

INTRODUCTION

- COVID-19 vaccination has drastically changed the course of the COVID-19 pandemic worldwide.
- Vaccine breakthrough SARS-CoV-2 infections has been increasingly reported throughout the world, particularly among individuals with advanced age and underlying comorbidities.
- Newer variants, including delta (B.1.617.2) and omicron (B.1.1.529), have been shown to have increased rates of vaccine breakthrough compared to older variants, leading to hospitalizations and deaths occurred in vaccine recipients.

OBJECTIVES

To describe the impact of vaccination on admission to ICU and death in hospitalized adult patients with confirmed SARS-CoV-2 infection using data collected from the Memorial Healthcare System (MHS), Hollywood, Florida from June 01 to September 21, 2021, when the B.1.617.2 (Delta) was the predominant variant.

METHODS

- This was a retrospective study of adult patients (18 years or older) with COVID-19 who were admitted to the Memorial Healthcare System (MHS), Broward County, Florida between June 01, 2021 and September 20, 2021.
- Patients were stratified by vaccination status as either unvaccinated or fully vaccinated.
 - Individuals who had no record of vaccination against COVID-19 or partially vaccinated individuals with a single dose vaccination or <14 day after the second dose administration before illness onset are defined as unvaccinated patients.
 - Individuals who have received two doses prescribed by the vaccination protocol with ≥ 14 days administration of the second dose of vaccine before illness onset are defined fully vaccinated patients.
- Unvaccinated patients were matched with fully vaccinated patients (1:1 ratio) based on the propensity score by nearest-neighbor matching and a caliper of 0.2, without replacement. Balance of all baseline characteristics between the two groups was evaluated by standardized mean differences with a maximum propensity score probability difference of 10%.

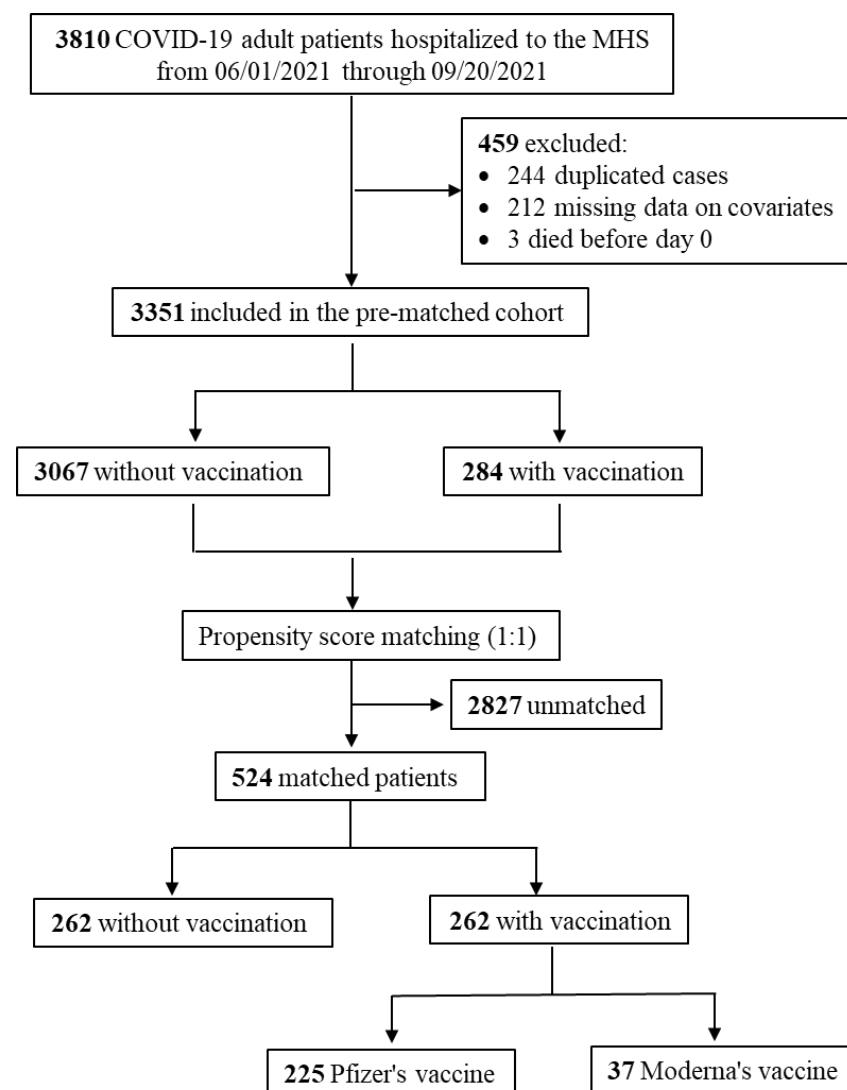


Figure 1. Flow chart of study population.

