Impact of COVID-19 – *From Medical Encounters to Long COVID*

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Limitations of Real-World Effectiveness Data

- Interpretation of these real-world effectiveness data should be approached with caution
- These studies were not designed as randomized, head-to-head comparisons, and no conclusions regarding comparative efficacy or safety should be drawn

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Overview of Topics

- Discuss the impact of emerging variants, their increased transmission and virulence on the burden of illness related to medical encounters and Long COVID
- Describe impact of host factors such as age, comorbidities, and prior exposure to virus or vaccine in relation COVID-19 related morbidity and mortality
- Gain an understanding on how to explain these factors to help support health care professional-patient conversations regarding COVID-19 vaccination

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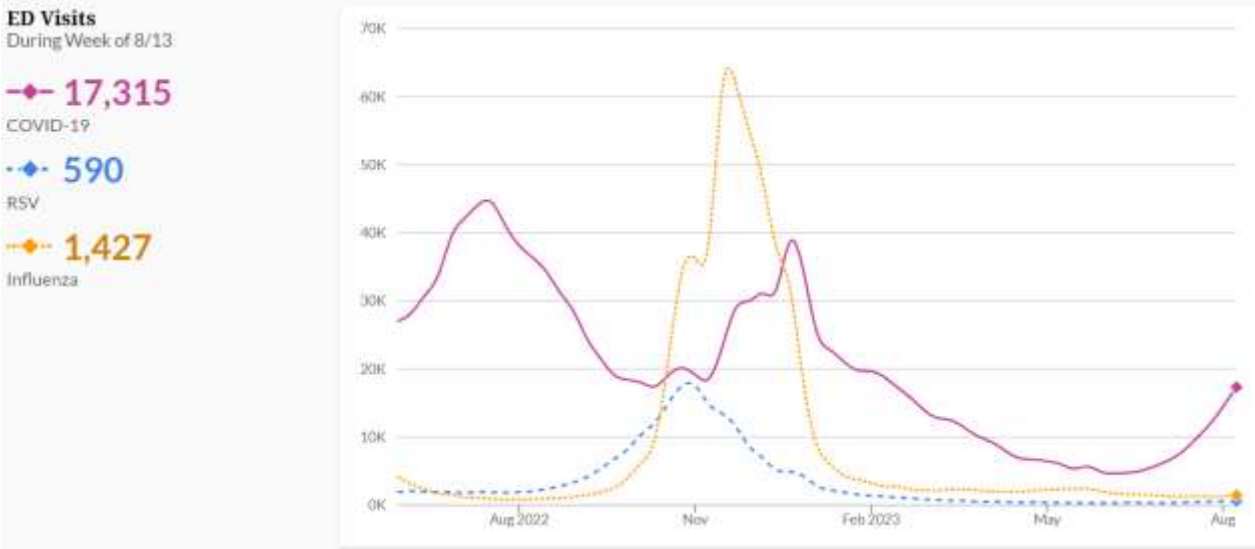
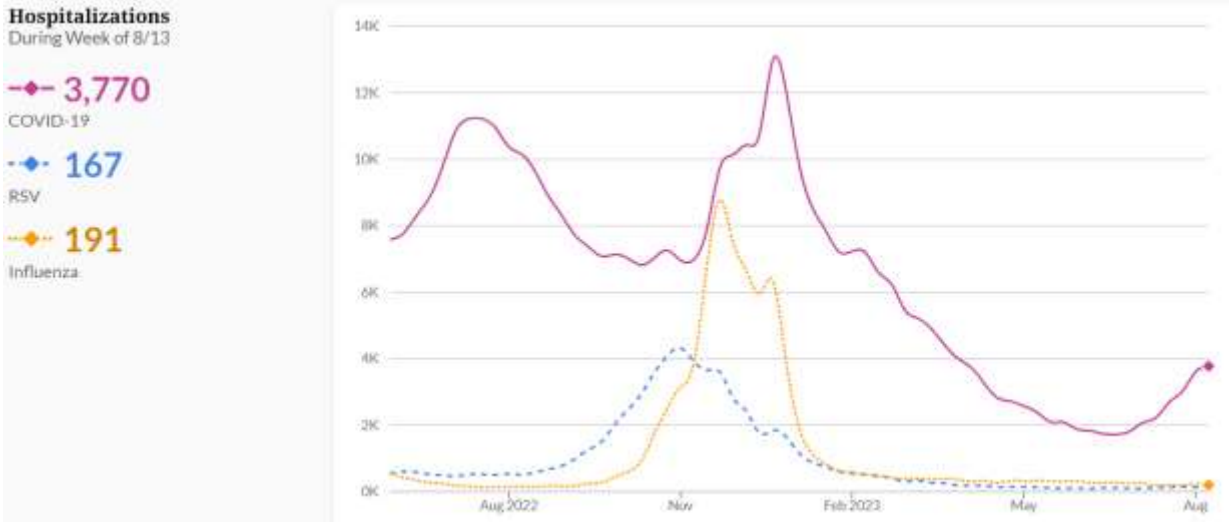
Burden of COVID-19 – Emergency Room Visits & Hospitalizations

COVID-19 remains the leading Respiratory Infectious Disease resulting in serious outcomes

Weekly counts of new ED visits by respiratory illness type



Weekly counts of new hospital admissions by respiratory illness type



ED, emergency department; RSV, respiratory syncytial virus.
Respiratory Illnesses Tracker. Epic Research. https://epicresearch.org/data-tracker/respiratory-illnesses. Accessed 11sep2023, Data as of Week of 13AUG

