaccine (2nd dose)
- Persons with COVID vaccine exposure to Pfizer COVID-19 vaccine (2nd dose)
- Persons with vaccine exposure to Moderna COVID-19 vaccine

b. CCAE



a. HealthVerity



c. Optum-DOD

