

Implications of COVID-19 on hip fracture care discharge locations during the early stages of the pandemic

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Abstract

Objectives: To document discharge locations for geriatric patients treated for a hip fracture before and during the COVID pandemic and subsequent changes in outcomes seen between each cohort.

Design: Retrospective cohort study.

Setting: Academic medical center.

Patients/Participants: Two matched cohorts of 100 patients with hip fracture treated pre-COVID (February–May 2019) and during COVID (February–May 2020).

Intervention: Discharge location and COVID status on admission. Discharge locations were home (home independently or home with health services) versus facility [subacute nursing facility (SNF) or acute rehabilitation facility].

Main Outcome Measurements: Readmissions, inpatient and 1-year mortality, and 1-year functional outcomes (EQ5D-3L).

Results: In COVID+ patients, 93% (13/14) were discharged to a facility, 62% (8/13) of whom passed away within 1 year of discharge. Of COVID+ patients discharged to an SNF, 80% (8/10) died within 1 year. Patients discharged to an SNF in 2020 were 1.8x more likely to die within 1 year compared with 2019 ($P = 0.029$). COVID– patients discharged to an SNF in 2020 had a 3x increased 30-day mortality rate and 1.5x increased 1-year mortality rate compared with 2019. Patients discharged to an acute rehabilitation facility in 2020 had higher rates of 90-day readmission. There was no difference in functional outcomes.

Conclusions: All patients, including COVID– patients, discharged to all discharge locations during the onset of the pandemic experienced a higher mortality rate as compared with prepandemic. This was most pronounced in patients discharged to a skilled nursing facility in 2020 during the early stages of the pandemic. If this trend continues, it suggests that during COVID waves, discharge planning should be conducted with the understanding that no options eliminate the increased risks associated with the pandemic.

Level of Evidence: III

Key Words: hip fracture, discharge location, COVID-19, rehabilitation

1. Introduction

The onset and continued presence of the COVID-19 pandemic affected communities across the globe. As of February 11th,

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2022, COVID-19 case total worldwide stand at 664,873,023 with 6,724,248 deaths.¹ The case total specifically in the United States stands at 100,651,473 with 1,093,540 deaths.² As the pandemic and the virus has evolved, so too has health care's response to it. Some of these changes range from simple social distancing policies and mask mandates to governmental orders regarding where hospitals may discharge patients.^{3,4}

Geriatric hip fractures occurring during the COVID-19 pandemic continue to be a significant resource strain for health care systems. The morbidity and mortality associated with hip fractures in these patients is well documented.^{5,6} One pre-COVID study by Kristensen et al⁷ found patients who did not regain their prefracture basic mobility due to limited rehabilitation access often had worse outcomes, namely they experienced an increased 30-day mortality rate. Therefore, postoperative rehabilitation is critical in this population.

The onset of the COVID-19 pandemic greatly affected the ability of rehabilitation centers to accept patients from a hospital setting because many lacked the necessary resources to care for this highly contagious and sick population. Guidelines changed frequently to try to address the rapidly evolving pandemic. However, these newly instituted guidelines often did not adequately provide instruction to both health care workers and patients alike. Three examples of this include the following: In New York State, in

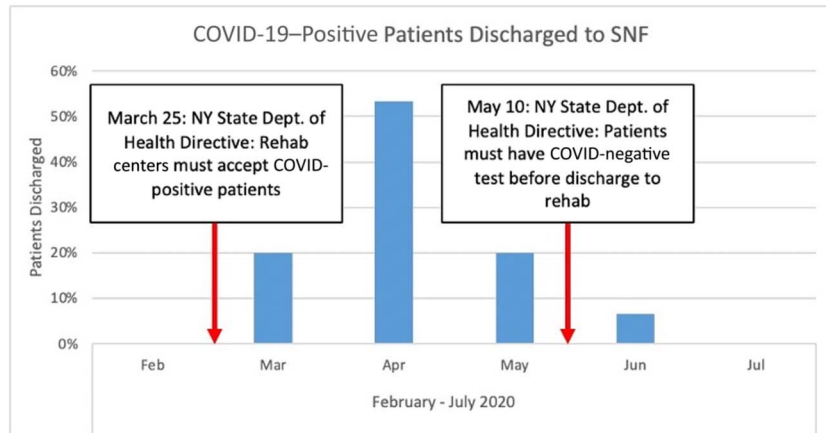


Figure 1. Impact of New York Department of Health Directives on discharges to subacute nursing facilities.

