Intern: Joseph Okeke
Timeline: June – August 2025

Development Of An Interactive Dashboard For Visualising Output Of Phewas Post-Covid Events In England

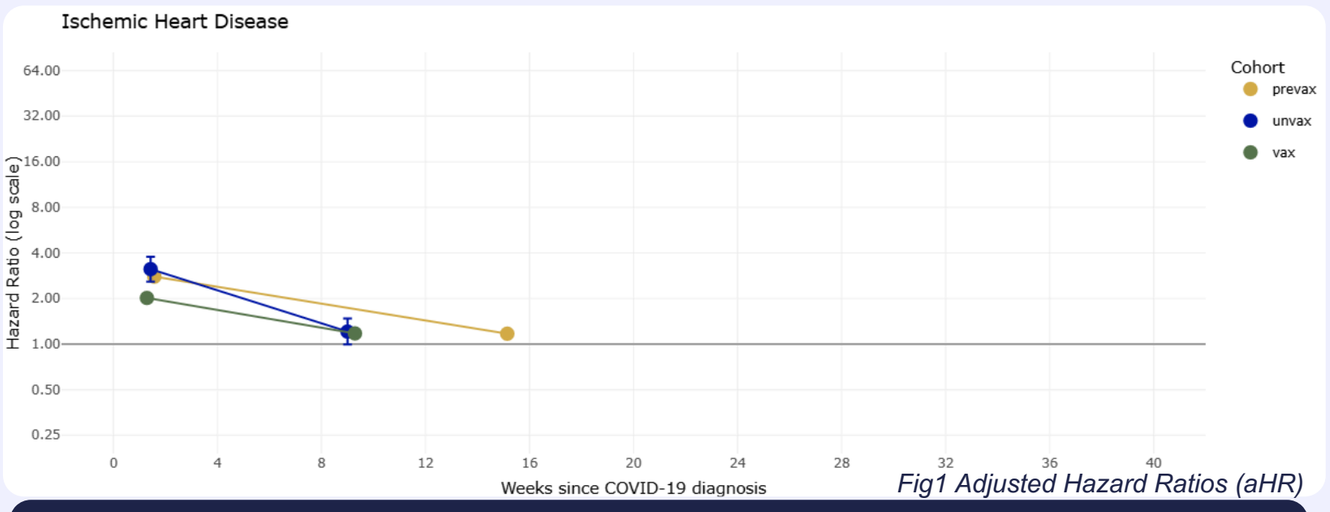

Fig1 Adjusted Hazard Ratios (aHR)

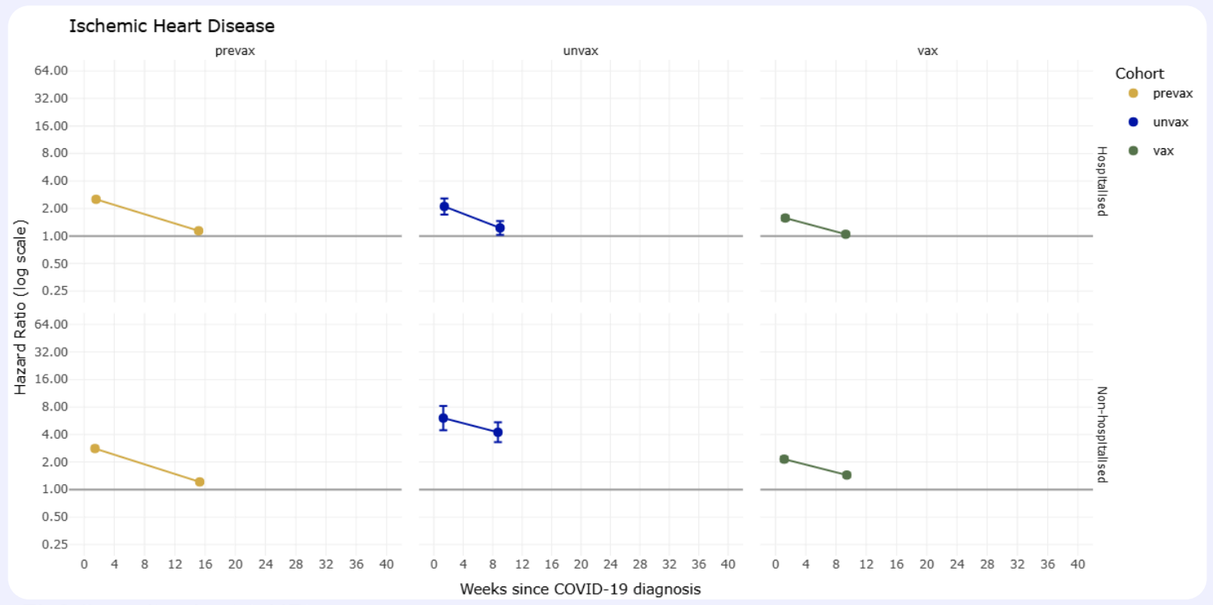

Fig2 Severity chart (aHR)

Background

- Individuals can face increased risk of long-term complications far beyond acute SARS-CoV-2 infection, affecting multiple organ systems.
- This project aimed to clearly communicate the risk of long-term complications after SARS-CoV-2 infection using results from a phenome-wide association study (PheWAS).

Research Objectives

- Understand the study methods and data structure.
- Build a Shiny dashboard
- Incorporate user-friendly plots and tables.

Methods

- **Participants**

Utilised health records of over 49 million individuals in England from the NHS SDE.

- **Design**

PheWAS comparing post-covid diagnoses across 3 cohorts: before vaccination, vaccinated, and unvaccinated.

