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A Study of Short Term Outcomes among Covid-19 Patients Discharged without Follow up In the New York Metropolitan Area

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Abstract

Background: A shortage of beds, high case volume, decreased availability of outpatient medical doctors, and limited disease knowledge resulted in the premature discharge and poor follow up of COVID-19 patients in the New York Metropolitan Area.

Objective: The primary objective of this retrospective study and phone survey was to characterize the demographics and clinical outcomes (e.g., readmission rates, comorbidities, mortality, and functional status) of COVID-19 patients discharged without follow-up. The secondary objective was to assess the impact of race and comorbidities on readmission rates and the extent to which patients were escalated to another care provider.

Methods: Electronic medical records were reviewed for COVID-19 patients discharged from 3 NYMA hospitals in March 2020. Follow up data regarding medical status, ability to perform activities of daily living and functional status was also obtained from patients via phone call. The Chi-square, Fishers exact test and t-tests were used to analyze the data.

Results: 349 patients were included in the analysis. The hospital readmission rate was 10.6% (58.8% for pulmonary reasons) and did not differ by race. 74.3% of readmissions were <14 days after release. The post-discharge mortality rate was 2.6%. Hypertension was the most common comorbidity (43%). There was a statistically significant association between mortality and number of comorbidities (p=<0.0001). 82% of patients were contacted by phone. 66.6% of patients returned to pre-COVID baseline function in ≥1 month. As a result of information obtained on the follow up phone call, 4.2% of patients required "escalation" to another provider.

Conclusion: Discharging COVID-19 patients without prearranged follow up was associated with high readmission and mortality rates. While the majority of patients recovered, prolonged weakness, lengthy recovery, and the need for additional medical intervention was noted. Further work to assess the effectiveness COVID-19 post-discharge programs is warranted.

Keywords: Patients, COVID-19, Population.

Abbreviations: NYMA- New York Metropolitan Area, PMD- Primary Medical Doctor, EMR- Electronic Medical Record, RTC- Rapid Transition Care.

Introduction

In spring 2020, the New York Metropolitan Area (NYMA) was the epicenter of the COVID-19 (COVID) pandemic in the US [1-3]. High case volume led to a ban on elective procedures and the opening of new patient units in most NYMA hospital [4]. The steady influx of new patients mandated expedient discharges across NYMA hospitals [5]. It proved difficult to arrange outpatient follow-up for a considerable percentage of COVID patients because many Primary Medical Doctor (PMD) offices and clinics were closed. Furthermore, existing post-discharge follow-up programs (in place for other conditions prior to the COVID surge) could not accommodate COVID discharges because of the very high volume of patients and the need to develop a follow up algorithm for use in a pandemic. Further, during the time period studied the medical communities understanding of COVID infections, in general, and the treatment of this condition was limited. As a result, COVID positive patients who were discharged during this early surge may have had little or no medical follow-up (F/U), despite their debilitated state and increased risk of pulmonary problems.

The goal of our study, which included both a retrospective Electronic Medical Record (EMR) analysis and a telephone-administered patient survey, was to determine the short term outcomes of COVID patients discharged from the hospital early in the NYMA surge for

whom medical F/U had not been arranged. The fate of this population in the first month of the pandemic, when attention and resources were appropriately focused on in patient care, was unclear. There was justifiably less concern for patients that had outpatient medical F/U prearranged before discharge; for this reason and because there was limited staff available to carry out this investigation, those with arranged F/U were not included in the study.

This work carries important public health implications regarding the risk of readmission and risk of death as well as the time needed for recovery. This descriptive study provides informative baseline data to determine the need for F/U programs post-discharge among COVID positive patients and can be used as a comparison for future studies that aim to assess the effectiveness of F/U programs in place for COVID patients post-discharge.

To our knowledge, there are limited data published in the COVID literature concerning the post-hospital course early in the pandemic and recovery of COVID patients discharged without F/U.

