

COVID-19 Vaccinations Among US Veterans with Mental Illness: a Retrospective Cohort Study



KEY WORDS: COVID-19 vaccination; mental health disparities; veterans.

J Gen Intern Med

DOI: 10.1007/s11606-022-07763-3

© This is a U.S. Government work and not under copyright protection in the US; foreign copyright protection may apply 2022

INTRODUCTION

Individuals living with mental illness have high COVID-19 infection rates and mortality.¹ Vaccination strategies have prioritized outreach based on age, high-risk medical conditions, racial and ethnic groups, and social vulnerability (e.g., homelessness), but not mental illness. Despite calls to ensure adequate access for this population, little is known about vaccination rates. Veterans receiving care within the Veteran's Administration (VA) experience a high prevalence of mental illness, and disparities in preventative care, including immunizations, have been previously reported.^{2,3} Thus, we sought to evaluate equity in COVID-19 vaccination rates among Veterans with mental illness.

METHODS

We conducted a retrospective cohort study among Veterans at the VA Puget Sound facility with an assigned primary care provider in the year prior to the study. We used the VA's electronic health record data repository to identify vaccination status, mental health diagnoses (determined by ICD-10 codes per previously published methods²), and demographics. Vaccinations included VA and Washington State data from December 2020 through August 2021.

We used Student's *t* tests (continuous variables) or Pearson χ^2 tests (dichotomous variables) to examine the association between patient characteristics and vaccination. We used logistic regression to determine the association between mental illness and COVID-19 vaccination. We used three separate groups of mental illness diagnoses: serious mental illness (SMI) (bipolar disorder or schizophrenia), a group of non-SMI conditions (post-traumatic stress disorder (PTSD), depression, or anxiety disorders), and substance use disorders

(SUD), and ran three separate models comparing each study group to a control group without mental illness diagnoses. Covariates are described in Table 1. Outcomes were reported as adjusted odds ratios and predicted probabilities. Analyses were conducted using R 4.1.0.

This work was designated as non-research, quality improvement activity by the VA Office of Research and Development and did not require local VA Institutional Review Board review.

RESULTS

We identified 103,025 Veterans without mental illness, 1467 with SMI, 15,329 with non-SMI, and 5110 with SUD (Table 1). In unadjusted analysis, those with SMI and non-SMI were more likely to be vaccinated than those without mental illness (no difference in those with SUD). In adjusted analysis, the predicted probability of vaccination was higher for all three groups compared to that of the no mental illness group: 9.6% (95% CI 7.0–12.2) for SMI, 5.1% (4.1–6.1) for non-SMI, and 4.8% (3.1–6.4) for SUD (Table 2).

DISCUSSION

After adjusting for clinical and sociodemographic covariates, we found that Veterans with mental illness had higher uptake of COVID-19 vaccination compared to Veterans with no mental illness, contrary to concerns that they would have difficulty accessing or not desire vaccination.

While older VA studies report disparities in preventative services including influenza vaccination,³ studies conducted since large-scale implementation of primary care-mental health integration (2007) and comprehensive primary care (2010) found equal pneumococcal and higher influenza vaccination rates in Veterans with mental illness.⁵ A recent study demonstrated equal COVID-19 vaccination rates for Veterans with SMI.⁶ Our study expands these findings, demonstrating higher COVID-19 vaccination rates for all mental illness groups. Higher health care utilization in Veterans with mental illness was previously hypothesized to lead to higher influenza vaccination rates.⁵ Our findings persist after adjusting for primary care and mental health visits. However, between-visit care coordination may contribute, given its prominent role in mental health care.

Prior Presentation: This work was presented at the Society of General Internal Medicine Annual Meeting, April 7, 2022.