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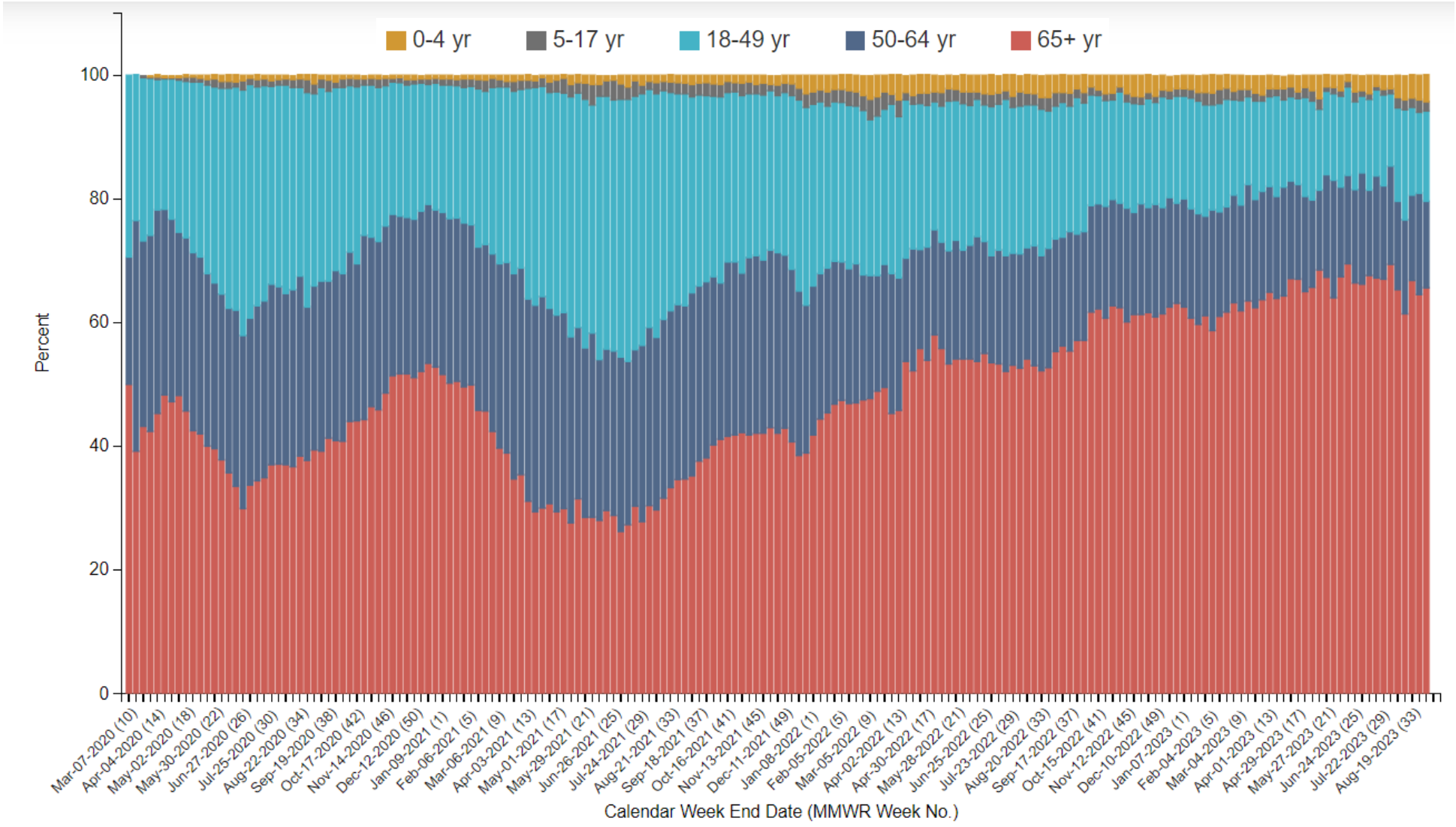
COVID-19 Associated Hospitalization by Age

COVID-19 Disproportionately Affects older Adults



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COVD-NET: COVID-19 – Associated Hospitalization Surveillance Network, Centers for Disease Control and Prevention. https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html#virusTypeDiv. Accessed 12SEP2023. Data as of 19AUG2023

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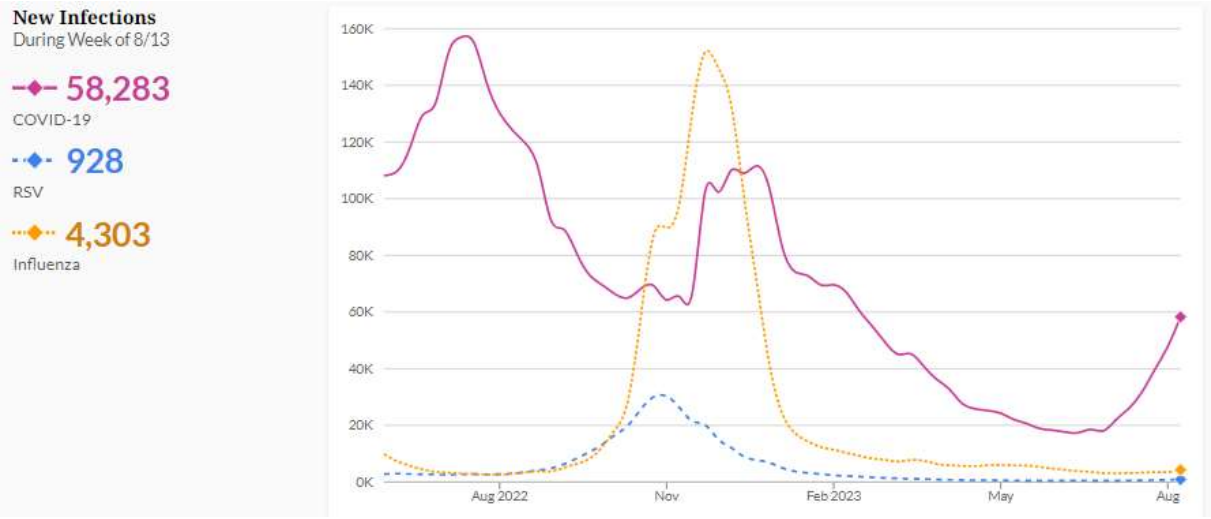
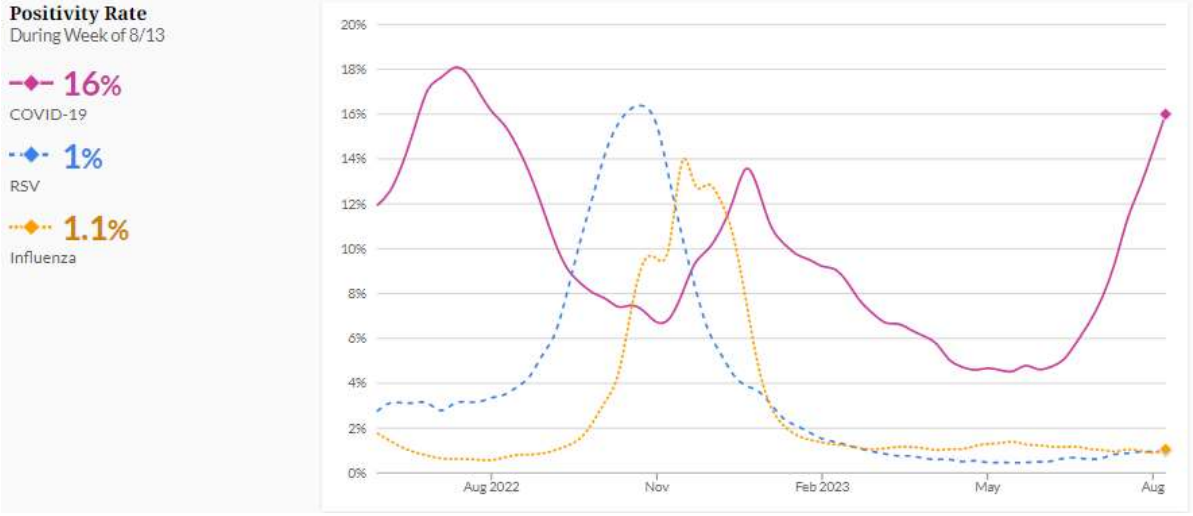
Burden of COVID-19 – New Infections & Positivity Rate