Clinical Characteristics of Vaccine Breakthrough COVID-19 Infection

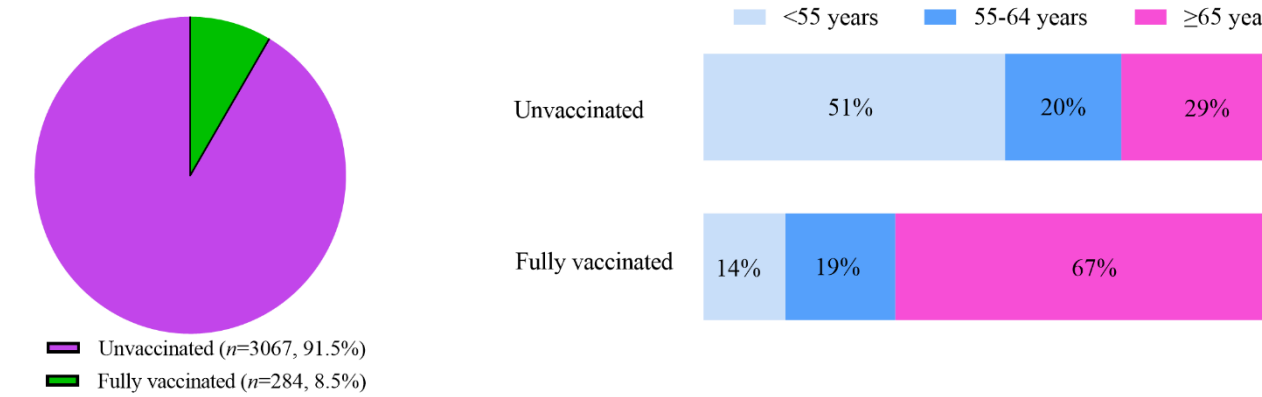


Figure 2. Of the patients hospitalized with COVID-19 from June 01 to September 21, 2021, 91.5% were not fully vaccinated and 8.5% were fully vaccinated. Patients with vaccine breakthrough SARS-CoV-2 infections were much older, with about 2 in 3 (67%) involving patients ages ≥ 65 years.

