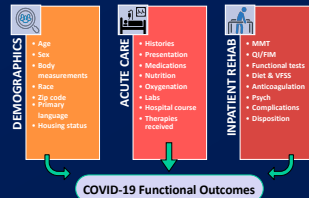




BACKGROUND & GOALS

There is minimal information on the typical functional recovery of individuals with COVID-19 admitted to inpatient rehabilitation facilities (IRFs) and the factors that may predict rehabilitation trajectories. This study characterizes the clinical course of these individuals in inpatient rehabilitation, including encountered complications and identifying patient-specific socioeconomic and medical factors that may be related to functional improvement.



DESIGN



This study is a multi-center retrospective chart review of adult subjects (age ≥ 18) who were initially hospitalized in acute care for COVID-19 systemic infection and subsequently admitted to an IRF. The primary outcome was change in Functional Independence Measures (FIM) and Quality Indicator (QI) scores from admission to discharge from inpatient rehabilitation. The relationship between patient-specific factors and FIM/QI scores was assessed using regression analysis.

Histories				
	# of Subjects	% of Subjects with Positive History	Prevalence in US General Population	
Medical	Diabetes	45	54%	10.5%
	Hypertension	61	73%	43.4%
	Coronary Artery Disease	16	20%	6.7%
	Chronic Obstructive Pulmonary Disease	2	2%	6.2%
	Chronic Kidney Disease	22	27%	15%
	Pulmonary Hypertension	0	0%	
	Asthma	8	10%	
	Hyperlipidemia/ dyslipidemia	50	60%	53%
	Neurologic disorder	7	8%	
	Pregnancy	0	0%	
Surgical	Immunosuppressed	4	5%	
	Coagulopathy	3	4%	
	Active cancer (at date of diagnosis of COVID-19)	4	5%	
	Lobectomy (lung)	0	0%	
	Depression	13	43%	
	Anxiety	10	40%	
	Bipolar	2	9%	
	Schizophrenia	0	0%	
	Alcohol	0	0%	
	Former smoker	111	50%	
Substance	Current smoker (prior to COVID hospitalization)	0	0%	
	Marijuana	2	10%	
	eCigarettes / vaping	0	0%	
	Alcohol use disorder	3	14%	
	IVDU (active or historic)	0	0%	
	Opioid use disorder	0	0%	
	Family member with COVID	4	21%	
	Healthcare	10	42%	
	Non-healthcare	4	17%	
	Unemployed	10	42%	

Table 2: Positive Historical Factors

RESULTS

Patients with COVID-19 ($n=134$) admitted to IRF had a mean age of 64.4 years (± 13.3); 62.0% female; 40.9% white, 30.7% black, 21.6% Hispanic. These individuals had significant co-morbidities including hypertension (73%), diabetes (54%), chronic kidney disease (27%), coronary artery disease (20%). The most common complications during inpatient rehabilitation were urinary tract infection (8.21%), increased oxygen requirement (2.99%), new/extension of preexisting deep venous thrombosis (2.24%), edema (2.24%), and nerve palsy (1.49%). On average, the percent increases in composite QI and FIM scores were 72% and 13%, respectively. Demographic and pre-morbid factors were not associated with functional recovery assessed using QI improvement (age, sex, race, past medical history; $p>0.05$). There was a trend towards a history of diabetes ($p=0.056$) and CKD ($p=0.065$) being associated with less functional improvement, compared to those without these diseases.

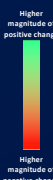
Functional Scores at Admission and Discharge								
	Mean Admission Score	Mean Discharge Score	Percent Increase	Percent Increase from Admission to Discharge in TICS non-COVID-19 Patients at Shirley Ryan				
				P (paired t test)	95% CI	N		
Quality Indicators (QI)	Eating	4.52	5.73	27%	<0.0001	-0.84 to 0.89	116	28%
	Oral hygiene	4.03	5.63	40%	<0.0001	-1.79 to 4.2	123	40%
	Suovae, bathe self	2.88	4.6	60%	<0.0001	-2.07 to 3.8	83	67%
	Upper body dressing	3.03	5.33	76%	<0.0001	-2.32 to 0.8	120	80%
	Lower body dressing	2.33	4.82	107%	<0.0001	-2.17 to 2.24	121	100%
	Footwear on/off	2.62	4.73	134%	<0.0001	-0.52 to 2.45	120	136%
	Toileting/hygiene	2.37	4.74	100%	<0.0001	-2.65 to 1.20	117	90%
	Chair, bed to chair transfer	2.72	5.16	90%	<0.0001	-2.64 to 2.23	115	83%
	toilet transfer	3.01	5.14	71%	<0.0001	-3.39 to 0.87	85	63%
	Tub/shower transfer	3.13	6.72	133%	0.0679	-7.46 to 0.27	32	Data not available
	Walk 10 feet	2.88	5.34	84%	<0.0001	-0.89 to 2.14	64	57%
	Walk 50 feet w/ turns	3.12	5.39	73%	<0.0001	-2.67 to 0.87	33	41%
Functional Independence Measures (FIM)	Wheel 150 feet	3.16	4.55	39%	0.1336	-2.79 to 0.43	11	77%
	Wheel 50 feet with turns	3.15	4.85	54%	<0.0001	-2.36 to 0.24	20	60%
	4 steps	2.79	5.18	86%	<0.0001	-0.40 to 7.5	38	25%
	Total (composite) QI	40.34	77.91	72%				62%
	Comprehension	5.54	6.18	12%	<0.0001	-0.83 to -0.43	68	
	Expression	5.55	6.12	11%	<0.0001	-0.88 to -0.35	68	
	Social interaction	5.14	6.13	11%	<0.0001	-0.87 to -0.33	67	
	Problem solving	4.76	5.62	18%	<0.0001	.08 to 0.62	68	
	Memory	4.88	5.59	15%	<0.0001	-0.96 to 0.46	59	
	Bowl % of confidence	81.81	88.69	9%	0.076	-14.90 to 0.75	109	Data not available
	Bladder % of confidence	84.87	92.27	9%	0.0038	-12.36 to -2.45	106	
	Total (composite) FIM	26.22	29.64	13%				