March 2020, there was a state-wide directive requiring nursing homes to accept patients regardless of COVID-19 status. This was reversed in May 2020 with a new directive requiring patients to have a negative COVID-19 test before leaving the hospital (Fig. 1).⁸ Similar hospital discharge mandates were made in England during March 2020, prompting hospitals across the country to aggressively free up hospital beds to accommodate the increasing number of admissions.⁹ One such method was increasing the amount of patients discharged home independently or with a home health aide to provide further care. This led to both widespread confusion among hospital staff because discharge guidelines were not clear and dissatisfaction among patients who did not feel adequately cared for or well-informed about their plan posthospitalization.¹⁰ Another report outlined the need for improved discharge criteria protocols specifically in COVID-19 positive patients (COVID+), with 5 countries having no strict discharge criteria and another 5 countries having discharge criteria with extensive variation across different states and counties with each country.¹¹ Such variation incited challenges in comprehensive discharge protocols with standard discharge locations for patients with hip fracture changing compared with before the pandemic. The immediate and downstream effects of these changes in discharge locations specifically for patients with geriatric hip fracture have not yet been studied.

The purpose of this study was to document discharge locations for geriatric patients treated for a hip fracture before and during the COVID pandemic and subsequent changes in outcomes seen between each cohort. This is the first article to document how discharge location in an urban hotspot during the early stages of the COVID-19 pandemic affected outcomes in patients with hip fracture.

2. Methods

This is a retrospective review of prospectively collected data observational cohort study. An institutional review board-approved geriatric trauma database was queried for all patients aged 55 years or older who sustained a hip fracture through a low-energy mechanism (fall from standing or from a height <2 stairs) between February–May 2019 and February–May 2020. Patients were treated at 1 academic medical center including 4 Level 1 trauma centers, 1 university-based tertiary care referral hospital, and 1 orthopaedic specialty hospital. Additional inclusion criteria

included the presence of a subtrochanteric, femoral neck, or intertrochanteric hip fracture [OTA/AO fracture classifications: 31A, 31B, 32(A-C)].

Two matched cohorts of 100 patients with hip fracture treated pre-COVID (February–May 2019) and during COVID (February–May 2020) were reviewed for discharge locations, COVID status on admission, 30-day and 90-day readmissions, inpatient and 1-year mortality, and 1-year functional outcomes based on EuroQol-5 Dimension (EQ5D-3L) scores. Patients were contacted by phone to complete the EQ5D-3L questionnaires on functional status along with their respective visual analog scores. In situations where the patient was demented or unable to communicate, the patient’s care taker was contacted for information on their functional status/well-being. Patients were matched through a propensity score method using a validated geriatric risk assessment tool, the Score for Trauma Triage in Geriatric and Middle-Aged Patients (STTGMA).^{12,13} This accounts for patient age, sex, Glasgow Coma Scale, comorbidities as represented by Charlson Comorbidity Index and American

TABLE 1
Overall Cohort Demographics

Total Cohort Demographics	N (%)
Total N	200
Age (years) mean ± SD	82.02 ± 9.34
Body mass index (BMI)	24.21 ± 4.80
Sex	
Male	81 (40.50%)
Female	119 (59.50%)
Race	
White	165 (82.50%)
Black	10 (5.00%)
Hispanic	9 (4.50%)
Asian	8 (4.00%)
Other	2 (1.00%)
Unknown	6 (3.00%)
STTGMA score	1.71 ± 3.87
Charlson Comorbidity Index (CCI)	1.46 ± 1.47
American Society of Anesthesiology Score (ASA)	2.96 ± 0.62
Ambulatory status	
Community	112 (56.00%)
Household	77 (38.50%)
Nonambulatory	11 (5.50%)

TABLE 2
Discharge Locations in 2019 versus 2020: Examination of Differences, 30-Day Mortality, and 1-Year Mortality
2019 Versus 2020 Discharge Location and Mortality Comparison

