Letter to the editor

Mental health outcomes after hospitalization with or without COVID-19

To the Editor:

Survivors of hospitalization for COVID-19 are at high risk for psychiatric morbidity. [1] Social isolation due to restrictive visitor policies and fears of contagion or stay-at-home orders could further increase psychiatric vulnerability and reduce the likelihood that patients would seek or receive treatment. [2]

We conducted a prospective cohort study to assess psychiatric symptoms in patients with and without COVID-19 after hospital discharge during the height of the COVID-19 pandemic (discharge dates 4/4/2020–6/16/2020). We also surveyed patients on their experiences with isolation and related psychological distress to determine how these related to psychiatric outcomes.

Patients were identified from a database developed for a statewide multi-institutional collaborative quality improvement initiative [3] and from the hospital's infection prevention database. Eligible patients were adults who were hospitalized with symptoms concerning for COVID-19 and underwent COVID-19 PCR testing. COVID-negative patients were pseudo-randomly sampled based on discharge time stamp in a 2:1 ratio of patients with vs. without COVID-19. Patients completed the survey via phone or electronically. This project received non-regulated status prior to data collection by the Institutional Review Board.

Survey questions included the Memory Impairment Screen-Telephone (MIS-T) [4], Patient Health Questionnaire-9 (PHQ-9), [5] General Anxiety Disorder-7 (GAD-7) [6], PTSD Checklist – 2 item version (PCL-2) [7], and 2 loneliness items from the UCLA Three-Item Loneliness Scale. [8] Questions about pre-existing psychiatric diagnoses, subjective mental health concerns, communication, and isolation-related psychological distress were included. Demographic and clinical data were obtained from the database and medical record. Full methods can be found in the **eMethods** and **eSurvey**.

Of 430 patients contacted, 178 (64% COVID-positive) completed the survey (**eFigure 1**). Responders were more likely to be White, require intensive care (ICU), have longer lengths of stay, and have higher Charlson comorbidity scores (**eTable 1**). Compared to COVID-negative patients, COVID-positive patients were more likely to be Black (45% vs. 13%, $P < 0.001$), have a longer length of stay (11 days vs. 5 days, $P < 0.001$), and be treated in an ICU (47% vs. 11%, $P < 0.001$). Fewer COVID-positive than COVID-negative patients reported pre-existing psychiatric diagnoses (21% vs. 39%, $P = 0.009$) (**eTable 2**).

Mental health symptom scores are reported in Table 1. COVID-positive patients had higher post-traumatic stress (PTS) scores (3.0 vs. 2.3, $P = 0.002$), more positive PTSD screens (25% vs 7%, $P = 0.003$), and higher loneliness scores (3.0 vs. 2.5, $P = 0.004$). After controlling for potential confounders (age, sex, Charlson comorbidity index, length of stay, and pre-existing psychiatric diagnosis), COVID-19 was independently associated with higher scores on the GAD-7, PCL-2, and loneliness scales (Table 1).

To understand whether patients recognized and sought care for mental health symptoms, we asked about subjective mental health concerns after discharge. More COVID-positive than COVID-negative patients self-reported mental health concerns (17% vs 2%, $P < 0.001$). Only 8 (37%; 7 COVID-positive) patients reporting mental health concerns received care for them, most (88%) via telehealth. While the majority of patients who reported mental health concerns (70%, 14/20) screened positive on the PHQ-9, GAD-7, or PCL-2, most patients who screened positive (68%, 30/44) did not report subjective concerns.

Most (80%) patients recalled at least daily communication with friends and family during hospitalization, without differences between COVID-positive and COVID-negative groups (**eTable 3**). More COVID-positive (65%) than COVID-negative (23%) patients reported receiving discharge instructions to self-isolate ($P < 0.001$), but the majority of all patients (66%) isolated themselves from friends or family for more than 7 days after discharge with no difference between COVID-positive and COVID-negative groups. This isolation was associated with higher scores on the GAD-7 (3.7 vs. 2.2, $P = 0.02$), PCL-2 (2.9 vs. 2.4, $P = 0.01$), and loneliness scale (2.9 vs. 25, $P = 0.005$) (**eTable 5**).