- **Outcomes**

Examined 307 health conditions (phenotypes) across multiple organ systems.

- **Metrics**

Adjusted Hazard Ratios (aHR): Comparison of the risk over time between those exposed and not exposed to SARS-CoV-2 (>1: higher risk; <1: lower risk; 1: equivalent risk).

- **Adjusted Hazard Ratios: Fig 1 & Fig 2**

Absolute Excess Risk (AER): difference in the risk between those exposed and not exposed to SARS-CoV-2.

- **Absolute Excess Risk (AER): Fig 3**

Try it out here!

Result & Discussion

Dashboard Project Brief

- Overall plots of aHR for each of the 307 diagnosis, by cohort.
- Sub-group plots of aHR by age-group, sex, ethnicity, prior history of disease, and severity of SARS-CoV-2 infection.
- AER plots for each diagnosis.
- Adjusted Hazard Ratios (aHR): Fig 1
- Severity chart (aHR): Fig 2
- Absolute Excess Risk (AER): Fig 3

Deliverables

Visualisation of Outcomes: Reveals, enables comparisons and allows stakeholders explore the scope of findings efficiently.

Risk Analysis: The dashboard allows users to explore how risks, vaccination status, metrics, subgroups and severity of Covid-19 variation over time.

Challenges Identified

- **Large dataset handling in Shiny:** Managing high volume data efficiently without slowing down reactive updates or overloading server memory.
- **Cleaning empty rows:** Identifying and removing blank and irrelevant entries to ensure accurate analysis.
- **Balancing usability with scientific detail**

Acknowledgements

- Supervisors – Marwa Al Arab & Eleanor Walsh
- Contributors – Elias Allara, Rachel Denholm, Venexia Walker, Spiros Denaxas, Angela Wood & Jonathan Sterne.

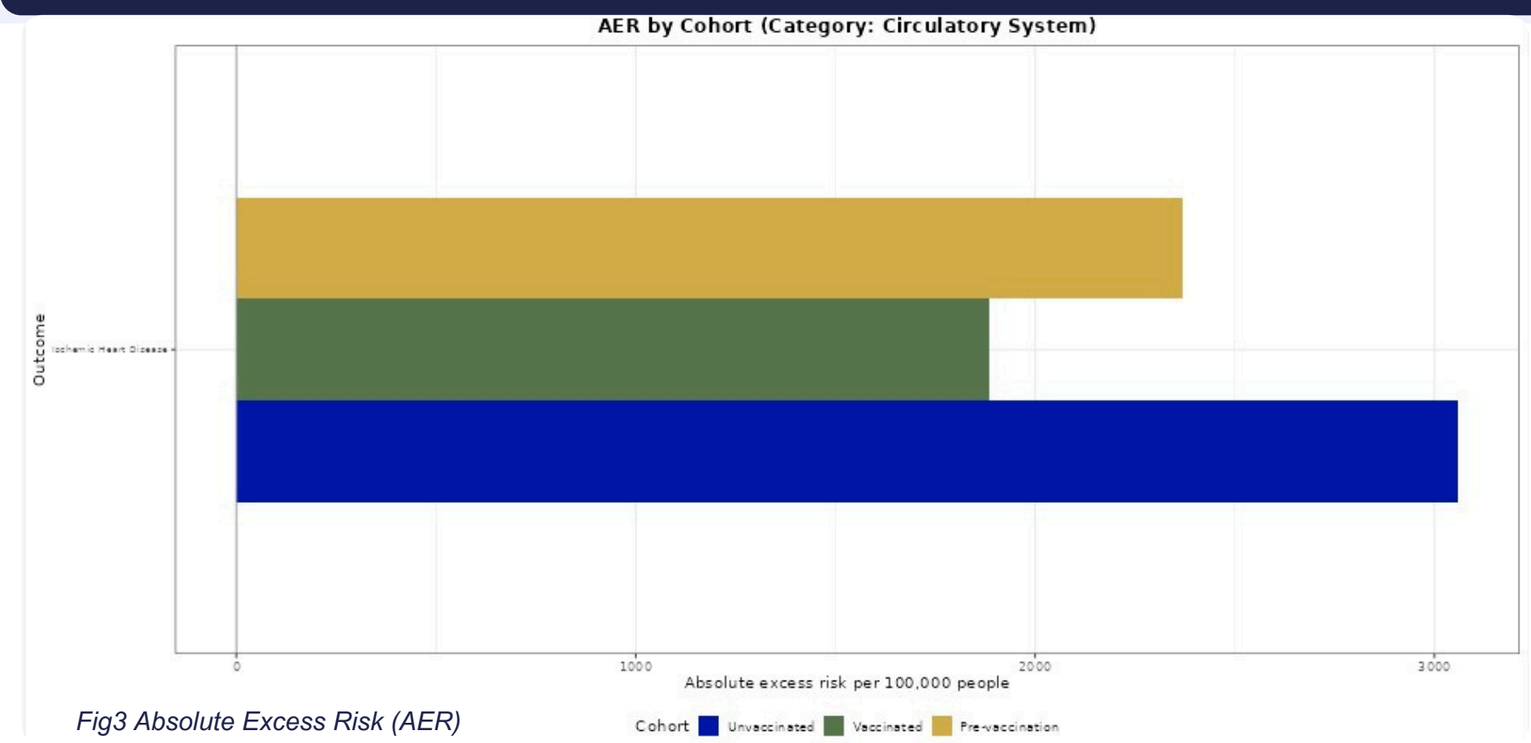

Fig3 Absolute Excess Risk (AER)