Methods

Patient Population

Patients with confirmed Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV-2) infection (via polymerase chain reaction (PCR) test) and those strongly suspected on clinical grounds to be infected who were discharged from one of 3 NW Health hospitals (Long Island Jewish Hospital (LIJ), Queens, NY; North Shore University Hospital (NSUH), Manhasset, NY; and Lenox Hill Hospital (LHH, New York, NY) during March 2020 for whom medical F/U had not been arranged were eligible for this study. Patients for whom post discharge medical F/U had been arranged, including outpatient MD's or other health care providers as well as those enrolled in the NW Health Solutions Rapid Transitions Care Management (NW HS TCM) program, were excluded.

Data Collection

Data for this study was obtained from the EMR, in retrospective fashion, and a NW COVID-19 Post-Discharge Follow up Quality Survey conducted from May 6 through June 20, 2020. The survey evaluated short-term outcomes of COVID patients and those suspected of having COVID who were discharged in March 2020 without F/U arranged. The survey objectives were to: 1) determine how often additional outpatient care or services, ER visits, or hospital readmissions were required, 2) to obtain functional recovery data and the time required to return to baseline, and 3) when indicated, to refer surveyed patients to a physician or other health care professional (escalation of care).

The COVID-19 Post-Discharge Quality Survey utilized the Research Data Capture (REDCap) management system and included a Part A (EMR data) and Part B (patient call data). Part A included 81 questions regarding demographics, co-morbidities, medications, admission/discharge dates, and hospital course. The EMR for each patient was queried for deaths, ER visits and NYMA re-hospitalizations. Part B, a telephone administered survey, included 45 questions regarding functional status pre- and post-COVID, activities of daily living (ADLs), home O2 use, and the need for referrals and/or escalation(s).

Of note, in addition to obtaining the Part B data mentioned above, each phone call followed the NW Health Solutions (HS) teams Rapid Transition Care (RTC) COVID 19 program that was initiated in the NW hospitals by April 1, 2020. The NW HS team, which in normal times is responsible for the standardized telephone follow up of discharged patients at high risk for readmission, developed this program during the first month of the COVID 19 surge in New York.

The RTC COVID 19 program questions and format where adhered to despite the fact that the calls were being made 4-7 weeks after discharge rather than 1, 2, and 14 days post release (as mandated in the program). The staff used to carry out this quality survey were Department of Surgery employees that were redeployed to the study late in the shutdown period and included 1 nurse practitioner (NP), 6 physician assistants (PAs), 1 registered nurse (RN), and 3 MD's. This staff was divided into 2 groups, EMR data retrievers and outreach callers. The redeployed staff were trained by the NW COVID Rapid transitions team and utilized the NW HS TCM protocol for clinical and social assessment to ensure patient well-being.

Three call attempts were made per patient and, in some, a fourth call was made if a prior call was deemed inadequate. When needed, follow-up with a medical doctor or Advanced Care Professional (escalation) or referral(s) to a hospital or NW department service (PT, social services, etc.) Was arranged. This retrospective descriptive analysis was approved under a NW HS IRB.

Statistical Analysis

Demographic and clinical attributes were summarized using descriptive statistics. Means, medians, and standard deviations were calculated for normally distributed continuous variables and frequencies and percentages were calculated for categorical variables. Continuous variables were compared using t-tests and categorical variables compared using Chi-square or Fisher's exact tests. All tests were two tailed with a significance level of alpha = 0.05. Analyses were performed with Stata 16.0 for Mac (StataCorp LP, College Station, TX).

Results

Part A. EMR Review

Overall population - Table 1: Part A analysis includes 349 patients (Table 1), from three NW hospitals (46.4% LIJ, 29.2% NSUH, and 24.4% LHH). Mean age was 55.3 (±15.8), 53.9% were male and the majority were <60 years of age (62.2%). White and black patients were equally represented (31.2% and 30.7% respectively), 11.5% were Asian and 22.4% identified themselves as other/multiracial; 24.6% of patients were Hispanic.

Regarding medication use, 44% were currently taking hypertension or cardiac drugs, 4.6% pulmonary agents, 4.8% anti-coagulants or anti-platelet agents, and 0.85% immune-suppressive drugs (Table 1). When considering the 7 comorbidities determined a priori (hypertension, CAD, COPD, asthma, DM, CVA, and Parkinson's disease), 22.9% of patients had no comorbidities, 21.2% had one, and 55.9% had 2 or more. The mean number of comorbidities was 2.3 (±0.83). Of note, 37.5% of patients had a BMI of 30 or greater.