COVID-19 remains the leading Respiratory Infectious Disease resulting in serious outcomes

Weekly counts New Infections by respiratory illness type



Weekly Positivity Rate by respiratory illness type



RSV, respiratory syncytial virus.
Respiratory Illnesses Tracker. Epic Research. https://epicresearch.org/data-tracker/respiratory-illnesses. Accessed 11sep2023, Data as of Week of 13AUG

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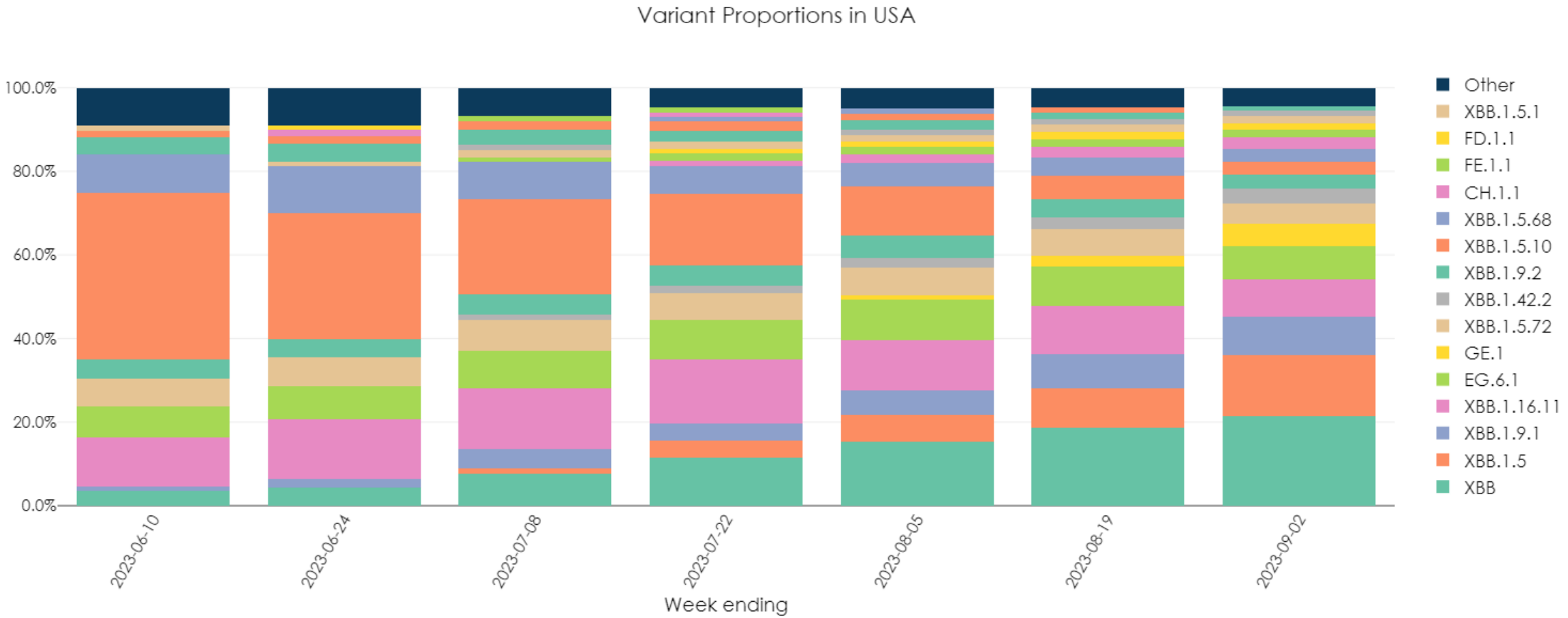
SARS COV-2 Variant Circulation over Time in the US

XBB subvariants predominating in the US as of 02SEP2023:

EG5 (21.5%), FL.1.5.1 (14.5%), XBB.1.16.6 (9.2%), XBB.1.16 (8.9%), XBB 2.3 (8.1%)



Adapted from CDC Data Tracker https://covid.cdc.gov/covid-data-tracker/#variant-proportions Accessed 12SEP2023

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Real World data Integrating Electronic Health Records linked with Pharmacy & Medical Claims Representative of the US Population

Objective

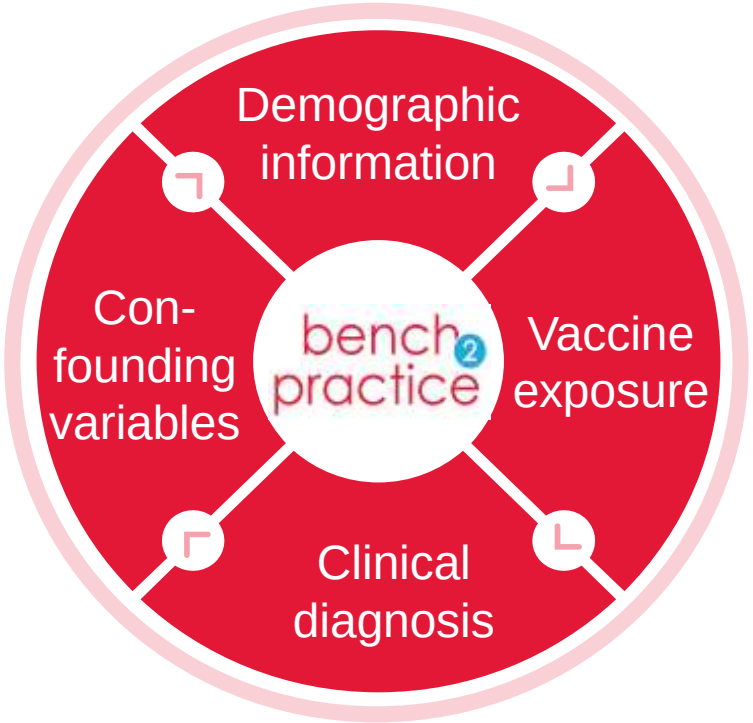
To synthesize & generate robust evidence on disease burden and vaccine effectiveness to support evidence-based interventions