Received March 18, 2022

Accepted August 1, 2022

Table 1 Clinical, Demographic and Health Care Utilization Characteristics of Veterans With and Without Mental Illness Seen at the VA Puget Sound

	No mental illness (n = 103,025)	Schizophrenia or bipolar disorder (n = 1467)	PTSD, depression, or anxiety (n = 15,329)	Substance use disorder (n = 5110)
Age, mean (SD), years	60.2 (17.1)	55.6 (15.2)	52.8 (16.1)	55.2 (15.1)
Male sex (%)	77,524/86,872 (89%)	1211/1450 (84%)	12,177/15,057 (81%)	4570/5013 (91%)
Married (%)	57,437/103,025 (56%)	494/1467 (34%)	7601/15,329 (50%)	1791/5110 (35%)
Race and ethnicity (%)				
American Indian/Alaska Native	1131/92,300 (1.2%)	17/1424 (1.2%)	200/14,871 (1.3%)	78/4954 (1.6%)
Asian/Pac Islander/Native Hawaiian	5678/92,300 (6.2%)	60/1424 (4.2%)	934/14,871 (6.3%)	193/4954 (3.9%)
Hispanic	5241/92,300 (5.7%)	77/1424 (5.4%)	1128/14,871 (7.6%)	263/4954 (5.3%)
Multi-race/other	2223/92,300 (2.4%)	45/1424 (3.2%)	518/14,871 (3.5%)	134/4954 (2.7%)
Non-Hispanic Black	8773/92,300 (9.5%)	213/1424 (15%)	2007/14,871 (13%)	780/4954 (16%)
Non-Hispanic White	69,254/92,300 (75%)	1012/1424 (71%)	10,084/14,871 (68%)	3506/4954 (71%)
Gagne score, mean (SD)*	0.18 (0.90)	0.73 (1.4)	0.36 (1.2)	0.66 (1.4)
Count of primary care visits past year, mean (SD)	2.9 (4.5)	6.4 (7.1)	6.2 (6.8)	5.6 (6.3)
Count of mental health visits past year, mean (SD)	0.7 (4.7)	17.7 (2.4)	9.6 (16.8)	14.9 (24.0)
Homelessness past year (%)†	352/103,025 (< 1%)	96/1467 (6.5%)	344/15,329 (6.5%)	310/5110 (6.1%)
Veteran rurality (%)‡				
Urban	60,464/85,166 (71%)	1156/1422 (81%)	11,058/14,380 (77%)	3807/4901 (78%)
Rural	24,702/85,166 (29%)	266/1422 (19%)	3322/14,380 (23%)	1094/4901 (22%)
Facility type for primary care (%)				
Community-based outpatient clinic	29,812/81,413 (37%)	261/1378 (19%)	3588/14,143 (25%)	1073/4729 (23%)
edical center	51,601/81,413 (63%)	1117/1378 (81%)	10,555/14,143 (75%)	3656/4729 (77%)
Socioeconomic status index, decile (SD)§	5.1 (2.4)	4.7 (2.4)	5.1 (2.4)	5.0 (2.5)
Percent with no high school degree (SD)¶	8.9 (6.2)	9.4 (6.0)	8.9 (5.9)	9.3 (6.3)

Note: Each mental health diagnosis group was compared independently to the reference group of no mental illness; *p* values for all comparisons statistically significant at the 0.05 level except the socioeconomic status index for the PTSD/anxiety/depression group. Complete case was used in the case of missing data, where missing covariates were dropped from the analysis

PTSD post-traumatic stress disorder

*Comorbidity score, previously described⁴

†Homelessness derived from ICD10 Z59 codes

‡Rurality derived from linking Veteran zip code to census tract and categorization as per Rural Urban Commuting Area (RUCA) codes²

§Socioeconomic status derived from linking Veteran zip code to US Census Bureau data²

¶Census data—raw numbers are percentages

Table 2 Association of Mental Illness with COVID-19 Vaccine Receipt

	Vaccine receipt (%)	Unadjusted OR	95% CI	Adjusted OR	95% CI	<i>p</i> value
No mental illness	64,499/103,025 (63%)	—	—	—	—	—
Schizophrenia or bipolar disorder	980/1467 (67%)	1.20	1.08, 1.34	1.58	1.38, 1.82	< 0.001
PTSD, depression, or anxiety disorder	9787/15,329 (64%)	1.05	1.02, 1.09	1.26	1.20, 1.32	< 0.001
Substance use disorder	3202/5110 (63%)	1.0	0.95, 1.06	1.24	1.15, 1.34	< 0.001

Note: Vaccination status includes Washington State data, which were analyzed and cleaned prior to entry into VA records. Rejected data were estimated at less than 2%. Forty-eight percent of overall vaccinations in the study period were administered through the VA. All comparisons are to the no mental illness group; all logistic regression models adjusted for age, sex, race and ethnicity, marital status, Gagne score, socioeconomic status index, Veteran rurality, homelessness, number of visits to primary care, number of visits to mental health, and percent without high school degree PTSD post-traumatic stress disorder

Our study also expands the VA COVID-19 vaccine equity literature as the first to incorporate state data, thereby addressing concerns that potential disparities (arising from differential ability to navigate complicated, online vaccine scheduling systems that were the hallmark of early non-VA vaccination efforts) were being masked.