Hospital course analyses found 12 patients (3.4%) admitted to the ICU and 4 intubated (1.2%). The mean length of stay (LOS) was 4.0 (±3.3) days with 39.9% under 3 days, 49.3% from 3 to <8 days, and 10.8% ≥ 8 days. Most patients (88.5%) were discharged home; the remaining were discharged to skilled nursing facilities (3.7%), inpatient rehabilitation facilities (0.9%), group homes (3.4%), or a psychiatric (1.4%) or other facility (2%).

Hospital readmissions and ER visits - Table 2: Of the 349 COVID patients (n=349) assessed there were 37 hospital readmissions (10.6%) in 34 patients (3 patients were readmitted twice); 74.3% occurred within 2 weeks and 17.4% after 45 days (Table A). The mean age of the readmitted patients vs. those not readmitted was 61.5 (±16.4) and 54.6 (±15.6) years, respectively (p=0.008). Readmission reasons included pulmonary problems (n=20, 58.8%), weakness

related/falls/syncope (n=5, 13.8 %), cardiovascular issues (n=3, 8.8%), and GI bleed (n=1, 2.8 %). There was a significant difference (p=0.002) between the mean comorbidity rates of the readmitted patients (3.4 ± 2.8) and non-readmitted patients (2.1 ± 2.1). No significant differences in the mean LOS of the readmitted vs. non-readmitted patients was noted. There were no significant differences related to race/ethnicity between the readmitted and non-readmitted patients.

Fifteen of the 349 patients made an ER visit following discharge (without hospital readmission) (4.3%). The mean age was 51.6 (±16.3) years. The time from discharge to ER visit was: ≤2 weeks (43.8 %), 2-4 weeks (6.25%), >28-45 days (37.5%), and >45 days (12.5%). Pulmonary problems (n=3, 20.0%), weakness related/fall (n=3, 20%), and GI issues (abdominal pain, diarrhea, vomiting (n=3, 20%) were the most common reasons for ER visits [not all data presented]. Pulmonary issues were more likely among those readmitted to the hospital compared to those who visited the ER only (p=0.01). The number of comorbidities, LOS, and race were similar for the ER only and hospital readmitted patients.

Mortality -Table 3: The mortality following initial discharge was 2.6% (n=9); 7 (77.8%) patients died in hospital post readmission, 1 patient died at home, and the site of death for 1 patient is unknown (family witheld information). All 9 deaths were attributed to COVID. The mean age among the deceased was 75.2 (± 9.2) vs. 54.7 (± 15.6) among survivors (p=0.0001). Deceased patients had almost three-times as many comorbidities as survivors (5.6 ± 4.0 vs. 2.2 ± 2.1, p <0.0001). The incidence of HTN, CAD, and COPD were significantly higher among the deceased versus the survivors.

None of the patients who died had been in an ICU or intubated during their original admission. A higher proportion of the deaths had been discharged to a nursing facility, inpatient rehabilitation, or other facility. The racial distribution and initial LOS were similar for the deceased and survivors. Of those readmitted, the mortality rate was 20.6%. Of the 7 deaths that occurred after readmission: 3 patients were made DNR/DNI after readmission and later passed while receiving supportive care, 1 was admitted to the ICU and intubated (later had pulseless activity arrest), and 1 patient who had been stable was found unresponsive (an arrest called but patient revived). Details for the remaining 2 deaths readmitted to non-NW hospitals are not available.

Part B. Telephone Survey Results - Table 4: Of the 349 completed Part A patients, 287 (82%) were successfully contacted for the phone survey (10.3% were not reachable, 3.1% had non-working/incorrect numbers, and 0.6% refused). The great majority of the calls (95%) were made 6 weeks or longer after discharge. Most patients after discharge were living with family or friend(s).

A substantial percentage lived alone (21.2%) but some of this group were visited by family and friends. A home health aide was available for 6.6% of the population. At the time of the phone call the majority of patients could walk independently, get out of bed, cook and feed themselves, and get to the bathroom. However, 10.2% needed a bedside commode, 17.0% felt weak, and 8.8% were short of breath. Only 3.9% had supplemental O_2 post discharge and only 13.3% had oxygen saturation monitors.