The Integrated Dataset is one of the first, and largest, datasets integrating EMR and claims data for vaccine research

Representativeness of the Integrated Dataset to the US population is suggested and ability to evaluate VE has been demonstrated previously[1–3]

The principal key and non-critical variables identified by the WHO as important for vaccine research are all available within the Integrated Dataset

An advantage of the Integrated Dataset:



1. Boikos C, Imran M, De Lusignan S, Ortiz JR, Patriarca PA, Mansi JA. Integrating Electronic Medical Records and Claims Data for Influenza Vaccine Research. *Vaccines (Basel).* 2022;10(5).
2. Nguyen VH. et al. Relative effectiveness of BNT162b2, mRNA-1273, and Ad26.COV2.S vaccines and homologous boosting in preventing COVID-19 in adults in the US. Open Forum Infectious Diseases. 2023:ofad288.
3. Hagit Kopel, et al.. Comparative Effectiveness of the Bivalent (Original/Omicron BA.4/BA.5) mRNA COVID-19 Vaccines mRNA-1273.222 and BNT162b2 Bivalent in Adults in the United States. medRxiv 2023.07.12.23292576; doi: https://doi.org/10.1101/2023.07.12.23292576

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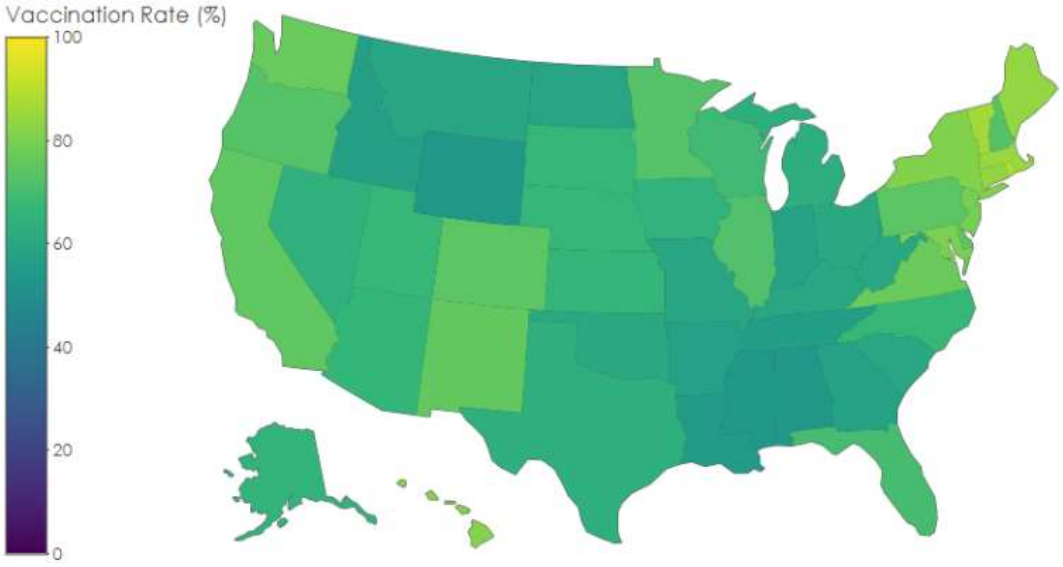
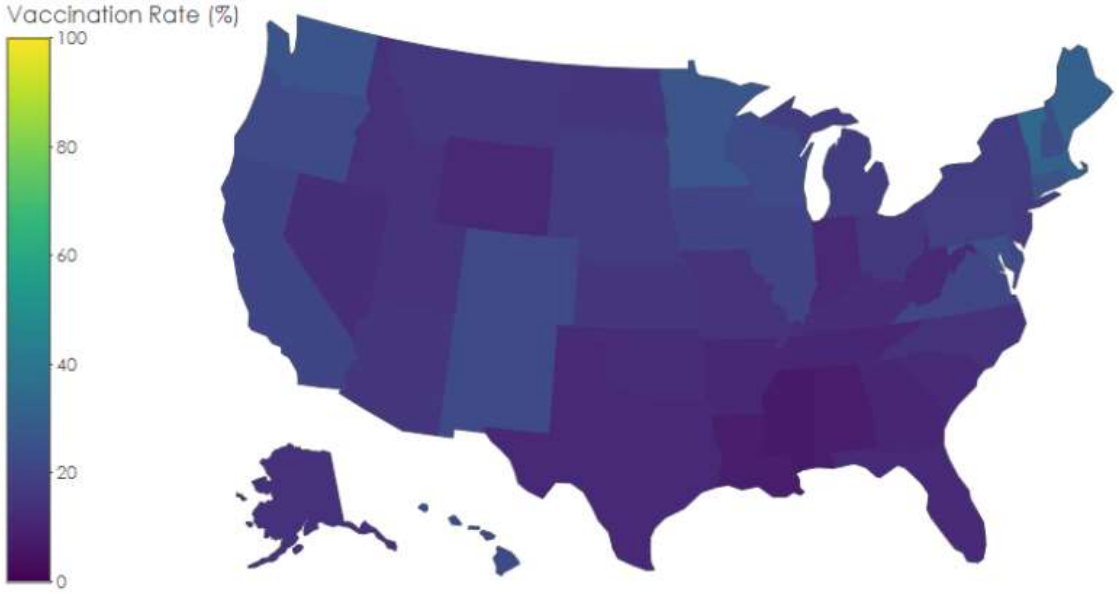
COVID-19 Vaccination Rates in the US

COVID-19 Vaccination rates have been steadily declining

Vaccination Uptake – Primary Series



Vaccination Uptake – Bivalent Booster



Adapted from CDC Data Tracker https://covid.cdc.gov/covid-data-tracker/#vaccination-states-jurisdictions. Accessed 12SEP2023

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COVID-19 Vaccination Rates in the US