The current VA model is well structured to deliver equitable, accessible care to Veterans with mental illness. Furthermore, VA COVID-19 vaccination efforts were conducted with a defined equity framework, data-driven outreach campaigns, lower technological and logistical

barriers to care, and specific focus on vulnerable populations including early administration of vaccines at homeless shelters and in patient homes.⁶ These factors may contribute to equitable vaccination outcomes for Veterans with mental illness. However, to date, no large studies have evaluated COVID-19 vaccination in persons with mental illness outside the VA, preventing comparisons regarding the impact of the VA model of care. Regardless, our results demonstrate that disparities in COVID-19 vaccination for persons with mental illness can be prevented.

Acknowledgements: Contributors: We gratefully thank Jorge Rojas, Jr, MS, and Stefanie Deeds, MD, for their help in preparing this manuscript. We also gratefully thank Katherine Ritchey, DO, MPH; Laxminarsimha Reddy, MD; and Morgan Fitzpatrick, MPH, RN, ANP-BC and their outreach teams which vaccinated many Veterans with mental illness who could not come to traditional vaccine clinics.

Anders Chen, MD, MHS^{1,2}
 Lauren A. Beste, MD, MS^{1,2}
 Kristen Strack, PhD¹
 John Geyer, MD^{1,2}
 Chelle Wheat, PhD, MPH¹
 Karin Nelson, MD, MSHS^{1,2}
 Ashok Reddy, MD, MS^{1,2}

¹Veterans Affairs Puget Sound Health Care System,
 Department of Veterans Affairs,
 1660 S. Columbian Way (PCC-123), Seattle, WA
 98108, USA

²Department of Medicine, University of Washington
 School of Medicine,
 Seattle, USA

Corresponding Author: Anders Chen, MD, MHS; Veterans Affairs Puget Sound Health Care System, Department of Veterans Affairs, 1660 S. Columbian Way (PCC-123), Seattle, WA 98108, USA (e-mail: andersch@uw.edu).

Funding This work was funded by the Primary Care Analytics Team through the Veterans Health Administration Office of Primary Care.

Declarations:

Conflict of Interest: The authors declare that they do not have a conflict of interest.

REFERENCES

1. **Fond G, Nemani K, Etchecopar-Etchart D** et al. Association between mental health disorders and mortality among patients with COVID-19 in 7 countries: a systematic review and meta-analysis. *JAMA Psychiatry*. 2021;78(11):1208-1217. <https://doi.org/10.1001/jamapsychiatry.2021.2274>.
2. **Trivedi RB, Post EP, Sun H** et al. Prevalence, comorbidity, and prognosis of mental health among US veterans. *Am J Public Health*. 2015;105(12):2564-9. <https://doi.org/10.2105/AJPH.2015.302836>.
3. **Druss BG, Rosenheck RA, Desai MM, Perlin JB**. Quality of preventive medical care for patients with mental disorders. *Med Care*. 2002;40(2):129-36. <https://doi.org/10.1097/00005650-200202000-00007>.
4. **Gagne JJ, Glynn RJ, Avorn J, Levin R, Schneeweiss S**. A combined comorbidity score predicted mortality in elderly patients better than existing scores. *J Clin Epidemiol*. 2011 Jul;64(7):749-59. <https://doi.org/10.1016/j.jclinepi.2010.10.004>. Epub 2011 Jan 5. PMID: 21208778; PMCID: PMC3100405.
5. **Browne KC, Hoerster KD, Piegari R** et al. Clinical care quality among veterans health administration patients with mental illness following medical home implementation. *Psychiatr Serv*. 2019;70(9):816-823. <https://doi.org/10.1176/appi.ps.201800474>.
6. **Haderlein TP, Steers WN, Dobalian A**. Serious mental illness diagnosis and COVID-19 vaccine uptake in the Veterans Health Administration. *Psychiatr Serv*. 2022 Jan 18;appips202100499. <https://doi.org/10.1176/appi.ps.202100499>.

Publisher's Note: Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.