At the time of hospital discharge, 10.1% of patients reported normal overall function, 18.1% were close to normal, 58.9% felt weak, 19.2% were walking short distances, 12.5% were bedbound, and 32.4% experienced shortness of breath. Two weeks post-discharge, 31.7% were functioning normally, 27.2% were close to normal, 29.3% felt weak, 16.0% were short of breath, 12.2% were walking short distances and 3.5% were bedbound. The following results were noted in response to the question "how long after hospital release were you functioning normally": less than 2 weeks, 3.9%; 2-4 weeks, 28.0%; 28-45 days, 35.1%; after 45 days, 15.4%. Importantly, at the time of the phone call, 16.1% were not yet back to normal. The calls were made >6 weeks post-discharge in 95%.

Escalations to an advanced care practitioner or physician were made for 12 of the 287 patients contacted (4.2%) and referrals to other services made for 11 patients (3.8%). Despite the lack of prearranged follow-up, 208 (74.3%) patients had communicated with their PMD (42.8% in person, 47.1% via phone, 14.9% online).

Discussion

During the early NYMA COVID surge the focus was, correctly, on inpatient care while the spectrum of disease severity, duration, and late complications (beyond pulmonary) were poorly understood. There was a dire need to discharge patients quickly to provide adequate space for the rising volume of patients being admitted to the hospital, even though COVID specific follow-up programs did not exist at that time. Numerous patients (64% of all COVID discharges from 3 NYMA hospitals) were released without follow-up arranged and these patients were the focus of this study.

Most discharged patients were less than 60 years old; over 50% had 2 or more high risk comorbidities and 38% were obese. Only 3.4% of patents had gone to an ICU and 1.2% were intubated; the LOS for the majority of patients was in the range of 2-5 days. Only a few went home with oxygen or saturation monitors. Because at discharge only 10% were back to normal, 58% were weakened, and 32% were short of breath, these patients may have been released prematurely. While most patients recovered at home without major issues, many noted fatigue and weakness for a month or more, and in 31.5% of patients it took at least 6 weeks (or more in some cases) to fully recover.

These results show that many COVID patients feel weak and are not back to normal for a long period after discharge. A proportion required ER visits or readmission (see below) and some needed additional outpatient follow-up or intervention. At the time of the telephone survey, the vast majority were able to perform all ADL's, though, 31.5% were still not back to normal function. Importantly, despite the lack of formal follow-up, by 6 weeks, 74% of patients had interacted with a health care provider.

Importantly, 34 patients (9.7%) required readmission, 72% within 2 weeks; they were older than those not readmitted (61.5 vs. 54.6 years). As per previous reports, respiratory problems were the most common reason for readmission. COVID may have been indirectly responsible for another 25% of readmissions (cardiac problems, weakness, syncope, falls, GI bleed, etc.) [6]. the readmitted patients, on average, had significantly more high-risk comorbidities than non-readmitted patients. Importantly, race and initial LOS, were not different among those readmitted compared to those who were not readmitted. None of the readmitted patients had been in the ICU or intubated during their first hospitalization.

Unfortunately, 7 patients died during the second hospitalization and 2 others died out of hospital (overall mortality 2.6%); their mean age was 75 (p<0.05 vs. survivors). Not surprisingly, significantly more patients that died had HTN, COPD, and CAD vs. the survivors; this is in agreement with the COVID literature as regards relevant comorbidities [7]. Also of note, a higher percentage of the deaths were initially discharged to an extended care or rehabilitation facility.

Of note, 4.3% of patients had an ER visit (without readmission) after initial discharge. Over half of these ER visits occurred a month or more post discharge. Pulmonary issues prompted the visit in only 20 % of cases. However, in 40 % the ER visit was for reasons

(weakness, falls, diarrhea, bleeding, etc.) that may have been COVID related. Also, the comorbidity, race, and initial LOS profile of the ER group was similar to those patients not requiring ER visits. All told, a high rate of ER visits and readmission (14% total) was noted.