	2019			2020			P		
	N (%)	30-Day Mortality	1-Year Mortality	N (%)	30-Day Mortality	1-Year Mortality	P	P	P
Total N (%)	100 (100.00%)	3 (3.00%)	18 (18.00%)	100 (100.00%)	9 (9.00%)	34 (34.00%)	—	0.074	0.010
Facility	84 (84.00%)	3 (3.57%)	16 (19.05%)	72 (72.00%)	7 (9.72%)	25 (34.72%)	0.041	0.118	0.027
SNF	70 (70.00%)	3 (4.29%)	15 (21.43%)	56 (56.00)	7 (12.50%)	22 (39.29%)	0.036	0.090	0.029
COVID+	—	—	—	10 (17.86%)	1 (10.00%)	8 (80.00%)	—	—	—
COVID-	70 (100.00%)	3 (4.29%)	15 (21.43%)	46 (82.14%)	6 (13.04%)	14 (30.43%)	0.021	0.085	0.273
ARF	14 (14.00%)	0 (0.00%)	1 (7.14%)	16 (16.00%)	0 (0.00%)	3 (18.75%)	0.690	—	0.351
COVID+	—	—	—	3 (18.75%)	0 (0.00%)	0 (0.00%)	—	—	—
COVID-	14 (100.00%)	0 (0.00%)	1 (7.14%)	13 (81.25%)	0 (0.00%)	3 (23.08%)	0.829	—	0.244
Home	16 (16.00%)	0 (0.00%)	2 (12.50%)	28 (28.00%)	2 (7.14%)	9 (32.14%)	0.041	0.274	0.148
Home Ind.	6 (6.00%)	0 (0.00%)	1 (16.67%)	21 (21.00%)	1 (4.76%)	7 (33.33%)	<0.01	0.586	0.430
COVID+	—	—	—	1 (4.76%)	0 (0.00%)	1 (100.00%)	—	—	—
COVID-	6 (100.00%)	0 (0.00%)	1 (16.67%)	20 (95.24%)	1 (5.00%)	6 (30.00%)	<0.01	0.576	0.518
HHS	10 (10.00%)	0 (0.00%)	1 (10.00%)	7 (7.00%)	1 (14.29%)	2 (28.57%)	0.420	0.218	0.323
COVID+	—	—	—	0 (0.00%)	0 (0.00%)	0 (0.00%)	—	—	—
COVID-	10 (100.00%)	0 (0.00%)	1 (10.00%)	7 (100.00%)	1 (14.29%)	2 (28.57%)	0.661	0.218	0.323

Bold values = significant P values.
 Home Ind, home independently; HHS, home with health services.

Society of Anesthesiology Score, injury characteristics as represented by the Abbreviated Injury Score for the Head/Neck and the Chest, and ambulatory status. Patients were identified as COVID-19-positive if they had a positive COVID-19 RT-PCR test on admission to the hospital for their hip fracture. Discharge locations were home (home independently or home with health services) versus facility [subacute nursing facility (SNF) or acute rehabilitation facility (ARF)]. Home independent is defined as a discharge to home without any official services (visiting nurse, for example). Patients were excluded if they died inpatient, were transferred, or discharged to hospice.

Comparative analyses were conducted between each cohort using chi square, Mann-Whitney U tests, and independent sample t tests when appropriate. Statistical analyses were performed using IBM SPSS data software, version 25.

2.1. Ethical Approval and Informed Consent

This retrospective study involving human participants was in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The Human Investigation Committee (IRB) of NYU Langone approved this study (Number s20-001766). Due to the approved IRB, informed consent was not required as study was retrospective in nature and information was anonymized.