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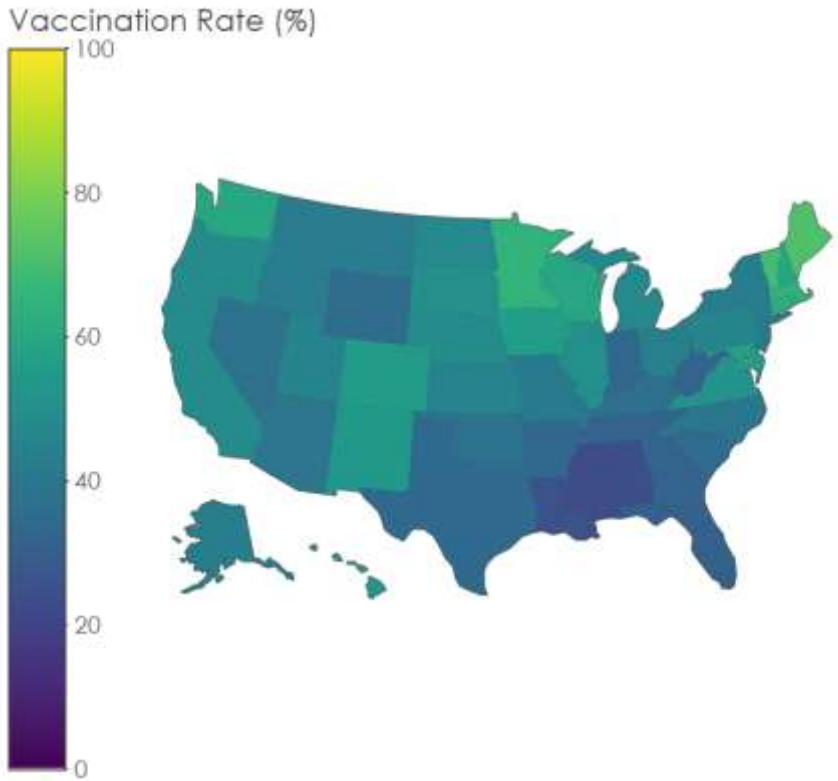
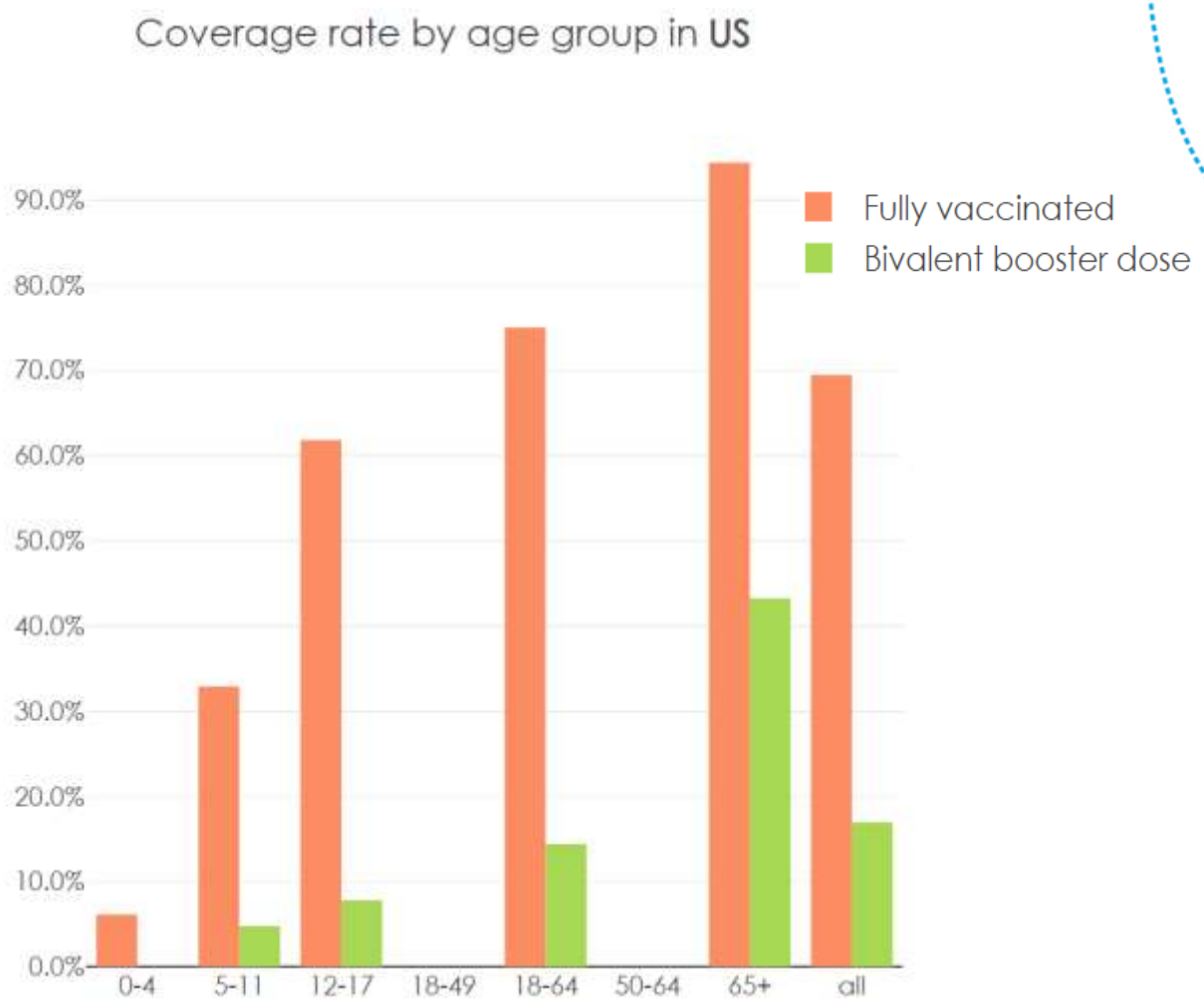
Vaccination Uptake in 65+ – Bivalent





Adapted from CDC Data Tracker https://covid.cdc.gov/covid-data-tracker/#vaccination-states-jurisdictions. Accessed 12SEP2023