COVID-positive patients recalled higher levels of isolation-related psychological distress during hospitalization (e**Figure 2** and **eTable 4**) including more strong agreements with the statements, "I worried that I might not see my friends and family again" (33% vs 13%, $P = 0.002$), "I worried that I might not get to say goodbye to my friends and family" (32% vs 14%, $P = 0.01$), and "I was afraid to die alone" (29% vs 9%, $P = 0.003$). Patients who reported these fears had higher scores on the GAD-7 (4.7 vs. 2.6), PCL-2 (3.4 vs. 2.5, $P = 0.005$), and loneliness scales (3.1 vs. 2.6, $P = 0.01$; **eTable 5**).

In conclusion, patients in our study hospitalized with COVID-19 had higher levels of anxiety, PTS, and loneliness after discharge compared to those hospitalized without COVID-19, independent of illness severity or pre-existing medical and psychiatric conditions. In contrast, there were no differences in post-discharge memory or depression scores between COVID-positive and COVID-negative patients. Isolation after discharge and memories of inpatient isolation-related distress predicted more anxiety, PTS, and loneliness symptoms. Most patients who screened at-risk did not recognize these symptoms as mental health concerns, and those who recognized them rarely received follow-up care.

Our study has several limitations, including the baseline demographic and clinical differences between the COVID-positive and COVID-negative groups and the low survey response rate. Still, the findings suggest that survivors of COVID-19 should be screened for anxiety and PTSD symptoms after hospital discharge to improve identification of at-risk patients and direct them to further care. Measures designed to reduce isolation during illness and after discharge should be considered, as these may reduce psychiatric vulnerability.

Table 1
Mental health descriptive and multivariable outcomes 30–40 days after discharge.

	Descriptive results			Linear regressions	
	Overall Patients (*N* = 178)	COVID Positive Patients (*N* = 114)	COVID Negative Patients (Ref) (*N* = 64)	Coefficient Estimate (95% CI)	P-Value[f]
	Mean/N	Mean/N	Mean/N		
MIS-T[a], mean	7.0 ± 1.4	7.0 ± 1.3	6.9 ± 1.5	0.2 (−0.2 to 0.7)	0.34
Positive screen for memory impairment	14 (9.0%)	6 (6.0%)	8 (14.3%)		0.08
PHQ-9[b], mean	3.8 ± 4.8	3.4 ± 4.3	4.4 ± 5.4	0.6 (−0.9 to 2.2)	0.42
Positive screen for depression	17 (9.6%)	9 (8.7%)	8 (13.3%)		0.34
GAD-7[c], mean	3.3 ± 4.8	3.5 ± 5.0	2.8 ± 4.4	1.8 (0.2 to 3.4)	0.03
Positive screen for anxiety	17 (10.2%)	12 (11.3%)	5 (8.2%)		0.52
PCL-2[d], mean	2.8 ± 1.6	3.0 ± 1.8	2.3 ± 1.0	0.7 (0.2 to 1.3)	0.01
Positive screen for PTSD	31 (18.1%)	27 (24.6%)	4 (6.6%)		0.003
Loneliness Score[e], mean	2.8 ± 1.2	3.0 ± 1.3	2.5 ± 0.8	0.6 (0.2 to 1.0)	0.002

Abbreviations: CI = confidence interval; GAD-7: General Anxiety Disorder-7; MIS-T: Memory Impairment Screen-Telephone; PCL-2: PCL-2: Post-Traumatic Stress Disorder Checklist-2; PHQ-9: Patient Health Questionnaire-9; PTSD: post-traumatic stress disorder; Ref = reference.

Note: Answers obtained via survey 30–40 days after hospitalization. Bivariate comparisons between COVID-positive and COVID-negative groups with $P < 0.05$ considered significant.

[a] Scores range 0–8, with higher score indicating better performance (Score ≤ 4 indicates potential memory impairment);

[b] Scores range 0–27, with higher scores indicating more depressive symptoms (Score ≥ 10 indicates potential depression);

[c] Scores range 0–21, with higher scores indicating more anxiety symptoms (Score ≥ 10 indicates potential anxiety);

[d] Scores range 0–8, with higher scores indicating more post-traumatic stress symptoms (Score ≥ 4 indicates potential PTSD);

[e] Scores range 2–6, with higher scores indicating more loneliness symptoms;

[f] P-values for linear regressions are presented where applicable.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.genhosppsych.2021.07.004.

References

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