3. Results

The demographic characteristics of the combined cohorts (200 patients) are as follows: mean age of 82.02 ± 9.34, mean body

TABLE 3
Comparison of 30-Day and 90-Day Readmissions
2019 Versus 2020 Discharge Location and Readmission Comparison

	2019			2020			P		
	N (%)	30-Day Readmission	90-Day Readmission	N (%)	30-Day Readmission	90-Day Readmission	P	P	P
Total N (%)	100 (100.00%)	6 (6.00%)	18 (18.00%)	100 (100.00%)	10 (10.00%)	17 (17.00%)	—	0.297	0.568
Facility	84 (84.00%)	4 (4.76%)	15 (17.86%)	72 (72.00%)	7 (9.72%)	12 (16.67%)	0.041	0.228	0.845
SNF	70 (70.00%)	4 (5.71%)	15 (21.43%)	56 (56.00)	5 (8.93%)	8 (14.29%)	0.036	0.486	0.302
COVID+	—	—	—	10 (17.86%)	1 (10.00%)	2 (20.00%)	—	—	—
COVID-	70 (100.00%)	4 (5.71%)	15 (21.43%)	46 (82.14%)	4 (8.70%)	6 (13.04%)	0.021	0.535	0.251
ARF	14 (14.00%)	0 (0.00%)	0 (0.00%)	16 (16.00%)	2 (12.50%)	4 (25.00%)	0.690	0.171	0.044
COVID+	—	—	—	3 (18.75%)	0 (0.00%)	0 (0.00%)	—	—	—
COVID-	14 (100.00%)	0 (0.00%)	0 (0.00%)	13 (81.25%)	2 (15.38%)	4 (30.77%)	0.829	0.127	0.025
Home	16 (16.00%)	2 (12.50%)	3 (18.75%)	28 (28.00%)	3 (10.71%)	5 (17.86%)	0.041	0.858	0.941
Home Ind.	6 (6.00%)	0 (0.00%)	0 (0.00%)	21 (21.00%)	3 (14.29%)	4 (19.05%)	<0.01	0.326	0.247
COVID+	—	—	—	1 (4.76%)	1 (100.00%)	1 (100.00%)	—	—	—
COVID-	6 (100.00%)	0 (0.00%)	0 (0.00%)	20 (95.24%)	2 (10.00%)	3 (15.00%)	<0.01	0.420	0.313
HHS	10 (10.00%)	2 (20.00%)	3 (30.00%)	7 (7.00%)	0 (0.00%)	1 (14.29%)	0.420	0.208	0.452
COVID+	—	—	—	0 (0.00%)	0 (0.00%)	0 (0.00%)	—	—	—
COVID-	10 (100.00%)	2 (20.00%)	3 (30.00%)	7 (100.00%)	0 (0.00%)	1 (14.29%)	0.661	0.208	0.452

Bold values = significant P values.
 Home Ind, home independently; HHS, home with health services.

TABLE 4
Comparison of 2019 Versus 2020 1-Year Functional Outcomes (as Measured by VAS) and EQ-5D (EuroQol-5 Dimension)

2019 versus 2020 Discharge Location and Functional Outcome Comparison

	2019			2020			P		
	N (%)*	1-Year VAS Score†	1-Year EQ5D-3L†	N (%)*	1-Year VAS Score†	1-Year EQ5D-3L†	P	P	P
Total N (%)	100 (100.00%)	69.20 ± 19.23	0.68 ± 0.34	100 (100.00%)	69.32 ± 16.91	0.63 ± 0.35	—	0.604	0.967
Facility	84 (84.00%)	67.31 ± 19.08	0.65 ± 0.34	72 (72.00%)	68.19 ± 17.55	0.60 ± 0.34	0.041	0.792	0.476
SNF	70 (70.00%)	65.00 ± 17.59	0.61 ± 0.35	56 (56.00)	68.09 ± 17.58	0.57 ± 0.37	0.036	0.425	0.564
COVID+	—	—	—	10 (17.86%)	65.00 ± 28.30	0.58 ± 0.59	—	—	—
COVID-	70 (100.00%)	65.00 ± 17.59	0.61 ± 0.35	46 (82.14%)	68.28 ± 17.72	0.57 ± 0.37	0.021	0.407	0.563
ARF	14 (14.00%)	76.92 ± 13.00	0.79 ± 0.27	16 (16.00%)	68.46 ± 18.19	0.69 ± 0.25	0.690	0.185	0.324
COVID+	—	—	—	3 (18.75%)	75.00 ± 0.00	0.76 ± 0.06	—	—	—
COVID-	14 (100.00%)	76.92 ± 13.00	0.79 ± 0.27	13 (81.25%)	66.50 ± 20.55	0.66 ± 0.29	0.829	0.152	0.294
Home	16 (16.00%)	78.21 ± 17.39	0.82 ± 0.29	28 (28.00%)	72.11 ± 15.57	0.69 ± 0.38	0.041	0.297	0.302
Home Ind.	6 (6.00%)	81.00 ± 19.49	0.91 ± 0.12	21 (21.00%)	71.79 ± 17.72	0.66 ± 0.39	<0.01	0.344	0.391
COVID+	—	—	—	1 (4.76%)	—	—	—	—	—
COVID-	6 (100.00%)	81.00 ± 19.49	0.91 ± 0.12	20 (95.24%)	71.79 ± 17.72	0.66 ± 0.39	<0.01	0.344	0.391
HHS	10 (10.00%)	76.67 ± 17.14	0.77 ± 0.35	7 (7.00%)	73.00 ± 8.37	0.78 ± 0.37	0.420	0.665	0.936
COVID+	—	—	—	0 (0.00%)	—	—	—	—	—
COVID-	10 (100.00%)	76.67 ± 17.14	0.77 ± 0.35	7 (100.00%)	73.00 ± 8.37	0.78 ± 0.37	0.661	0.665	0.936