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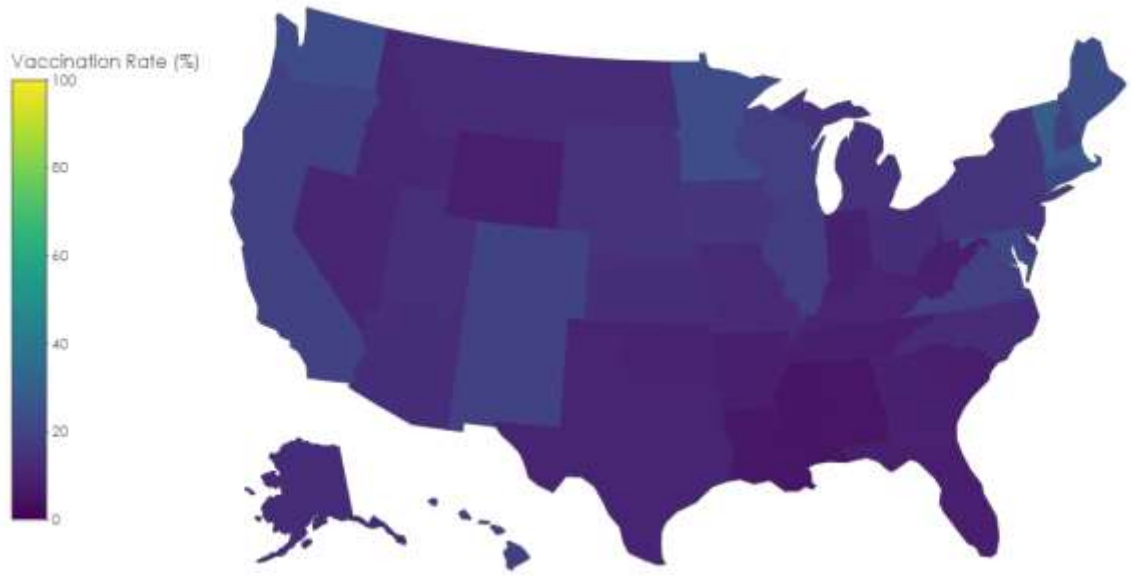
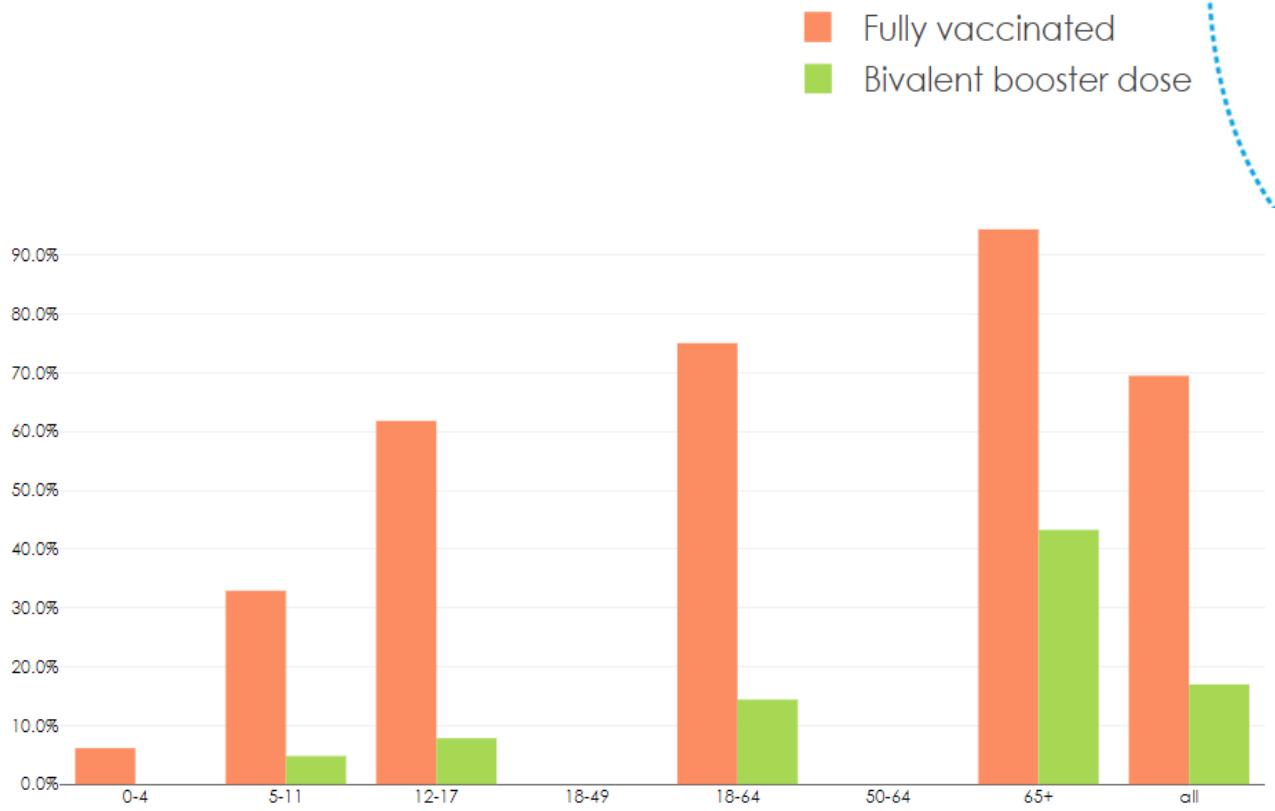
COVID-19 Vaccination Rates in the US

COVID-19 Vaccination rates have been steadily declining

Vaccination Uptake in 18-64 yrs– Bivalent





Adapted from CDC Data Tracker https://covid.cdc.gov/covid-data-tracker/#vaccination-states-jurisdictions. Accessed 12SEP2023