	N=349
Age categories	
60+, n (%)	130 (37.3)
<60	217 (62.2)
>=60 and <70	67 (19.2)
>=70 and <80	46 (13.2)
>=80	19 (5.4)
Ethnicity, n (%)	
Hispanic	46 (24.6)
Non-Hispanic	136 (72.7)
Don't know	5 (2.7)
Race, n (%)	
White	109 (31.2)
Black or African American	107 (30.7)
Asian	40 (11.5)
Native Hawaii/Pacific Islander	6 (1.7)
Other/multiracial	78 (22.4)
Unavailable/unknown	9 (2.6)
Mortality	
Deceased, n (%)	9 (2.6)
Age, mean (SD)	75.2 (9.2)
Cause of death	
COVID related, n (%)	9 (100)
Comorbidities	
Number comorbidities, overall, mean (SD)	2.3 (0.83)
0 comorbidities	80 (22.9)
1 comorbidity	74 (21.2)
>=2 comorbidities	195 (55.9)
Obesity (BMI >=30), n (%)	131 (37.5)
Hypertension	150 (43.1)
Coronary artery disease	26 (7.5)
Diabetes	78 (22.5)
COPD	11 (3.2)
Parkinson's Disease	3 (0.86)
CVA	6 (1.7)
Asthma	32 (9.4)
Pre-admission medications	
Insulin/oral diabetic agent, n (%)	68 (19.5)
Blood Pressure Meds, n (%)	127 (36.4)
Anticoagulant, n (%)	16 (4.6)
Antibiotics, n (%)	14 (4.01)
Anti-Cholesterol, n (%)	34 (9.74)
Antihistamine, n (%)	7 (2.01)
Psych related, n (%)	16 (4.58)
Aspirin, n (%)	6 (1.72)
Anti Seizure, n (%)	14 (4.01)
Other Cardiac, n (%)	26 (7.45)
Inhalers, n (%)	16 (4.58)
Other, n (%)	59 (16.91)
Length of Stay (LOS)	
LOS, mean (SD)	4.0 (3.3)
<3 days	140 (39.9)
3 days to <8 days	173 (49.3)
>=8 days	38 (10.8)
ICU Admissions, n (%)	12 (3.4)
Intubations, n (%)	4 (1.2)
Discharge location	
Home	309 (88.5)
Other	40 (11.5)
Skilled nursing facility	5 (1.4)
Extended Skilled Nursing	8 (2.3)
Discharge to adult/group home	12 (3.4)
Psychiatric facility	5 (1.4)
Inpatient rehab facility	3 (0.9)
Other	7 (2.0)
Abbreviations: Lenox Hill Hospital (LHH), Long Island Jewish (LIJ), North Shore University Hospital (NSUH)	

Table 1: Patient Characteristics (Part A, EMR Review).

	No readmission	**Hospital Readmission**	**ER Visit**	***P* value**
	Patients n= 315	**Patients n= 34**	**n= 15**	
	Events n= n/a	**Events n= 37**	**n= 15**	
Age, mean (SD)	54.6 (15.6)	61.5 (16.4)	51.6 (16.3)	0.03
Length of stay, mean (SD)	3.9 (3.0)	3.8 (4.2)		0.79
Readmission Reason*				
Respiratory	n/a	20 (58.8)	3 (20.0)	0.02
Cardiac	n/a	3 (8.8)	0 (0.0)	0.54
Other	n/a	13 (38.2)	12 (80.0)	0.01
Comorbidities				
Number of comorbidities, mean (SD)	2.1 (2.1)	3.4 (2.8)	2.5 (2.8)	0.31
Number of comorbidities, n (%)				
0 comorbidities	78 (24.8)	2 (5.9)	3 (20.0)	
1 comorbidity	65 (20.6)	9 (26.5)	5 (33.3)	
>=2 comorbidities	174 (54.6)	23 (67.7)	7 (46.7)	
List of comorbidities, n (%)				
Obese (BMI >=30)	121 (38.4)	10 (29.4)	0.3	
Hypertension	131 (41.6)	19 (57.6)	0.08	
Coronary artery disease	21 (6.4)	6 (17.7)	0.02	
Diabetes mellitus	69 (21.7)	10 (30.3)	0.27	
Respiratory	36 (11.6)	7 (21.3)	0.26	
CVA	5 (1.6)	1 (3.0)	0.45	
Other	122 (39.0)	9 (27.3)	0.26	
Race				
White, n (%)	91 (28.9)	13 (38.2)	4 (26.7)	
Black or African American, n (%)	94 (29.8)	10 (29.4)	3 (20.0)	
Asian, n (%)	34 (10.8)	2 (5.9)	4 (26.7)	
Native Hawaii/Pacific Islander, n (%)	6 (1.9)			
Other/multiracial, n (%)	66 (21)	8 (23.5)	4 (26.7)	
Unavailable/unknown, n (%)	8 (2.5)	1 (2.9)	0 (0.0)	0.33
Time to readmission among deceased (n=9)				
Patients Readmitted 0 to <14 days	n/a	6 (85.7)		
Patients Readmitted >=14 days to <28 days	n/a			
Patients Readmitted >=28 days to <45 Days	n/a	1 (14.3)		
Patients Readmitted >45 days	n/a			
ICU admission during readmission		1 (2.6)		
*Based upon events, not number of patients (Timeline data missing for one hospital patient)				