Bold values = significant P values.

* N and % represent all patients, alive or dead.

† Functional scores only represent living patients.

Home Ind, home independently; HHS, home with health services; VAS, visual analog score.

mass index of 24.21 ± 4.80, mean STTGMA score of 1.71 ± 3.87, Mean Charlson Comorbidity Index of 1.46 ± 1.47, and mean American Society of Anesthesiology Score of 2.96 ± 0.62. Sixty percent of patients were female, 83% of patients were White, 56% of patients were baseline community ambulators, while 39% were household ambulators (Table 1). Fourteen patients (14.00%) were COVID+ on admission to the hospital at the time of their injury in 2020.

3.1. Overall

More patients were discharged home rather than a facility in 2020 (2019: 84% facility, 16% home; 2020: 72% facility, 28% home; P = 0.041). Of patients going home, more went home independently in 2020 versus 2019 (21.00% vs. 6.00%, P < 0.01). Of patients discharged to a facility, fewer went to an SNF in 2020 (56.00% vs. 70.00%, P = 0.036). Of patients discharged in 2020,

more were discharged home independently and less were discharged to an SNF (2019: 6% home independently, 10% home with health services, 14% ARF, 70% skilling nursing facility; 2020: 21% home independently, 7% home with health services, 16% ARF, 56% skilling nursing facility; P = 0.014).

Patients in the 2020 cohort had higher 1-year mortality (34.00% vs. 18.00%, P = 0.01). Patients discharged to an SNF in 2020 were 1.8x more likely to die within 1 year (39.29% vs. 21.43%, P = 0.029) (Table 2). Patients discharged to an ARF in 2020 had higher rates of 90-day readmission (25.00% vs. 0.00%, P = 0.044) (Table 3). There was no difference seen in 1-year functional outcomes between all patients in 2019 and 2020 regardless of discharge location (Table 4). Finally, there was no difference seen in mortality, readmission, or 1-year functional outcomes seen between patients discharged to an SNF and patients discharged home independently in 2020 (Table 5).

TABLE 5
Subanalysis Comparing Discharge With Subacute Nursing Facility versus Home Independently in 2020