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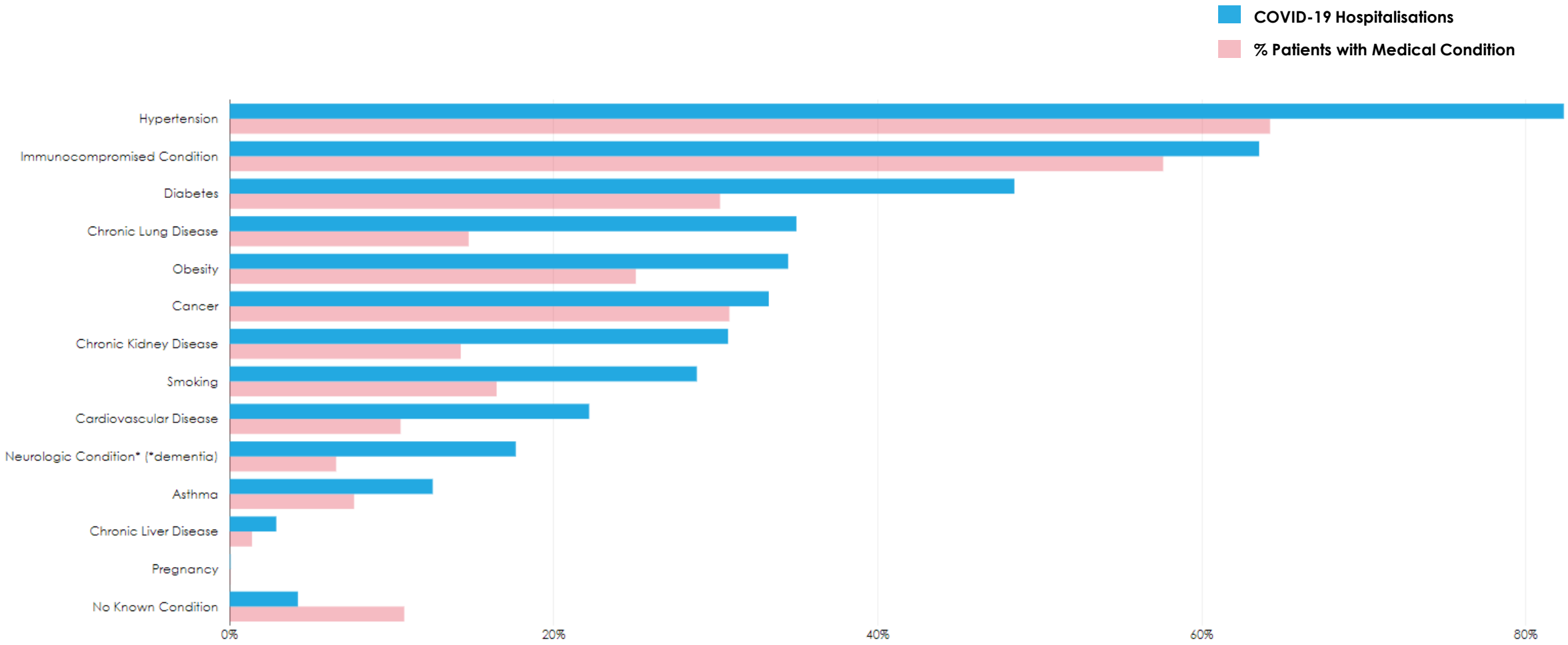
COVID-19 Hospitalisations by Patient Comorbidities: adults ≥ 65 yrs



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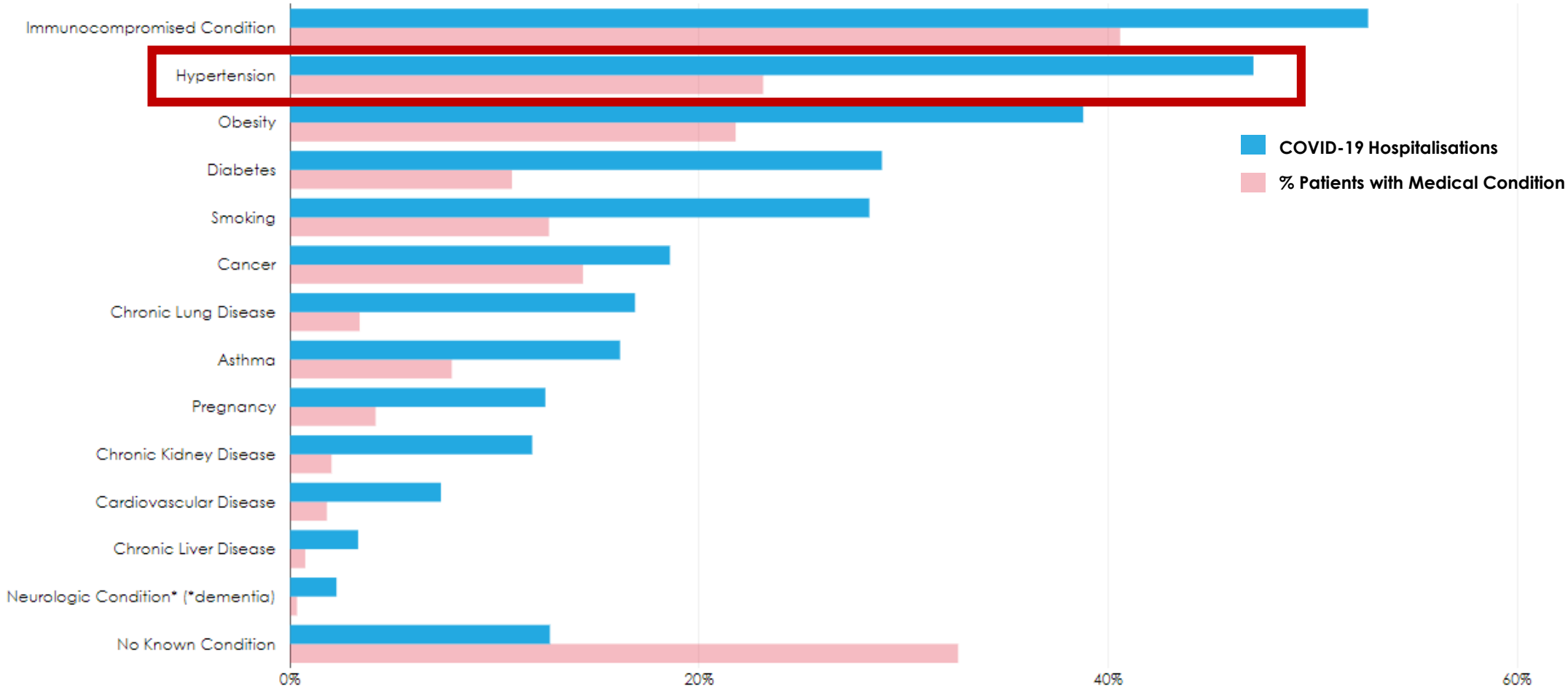
COVID-19 Hospitalizations by Patient Comorbidities: adults ≥ 18 yrs

- **Approximately 75%* of US adults have underlying conditions that put them at increased risk of severe complications due to COVID**
- **COVID-19 Disproportionately Impacts Individuals with medical conditions that place them at higher risk for hospitalisations**



*Ajufo E et al. U.S. population at increased risk of severe illness from COVID-19. Am J Prev Cardiol. 2021 Jun;6:100156. doi: 10.1016/j.ajpc.2021.100156. Epub 2021 Feb 13. Erratum in: Am J Prev Cardiol. 2021 Jun;6:100195. PMID: 33615285; PMCID: PMC7880833.

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Understanding Long COVID

What is Long Covid?

- Symptoms following Covid-19 infection that continue for more than 12 weeks (excluding post-ICU syndrome and illness from acute-phase organ damage)[1].
- Majority do not recover within a year[2]; millions still ill from March 2020.
- Encompasses wide range of systemic health issues impacting neurological, cardiovascular, respiratory, metabolic and hormonal systems among others[3].
- Often involves damage to major organs including the brain, heart and lungs, and typically also involves ongoing inflammation and vasculopathy.
- Sufferers often in appalling states of health; housebound; in pain; lives ruined[4].