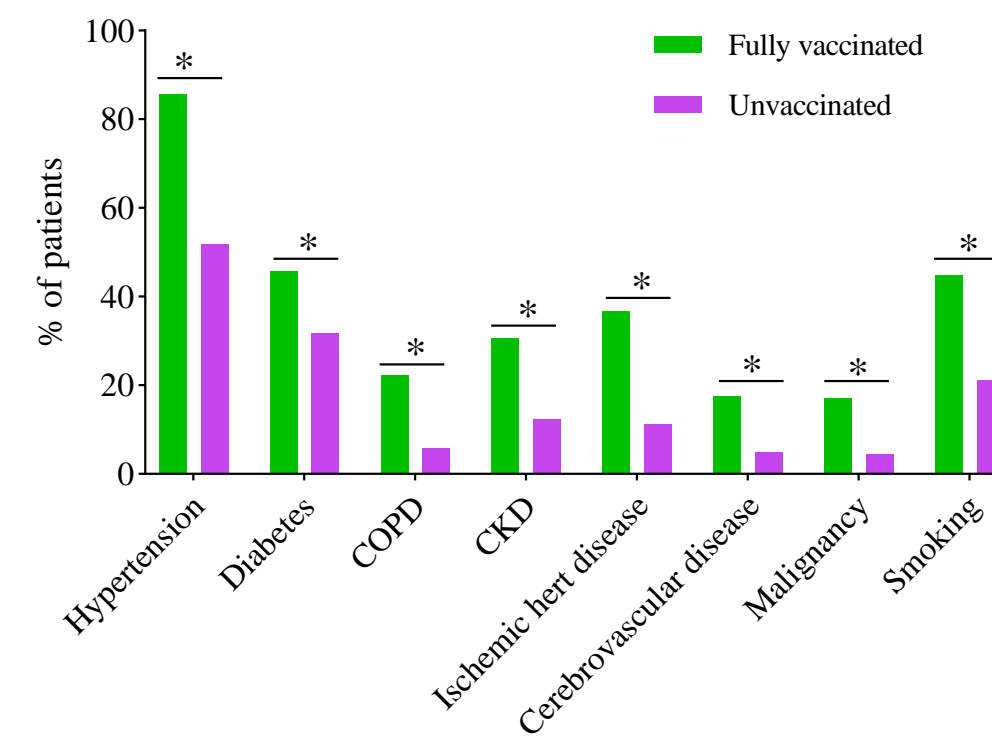


Figure 3. Patients with vaccine breakthrough COVID-19 infection had a significantly higher comorbidity profile compared with unvaccinated, including hypertension (85.6% vs. 51.9%), diabetes (45.6% vs. 31.8%), chronic obstructive pulmonary disease (22.2% vs. 5.7%), chronic kidney disease (30.6% vs. 12.4%), ischemic heart disease (36.6% vs. 11.3%), cerebrovascular disease (17.6% vs. 4.8%), malignancy (17.1% vs. 4.4%) and smoking (44.7% vs. 21.1%). $*p < 0.0001$.