Discharge Locations with Significance in 2020

	SNF			Home Ind.			P		
	N (%)	<30-Day Mortality	1-Year Mortality	N (%)	<30-Day Mortality	1-Year Mortality	P	P	P
Total N (%)	56 (100.00%)	7 (12.50%)	22 (39.29%)	21 (100.00%)	1 (14.29%)	7 (33.33%)	—	0.322	0.631
COVID+	10 (17.86%)	1 (10.00%)	8 (80.00%)	1 (4.76%)	0 (0.00%)	1 (100.00%)	0.144	0.740	0.621
COVID-	46 (82.14%)	6 (13.04%)	14 (30.43%)	20 (95.24%)	1 (14.29%)	6 (30.00%)	0.144	0.329	0.972
		30-Day Readmission	90-Day Readmission		30-Day Readmission	90-Day Readmission	P	P	P
Total N (%)	56 (56.00)	5 (8.93%)	8 (14.29%)	21 (21.00%)	3 (14.29%)	4 (19.05%)	—	0.493	0.608
COVID+	10 (17.86%)	1 (10.00%)	2 (20.00%)	1 (4.76%)	1 (100.00%)	1 (100.00%)	0.144	0.026	0.087
COVID-	46 (82.14%)	4 (8.70%)	6 (13.04%)	20 (95.24%)	2 (10.00%)	3 (15.00%)	0.144	0.865	0.831
		1-Year VAS Score†	1-Year EQ5D-3L†		1-Year VAS Score†	1-Year EQ5D-3L†	P	P	P
Total N (%)	56 (56.00)	68.09 ± 17.58	0.57 ± 0.37	21 (21.00%)	71.79 ± 17.72	0.66 ± 0.39	—	0.512	0.455
COVID+	10 (17.86%)	65.00 ± 28.30	0.58 ± 0.59	1 (4.76%)	—	—	0.144	—	—
COVID-	46 (82.14%)	68.28 ± 17.72	0.57 ± 0.37	20 (95.24%)	71.79 ± 17.72	0.66 ± 0.39	0.144	0.540	0.453

Bold values = significant P values.

* N and % represent all patients, alive or dead.

† Functional scores only represent living patients.

Home Ind, home independently; HHS, home with health services.

3.2. COVID+ Patients

In COVID+ patients, 13 (93%) were discharged to a facility, 8 (62%) of whom passed away within 1-year of discharge. Of 10 COVID+ patients discharged to an SNF, 8 (80%) died within 1 year. COVID+ patients discharged home independently had higher rates of 30-day readmission as compared with COVID+ patients discharged to an SNF (100.00% vs. 10.00%, $P = 0.026$).

3.3. COVID- Patients

In COVID- patients, there was no change in 1-year mortality overall. However, COVID- patients discharged to an SNF in 2020 had a 3x increased 30-day mortality rate (13.04% vs. 4.29%, $P = 0.085$) and 1.5x increased 1-year mortality rate (30.43% vs. 21.43%, $P = 0.273$) compared with 2019. COVID- patients discharged to an ARF in 2020 had higher rates of 90-day readmission (30.77% vs. 0.00%, $P = 0.025$) compared with 2019. There was no difference seen in 1-year functional outcomes between COVID- patients in 2020 and 2019 patients. Similarly, there was no difference seen in mortality, readmission, or 1-year functional outcomes between COVID- patients discharged to an SNF as compared with home independently in 2020.

4. Discussion

The onset of the COVID-19 pandemic overwhelmed health care systems across the world. Hospital networks quickly reached capacity, and discharge protocols were amended rapidly to empty beds to accommodate the rising number of cases. To the best of our knowledge, this is the first study to assess how the COVID pandemic changed discharge planning for geriatric patients treated for hip fracture and the impact on long-term outcomes. Our study found that the proportion of patients discharged to an SNF decreased in 2020, while more patients were discharged home independently. Patients discharged to an SNF had even higher risk of mortality than prepandemic, especially in the COVID+ population. Although all patients experienced similar functional outcomes at 1 year compared with prepandemic regardless of where they were discharged.

Geriatric patients who sustained a hip fracture during the pandemic experienced higher rates of mortality during the early days of the pandemic.^{14,15} However, there is little published on mortality outcomes 1-year posthospital discharge. Our study findings demonstrate the higher rates of mortality in the 2020 pandemic cohort extend out to 1-year posthospital discharge. This may be due to the impact of the COVID infection itself, as well as poorer management of medical comorbidities both during the hospitalization and postdischarge as the pandemic surges continued to stress hospital systems. While our finding of 34% mortality in this population may be higher than some more recent literature, a study by Isla et al¹⁶ found an identical rate of 34% in their work. Therefore, our study findings align with the literature, and it is important to recognize that our study is set in the initial stages of the pandemic, when our region was hit very hard and the number of COVID-19-related deaths increased exponentially.