Table 2: Hospital readmissions and ER visits groups (Part A, EMR Review).

This study provides data from the first 4-6 weeks of the pandemic in the NYMA which was the hardest struck area in the US at that time. During this period of time the health the number of COVID admissions was such that all elective surgery was cancelled and most outpatient offices closed. The great majority of patients in hospital during this period had COVID infection.

New "pop up" ICU's were necessary to handle the volume of severely ill COVID patients and other lower acuity hospital beds were temporarily added at many regional hospitals. Also, an impressive number of health care workers were re-deployed to staff

new in patient floors and units. The stress to the health care system at this time is hard to comprehend retrospectively. To accommodate the continual influx of new COVID patients, prompt discharge of COVID patients was necessary. It was not possible during this time to arrange F/U for all patients for reasons already mentioned. Also, the medical community in the NYMA and worldwide did not yet fully understand this viral illness; the intermediate and long term sequellae of this illness was unknown. Effective treatment for COVID was slowly being formulated. This study reveals the fate of patients discharged in March 2019 without arranged F/U. The results are sobering yet, not surprising, given the circumstances. Thankfully, the great majority survived. Also, to its great credit, the Health care system pivoted very rapidly to face, head on, the pandemic. A safety net for COVID discharges was developed and implemented in very short order.

	Deceased n=9	**Living n=340**	***P* value**
Comorbidities			
Number of comorbidities, mean (SD)	5.6 (4.0)	2.2 (2.1)	p <0.0001
Number of comorbidities, n (%)			
0 comorbidities	0 (0.0)	80 (23.5)	
1 comorbidity	0 (0.0)	74 (21.8)	
>=2 comorbidities	9 (100.0)	186 (54.7)	
			0.02
List of comorbidities, n (%)			
Obesity (BMI>=30)	*3* (33.3)	128 (37.7)	1
Hypertension (n=8 deaths 1 missing)	8 (100.0)	142 (41.8)	0.001
Coronary artery disease	3 (33.3)	23 (6.8)	0.02
Diabetes (n=8 deaths 1 missing)	4 (50)	74 (21.8)	0.08
COPD (n=8 deaths 1 missing)	2 (25.0)	9 (2.7)	0.02
CVA	0 (0.0)	6 (1.8)	1
Asthma (n=8 deaths 1 missing)	1 (12.5)	31 (9.3)	0.55
Hospital original admission details	Deceased (n=9)	Living (n=340)	
Length of stay			
Mean (SD)	4.6 (3.8)	3.9 (3.2)	0.53
Range, days	2-14 days	0-21 days	
Median, days	4	3	
Length of stay, n (%)			
<3 days	3 (33.3)	137 (40.3)	
>=3 and 8 days	5 (55.6)	167 (49.1)	
>=8 days	1 (11.1)	36 (10.6)	
			0.18
Discharge disposition			
Home	5 (55.6)	305 (89.2)	
SNF, Rehab, or other	4 (44.4)	37 (10.2)	

Table 3: Patient Mortality (Part A, EMR Review).