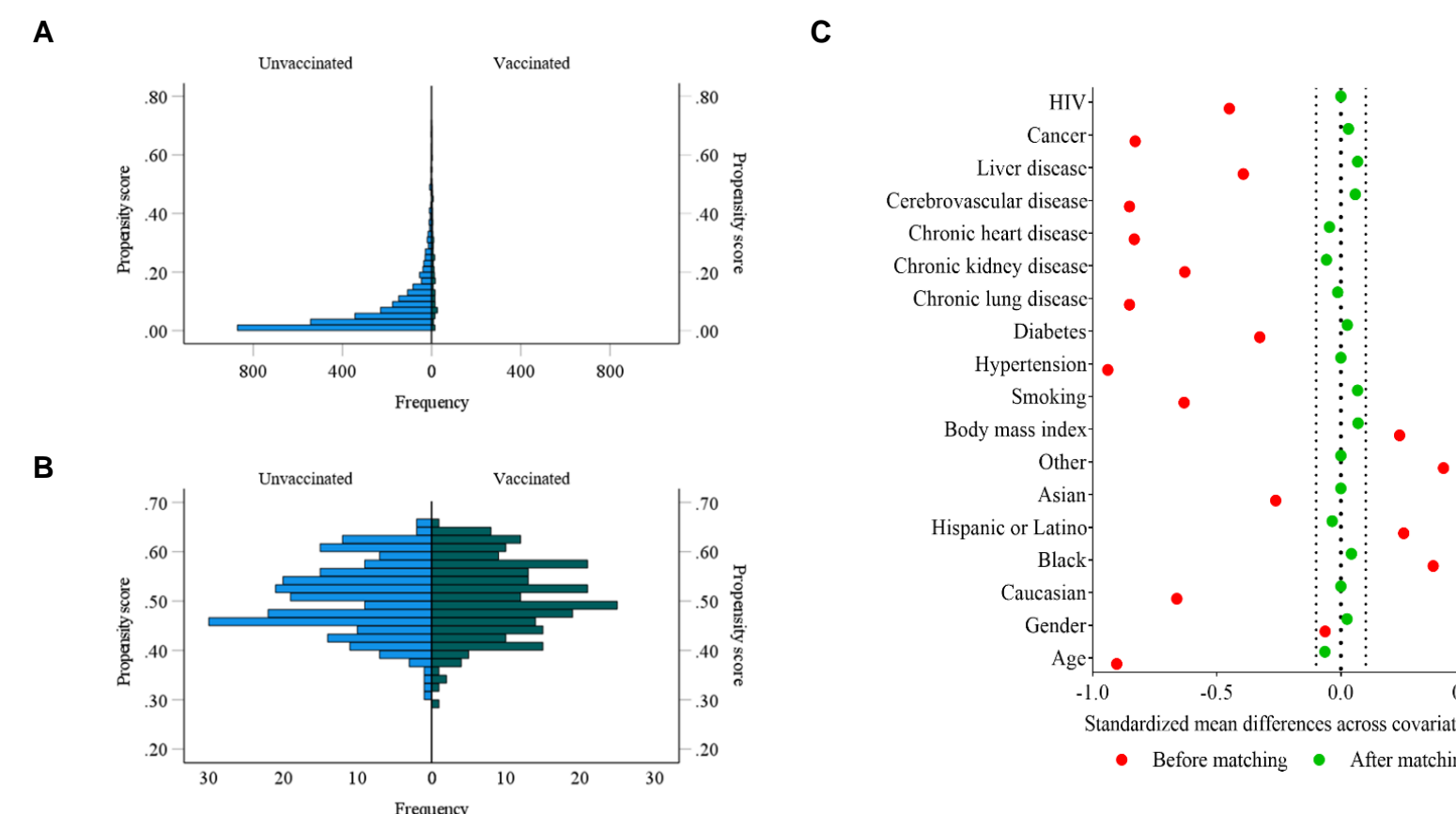


Figure 4. Propensity score distribution and covariate balance measured by standardized mean difference. Mirrored histograms of the propensity score distribution for the unvaccinated (blue bars) and the vaccinated (green bars) before (A) and after (B) matching. (C) Covariate balance plot of distribution of standardized mean differences before (red dots) and after (green dots) matching. The baseline characteristics were comparable between the unvaccinated and vaccinated (breakthrough COVID-19 infection) patients after matching.