Table 3: Change in Functional Independence Measure (FIM) and Quality Indicator (QI) scores from admission to discharge

Table 5: Heat Map, showing of change in functional outcome from admission to discharge.

Greener color indicates higher magnitude of positive change; redder color indicates higher magnitude of negative change.

Note: Asterisk (*) denotes unavailable results for this category due to missing or insufficient data.



Category	Item	Global Performance Metrics (Q1-Q4)										Regional Performance Metrics (Q1-Q4)										Operational & Financial Metrics (Q1-Q4)											
		Q1 Growth	Q2 Growth	Q3 Growth	Q4 Growth	YTD Growth	Avg Growth	Q1 Sales	Q2 Sales	Q3 Sales	Q4 Sales	Q1 Profit	Q2 Profit	Q3 Profit	Q4 Profit	YTD Profit	Avg Profit	Q1 Units	Q2 Units	Q3 Units	Q4 Units	Q1 Cost	Q2 Cost	Q3 Cost	Q4 Cost	Q1 Revenue	Q2 Revenue	Q3 Revenue	Q4 Revenue	Q1 Margin	Q2 Margin	Q3 Margin	Q4 Margin
Product Line A	Item A1	12.5	15.2	18.7	22.1	17.1	19.6	1000	1200	1500	1800	500	600	750	900	2750	687.5	150	180	220	250	800	950	1100	1300	1500	1800	2000	2200	2500	2800	3000	3200
	Item A2	8.3	9.7	11.5	13.2	10.7	10.7	800	950	1100	1250	400	450	550	650	2050	512.5	120	140	160	180	650	750	850	950	1100	1250	1400	1550	1700	1850	2000	
	Item A3	20.1	22.5	25.0	27.8	23.9	23.9	1200	1400	1600	1800	600	700	800	900	3000	750	200	230	260	290	1000	1150	1300	1450	1600	1800	2000	2200	2400	2600	2800	
	Item A4	5.7	6.8	7.9	9.1	7.4	7.4	600	700	800	900	300	350	400	450	1500	375	80	90	100	110	400	450	500	550	600	650	700	750	800	850	900	
	Item A5	18.9	21.3	23.7	26.1	22.5	22.5	900	1050	1200	1350	450	550	650	750	2400	600	180	210	240	270	750	850	950	1050	1150	1250	1350	1450	1550	1650	1750	
Product Line B	Item B1	7.2	8.5	9.8	11.1	9.2	9.2	700	800	900	1000	350	400	450	500	1500	375	100	120	140	160	500	550	600	650	700	750	800	850	900	950	1000	
	Item B2	11.5	13.2	15.0	16.8	14.1	14.1	850	1000	1150	1300	420	500	580	660	2160	540	140	160	180	200	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	
	Item B3	19.8	22.1	24.5	26.9	23.3	23.3	1100	1300	1500	1700	550	650	750	850	2800	700	220	250	280	310	900	1050	1200	1350	1500	1650	1800	1950	2100	2250	2400	
	Item B4	6.1	7.3	8.5	9.7	7.9	7.9	650	750	850	950	320	380	440	500	1690	422.5	90	100	110	120	450	500	550	600	650	700	750	800	850	900		
	Item B5	16.7	19.0	21.3	23.6	19.7	19.7	950	1100	1250	1400	470	550	630	710	2360	590	190	220	250	280	750	850	950	1050	1150	1250	1350	1450	1550	1650		
Product Line C	Item C1	9.4	10.8	12.2	13.6	11.5	11.5	750	850	950	1050	380	450	520	590	1970	492.5	110	130	150	170	550	600	650	700	750	800	850	900	950	1000		
	Item C2	13.7	15.1	16.5	17.9	15.7	15.7	900	1050	1200	1350	450	520	590	660	2220	555	130	150	170	190	650	750	850	950	1050	1150	1250	1350	1450	1550		

CONCLUSIONS

- Individuals with COVID-19 make significant functional gains in inpatient rehabilitation. Although these patients generally have significant co-morbidities, these do not appear to impact their overall recovery in rehabilitation.
- Further analysis is on-going to assess other laboratory and disease-related markers that may be related to outcome, with a cohort of approximately 250 subjects so far.

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