This study provides data from the first 4-6 weeks of the pandemic in the NYMA which was the hardest struck area in the US at that time. During this period of time the health the number of COVID admissions was such that all elective surgery was cancelled and most outpatient offices closed. The great majority of patients in hospital during this period had COVID infection.

New "pop up" ICU's were necessary to handle the volume of severely ill COVID patients and other lower acuity hospital beds were temporarily added at many regional hospitals. Also, an impressive number of health care workers were re-deployed to staff new in patient floors and units. The stress to the health care system at this time is hard to comprehend retrospectively. To accommodate the continual influx of new COVID patients, prompt discharge of COVID patients was necessary. It was not possible during this time to arrange F/U for all patients for reasons already mentioned. Also, the medical community in the NYMA and worldwide did not yet fully understand this viral illness; the intermediate and long term sequellae of this illness was unknown. Effective treatment for COVID was slowly being formulated. This study reveals the fate of patients discharged in March 2019 without arranged F/U. The results are sobering yet, not surprising, given the circumstances. Thankfully, the great majority survived. Also, to its great credit, the Health care system pivoted very rapidly to face, head on, the pandemic. A safety net for COVID discharges was developed and implemented in very short order.

Greater knowledge of COVID combined with a proper follow-up program should allow for early detection of issues and allow for rapid intervention. By April 2020 it was clear that lung problems were common after discharge; as a result, a much greater percentage of discharged patients had home oxygen saturation monitors and oxygen available. Also, a specific follow-up program was started at the NW hospitals in question (COVID-19 TCM program) for all COVID discharges in April; patients were called 4 times in the first two weeks. Also, COVID treatment evolved. These changes decreased ER visit and hospital readmission rates. An ongoing survey, similar to this one, regarding April discharges at the same NW hospitals with the NW TCM program in place aims to answer these questions.

There are few reports that address the early post-discharge time period among COVID patients. An article from the NW system, with mean follow-up of 4.4 days reported a 2.2% readmission rate and a median time to readmission of 3 days [3]. Another study of 2,864 discharges from 5 NYMA hospitals, with follow up of ≥ 14 days, reported that 3.6% (103 patients) returned to the ER after a median of 4.5 days [2]. Of these, 56 were readmitted (2% of the overall group). Pulmonary issues prompted the ER visit in half the patients. Unlike the current study, significantly more of the patients that went to the ER had HTN and COPD vs. the group that did visit the ER.

Also, the ER cohort had a significantly shorter LOS and lower ICU admission rate during the index admission vs. the comparison group. Of the readmitted patients, 5.8% required the ICU and 3.6% died [2]. It should also be noted that the patients surveyed in this study may not be representative of the entire March 2020 discharge population. It is possible that among the group with arranged medical follow-up (not surveyed), there were more patients that required intubation, ICU care, or had more severe COVID related issues because it seems unlikely that such patients would have been discharged without outpatient follow-up. This might explain, in part, why such a small number of surveyed patients required the ICU or intubation.

Another limitation is that this is a descriptive study of one patient population. The lack of a comparison population for which post discharge follow-up had been arranged prevents us from assessing the impact of follow-up on the disease course and recovery. We postulate that the readmission rate would be lower for patients contacted early after discharge. In addition, our results are limited by the fact that 20% of the population could not be reached by phone. The course of these patients is unknown. It is likely that some in this group have difficult living situations or are high risk. This missing subset of data may have impacted the results. These data are also limited by the lack of detailed data regarding readmissions and deaths that occurred in non-NW hospitals. Basic data about admissions or ER visits in the NYMA can be obtained from the Health Information Exchange however EMR details from non-NW hospitals could not be accessed.