COVID-19 vaccines effectively reduce risk of severe illness and death

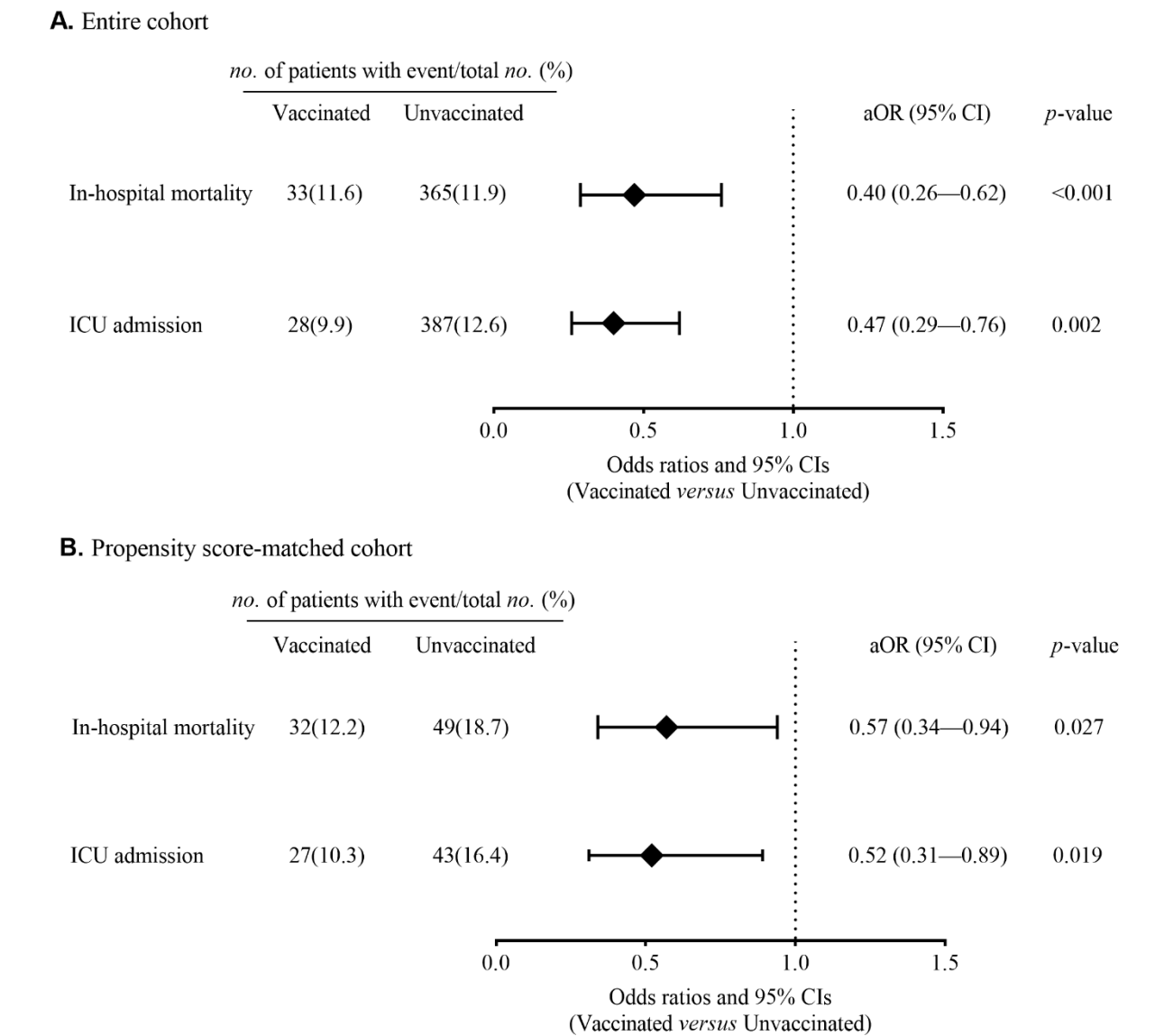


Figure 5. Forest plot showing adjusted odds ratios (aORs) estimates with 95% confidence interval (CIs) for vaccination and risk of disease severity. aORs were obtained from the multivariable logistic regression models adjusted for age, gender, race/ethnicity, body mass index, and comorbidities (chronic lung disease, chronic kidney disease, chronic heart disease, hypertension, diabetes).

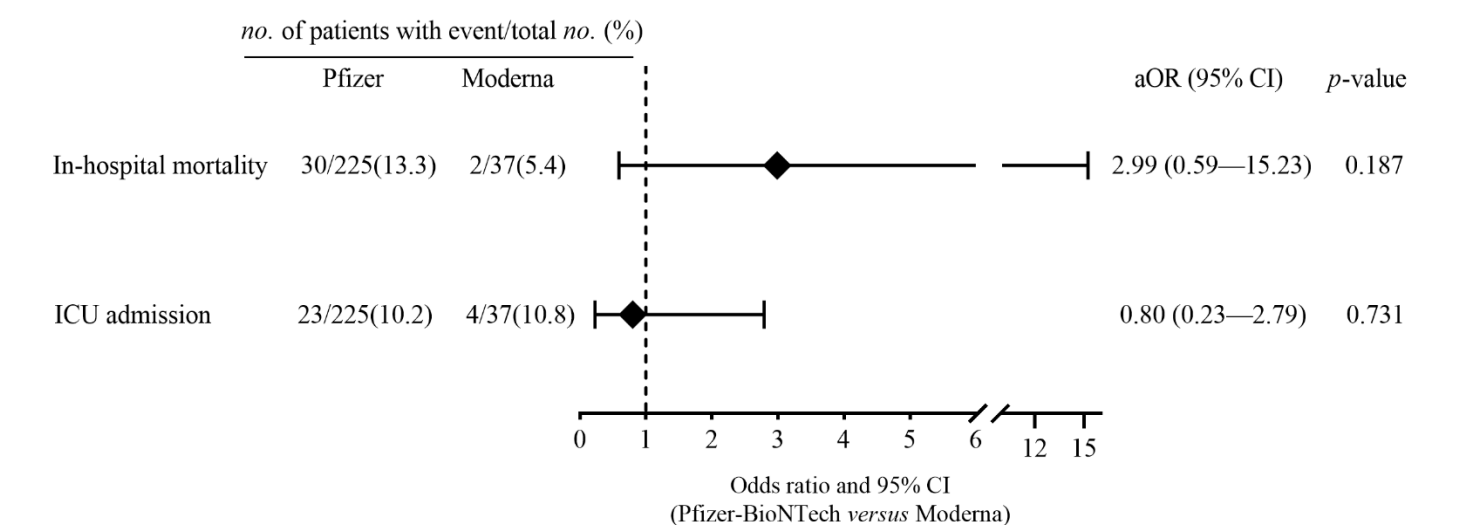


Figure 6. Forest plot showing adjusted odds ratios (aORs) estimates with 95% confidence interval (CIs) for vaccine type and risk of disease severity. No differences in ICU admission and death were observed between patients received Pfizer-BioNTech and those received mRNA-1273 (Moderna).

CONCLUSIONS

- In this retrospective, adult inpatient study, 8.5% patients were vaccine breakthrough infections and 91.5% were not vaccinated.
- Patients with vaccine breakthrough infection were older and had a significantly higher comorbidity profile than those of unvaccinated patients with COVID-19.
- COVID-19 vaccines significantly reduce risk of severe illness or death in hospitalized adult patients with COVID-19 compared with absence of vaccination.
- Effectiveness of vaccines against COVID-19-associated ICU admission or death was comparable between Pfizer-BioNTech and mRNA-1273 (Moderna).