Multiple reports found patients with hip fracture during the early pandemic were often discharged earlier in their postoperative treatment course to reduce the risk of COVID-19 infection and open up hospital beds.^{17,18} COVID-19+ patients however often required a longer inpatient hospital stay. A report from Scotland found similar rates of discharge locations to facilities or home prepandemic and during the pandemic.¹⁸ Their study did not break

down discharge locations based on COVID positivity; however, nor did it assess whether these changes affected long-term outcomes. Another study from a conglomerate of geriatric surgery centers in Austria, Germany, and Switzerland found in COVID- patients, 41% were discharged to an inpatient facility (ARF), 42% were discharged home, and 18% were discharged to a nursing facility (SNF). Of COVID+ patients, 61% were discharged home.¹⁹ While this contrasts our study findings with 93% of COVID+ patients being discharged to a facility, it is important to recognize the state-wide and country-wide guidelines differed based on location. For example, some guidelines in New York State mandated that patients be discharged to specific locations, regardless of COVID status.⁸

We noted a decrease in discharge to SNFs during the early stages of the pandemic because, in our region of such a high mortality rate in patients at SNFs, there was a general push within the health care community and families/patients to send patients home and away from SNFs. We noted a difference in 30-day readmission rates between those discharged to a SNF as compared with home independently. We speculate this may be because sicker COVID+ patients died soon after discharge and at the time many hospitals were trying to limit the amount of patients coming in (especially COVID+) because they were already overwhelmed with patients. Therefore, these patients were not presenting to the hospital out of fear or because the patient was very sick and had already passed away before readmission. We also noted an increased rate of patients being discharged home independently in 2020. This is likely due to multiple factors, including patients and family members alike not wanting external staff entering their homes and general shortage of resource availability as health systems in our region were overwhelmed. Finally, many nursing staff may have also been recruited to care for COVID-19-positive patients and help abate the heavy influx of patients to the hospitals and health systems.

Our study found comparable 1-year functional outcomes among all discharge locations when comparing 2019 and 2020. This indicates that despite changes in discharge location, patients injured during the pandemic experienced a similar return to function as patients in the 2019 cohort. This demonstrates that despite the ongoing pandemic, patients were able to receive appropriate rehabilitation and get back to a functional state of activity comparable with preinjury.

With more patients discharged home independently and less patients discharged to an SNF in 2020, we sought to compare outcomes between these 2 locations to assess whether changes in discharge protocol were appropriate to combat the pandemic. While COVID+ patients discharged home independently had higher rates of 30-day readmission, this was only 1 patient and therefore precludes any result as clinically significant. One report similarly found decreased usage of SNFs during the pandemic; however, their study did not assess the implications and long-term outcomes of this decrease in SNF discharge.²⁰

This study has several limitations. First, our cohorts only represent the first few months of the pandemic and may not be generalizable across the entire pandemic, especially with changes in the severity of the virus variants and prevalence of the vaccine. Similarly, changes in discharge location seen in our study likely reflect government mandates specific to our state that were instituted during the spring of 2020. The requirements in other states and countries may be different making our findings more difficult to generalize. Second, although cohorts were propensity-matched based on the STTGMA score, this STTGMA score does not account for COVID status and therefore there may be some bias toward increased severity of illness in the COVID+ cohort.

Similarly, COVID-19 was not a risk factor in 2019 and therefore is challenging account for. Third, we do not know how long each patient stayed at their respective rehabilitation facility receiving regimented care before going home or for how long a patient received home health services. This makes it more difficult to compare functional outcomes because patients may have received varying amounts of rehabilitation, affecting their 1-year outcomes. Finally, the small sample sizes of each individual discharge location makes the study underpowered to detect some of the differences seen in 1-year mortality and functional outcome and may limit the extent to which our study findings can be applied to other medical centers and patient populations.

In conclusion, our results demonstrate that all patients, including COVID– patients discharged to all discharge locations, during the onset of the pandemic had a higher mortality rate compared with the standard mortality rate often seen before the pandemic. This increase in the mortality rate was most pronounced in patients who were discharged to a skilled nursing facility in 2020 during the early stages of the pandemic. Further studies will be conducted to evaluate whether this trend persisted during subsequent COVID waves that occurred during 2020–2022. If this trend continues, it suggests that during COVID waves, discharge planning should be conducted with the understanding that no options eliminate the increased risks associated with the pandemic and that additional factors, such as patient health, functional status, and so on, should remain critically important to discharge planning.

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