This retrospective quality study and survey was feasible only because of the collaboration of the NW HS Rapid Transition Care COVID 19 team (responsible for contacting COVID patients 3 times early post discharge, from April 1, 2019 onward) and the redeployed surgical staff. The latter were taught and supervised by the former

	Part B
	n=287*
Total able to call (from Part A), n (%)	287 (0.82)
Primary discharge to survey timeline data, n (%)	
0 to <=2 weeks	0 (0)
>2 to <=4 weeks	0 (0)
>4 to <=6 weeks	13 (4.5)
>6 weeks	274 (95.4)
Contact with PMD, n (%)	208 (74.3)
Phone, n (%)	98 (47.1)
On-line visit, n (%)	31 (14.9)
In-person, n (%)	89 (42.8)
Level of Function Pre-COVID, n (%)	
Full	260 (90.6)
Limited	14 (4.9)
Ambulation	3 (1.1)
Wheelchair	2 (0.70)
Bedbound	1 (0.35)
Level of function at time of discharge from hospital, n (%)	
Bedbound	36 (12.5)
Minimal walking	55 (19.2)
Shortness of breath	93 (32.4)
Weakened	169 (58.9)
Close to normal	52 (18.1)
Normal	29 (10.1)
Other	13 (4.5)
Level of function 2 weeks after discharge, n (%)	
Bedbound	10 (3.5)
Minimal walking	35 (12.2)
Shortness of breath	46 (16.0)
Weakened	84 (29.3)
Close to normal	78 (27.2)
Normal	91 (31.7)
Other	8 (2.8)
Activities of daily living (ADLs)	
Lives alone, n (%)	59 (21.2)
Assistance at home:	
Home health aide, n (%)	19 (6.6)
Family/friend, n (%)	235 (81.9)
None, n (%)	23 (8.0)
Being followed by a visiting nurse, Northwell homecare or other? n (%)	9 (3.3)
Taking their medications, n (%)	164 (58.8)
Taking a blood thinner, n (%)	35 (12.7)
Walking interpedently, n (%)	268 (95.7)
Getting out of bed without assistance, n (%)	270 (96.8)
Cooking and feeding for self, n (%)	271 (96.8)
Going to the toilet by themselves? n (%)	271 (97.1)
Bedside commode needed, n (%)	28 (10.2)
Feels weak, n (%)	47 (17.0)
Home O2 utilized post-discharge, n (%)	11 (3.9)
Feels short of breath with activities of daily living, n (%)	24 (8.8)
Has a home O2 measuring device (i.e., pulse oximeter (Pulse-Ox), n (%)	37 (13.3)
Return to normal function (at time of survey), n (%)	**234 (83.9)**
Did not return to normal function	**45 (16.1)**
How long ago did return to normal occur?	**n=279**
Patients reporting 0-2 Weeks	11 (3.9)
Patients reporting 2-4 Weeks	78 (28.0)
Patients reporting 28-45 Days	98 (35.1)
Patients reporting >45 days	43 (15.4)
Escalation required, n (%)	12 (4.3)
Referrals required, n (%)	11 (4.1)
May we contact you in the future?	262 (94.9)
*Total n includes all completed surveys only	

Table 4: Post-Discharge Patient Activities of Daily Living, Escalations/Referrals (Part B, Telephone Follow Up).

and all worked together to complete the study which has provided important information that will likely influence our responses to future pandemics. This collaboration and the NYMA surge, in general, demonstrated that large health care organizations can and must be able to rapidly redeploy and reassign workers to meet the challenge. In addition to meeting the clinical needs, assigning some staff for the performance of quality studies in the midst of the crisis makes sense and will provide data that will inform adjustments to the programs in question. In the author's opinion, NW did an admirable job in meeting these challenges.

In summary, this study concerned a population of COVID patients discharged from the NYMA in the early surge of the disease for whom no follow-up had been arranged. The disease portrait that emerges is that the great majority of patients recovered, albeit slowly, many with weakness lasting over a month. Almost all were able to carry out their ADL's at 6 weeks. Readmission was necessary, usually within 2 weeks, for 9.7% of patients, most often for pulmonary but also for weakness related issues. Readmitted patients, were older and had more co-morbidities compared to those not readmitted. Further, 20% of readmitted patients died in hospital, most without intubation and some after having been made DNR/DNI. Another 4.3 % of patients went to the ER but only 20% for pulmonary reasons. When called, 4.2% required escalation to ACP or MD. Clearly, specific COVID early follow-up programs are warranted. The extent to which a COVID follow-up program can improve this picture needs to be investigated.

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