[1] World Health Organization
[2] UK ONS, April 2022
[3] 'Characterising Long Covid', The Lancet
[4] Sky News

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Impact of COVID on New-Onset Hypertension – Long COVID

Even mild COVID-19 can lead to Long-COVID symptoms that can persist for months and years

- Compared with people who had influenza, those hospitalized with Covid-19 were over twice as likely to develop hypertension
  - At 6-month follow-up, new-onset persistent hypertension was seen in 20.6% of hospitalized patients with COVID-19 and 10.85% of non hospitalized patients with COVID-19
  - Hospitalized patients with COVID-19 were 2.23 times and nonhospitalized patients with COVID-19 were 1.52 times more likely to develop persistent hypertension than influenza counterparts
  - 21.0% of hospitalized patients with COVID-19 with no prior hypertension developed hypertension during COVID-19 hospitalization.
- Incidence of new-onset persistent hypertension in patients with is likely constituting a major health burden given the sheer number of patients with COVID-19

Zhang V, Fisher M, Hou W, Zhang L, Duong TQ. Incidence of New-Onset Hypertension Post-COVID-19: Comparison With Influenza. Hypertension. 2023 Aug 21. doi: 10.1161/HYPERTENSIONAHA.123.21174. Epub ahead of print. PMID: 37602375.

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Postacute Impact of COVID-19 – Long COVID

There is a substantial cumulative burden of health loss due to Long COVID

- Individuals with COVID-19 have increased risks for death, hospitalization, and sequelae at 2 years after infection compared vs non-infected controls
  - ➢ Risks and burden in DALYs were higher in those hospitalized vs those not hospitalized during the acute phase of the disease
- Cumulative incidence and Disability-adjusted life years of Long COVID were higher in the hospitalized group compared with the non-hospitalized group at 2 years after infection

Bowe, B., Xie, Y. & Al-Aly, Z. Postacute sequelae of COVID-19 at 2 years. *Nat Med* (2023). https://doi.org/10.1038/s41591-023-02521-2

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Summary

- **Heath care contacts including hospitalization have seen a corresponding sharp rise since June , with COVID-19 continuing to be the leading respiratory ID causing morbidity & mortality**
- **COVID-19 disproportionately affects individuals with underlying health conditions that place them at higher risk for COVID-19 related morbidity and mortality, including development of Long COVID**
- **Even mild COVID-19 can lead to Long-COVID symptoms that can persist for months and years**
  - Compared with people who had influenza, those hospitalized with Covid-19 were over twice as likely to develop hypertension
  - Long Covid creates a higher burden of disability than either heart disease or cancer
- **Vaccination and early treatment can help reduce long covid risk by about 30%[1]**

1 Tsampasian V, Elghazaly H, Chattopadhyay R, et al. Risk Factors Associated With Post−COVID-19 Condition: A Systematic Review and Meta-analysis. *JAMA Intern Med.* 2023;183(6):566–580. doi:10.1001/jamainternmed.2023.0750

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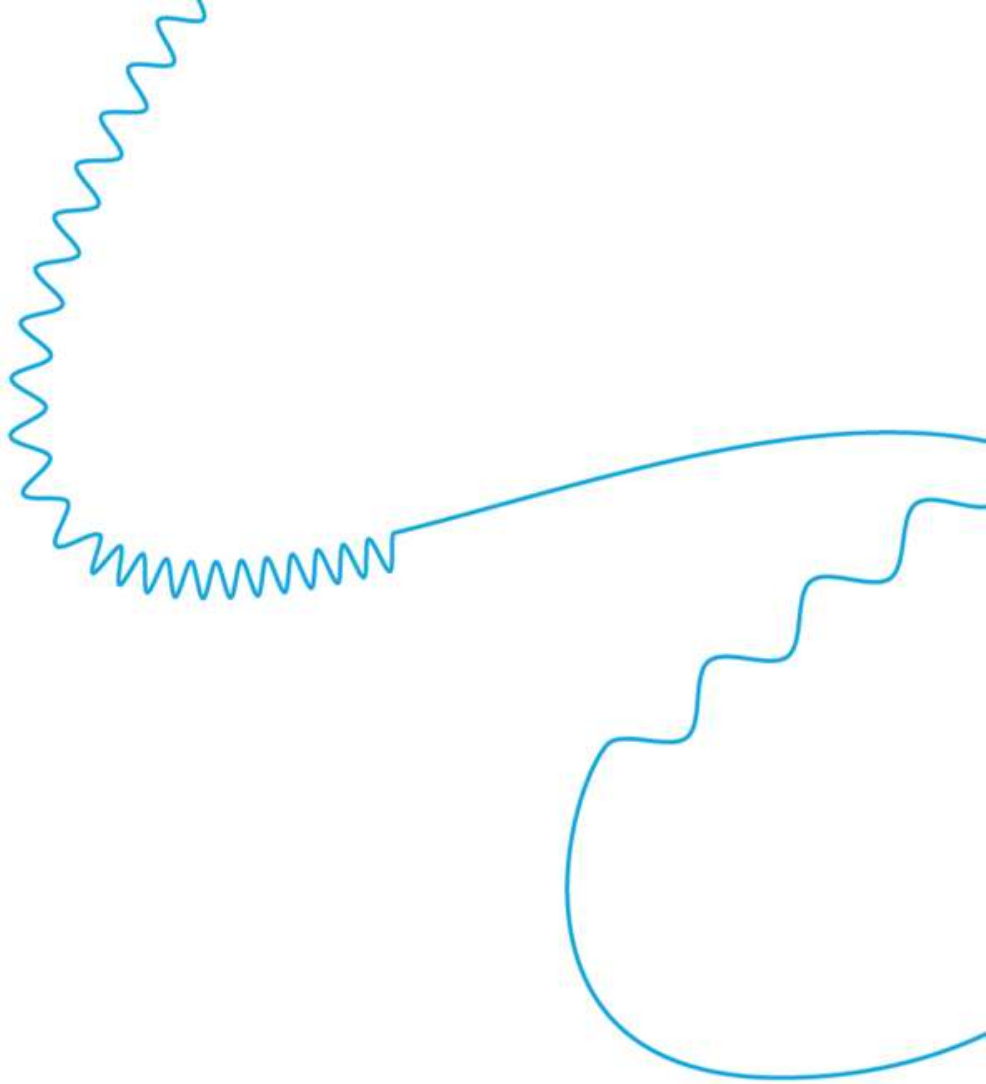
Thank you



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