

# Post-COVID Recovery: Outcomes of Chronically Critically Ill Patients Admitted to a Regional Weaning Center

Meg Stearn Hassenpflug, MS, RD<sup>1</sup>; David R. Nelson, MD<sup>1</sup>; M. Jillisa Steckart, MEd, PsyD<sup>2</sup>

Barlow Respiratory Hospital<sup>1</sup>, UCLA David Geffen School of Medicine, Los Angeles, CA USA<sup>2</sup>



## RATIONALE

Survivors of COVID-19 pneumonia often suffer from chronic critical illness (CCI) and require extended hospitalization. Barlow Respiratory Hospital (BRH) is a 105-bed long-term care hospital (LTCH) that serves as a regional weaning center, accepting CCI patients transferred from the ICUs of hospitals in southern California. For over four decades, BRH has focused on weaning ventilator-dependent patients from prolonged mechanical ventilation, with over 7,000 patients discharged from our Ventilator Weaning Program. In 2020, we began admitting patients for post-COVID recovery. Herein we report patient characteristics and weaning outcomes of a series of COVID-19 survivors admitted to the post-acute venue of an LTCH for weaning from prolonged mechanical ventilation.

## METHODS

Descriptive report of patients admitted to the Ventilator Weaning Program. The Ventilation Outcomes Database (VOD), a performance improvement database, was queried for selected patient admission characteristics, outcomes, and discharge disposition. Outcomes (weaned, ventilator-dependent, died) were scored at BRH discharge; weaned was defined as patient being free of invasive mechanical ventilation for at least one full calendar day prior to day of discharge. Time to wean (days) was tallied from day of admission through last day of ventilator support prior to discharge. Comparison of post-COVID-19 patients is made to non-COVID patients treated during the same time period, and pre-pandemic outcomes of calendar year 2019. All patients were treated by the same medical staff utilizing the Therapist-Implemented Patient-Specific (TIPS©) weaning protocol.

## RESULTS

Variable	Ventilator Weaning Program Outcomes: Post-COVID vs Non COVID Patients 2020-2021		Overall Comparison 2020-2021 and 2019	
	Post-COVID (n=100)	Non COVID (n=260)	2020-2021 (N=360)	2019 (N=318)
Age, years (Median)	64 [27-94]	68 [28-104]	67 [27 - 104]	70 [18-94]
Gender, male (n, %)	70 (70%)	151 (58%)	221 (61%)	157 (49%)
Premorbid location, home	86/96 (90%)	178/254 (70%)	264/351 (75%)	Not Available
Premorbid Mobility, Independent	78/95 (82%)	127/242 (53%)	205 (61%)	132/293 (45%)
Transfer hospital LOS, days	36 [2-82]	20 [1-390]	24 [1 - 390]	19 [1-367]
Pressure injury ≥ stage 2	83 (83%)	200 (77%)	283 (79%)	241 (76%)
Multiple pressure injuries	62 (62%)	133 (51%)	195 (54%)	173 (54%)
	<b>Laboratory values: Mean (SD)</b>		<b>Laboratory values: Mean (SD)</b>	
Serum albumin (g/dl)	2.5 (0.56)	2.4 (0.49)	2.4 (.51)	2.4 (0.63)
Hematocrit (%)	26.9% (4.1)	28.3% (4.3)	27.9 (4.3)	28.2% (4.6)
BUN (mg/dl)	40.1 (27.0)	36.7 (23.4)	37.6 (24.4)	39.7 (29.6)
Creatinine (mg/dl)	1.2 (1.3)	1.1 (1.6)	1.2 (1.6)	1.4 (1.5)
Serum glucose (mg/dl)	162 (54.9)	144 (50.2)	149 (52.1)	139.7 (42.0)
Hemodialysis patients	16 (16%)	53 (20%)	69 (19%)	67 (21%)
APACHE <sup>®</sup> III APS	42 [22 - 91]	44 [13 - 95]	43 [13 - 95]	42 [14 - 102]
<b>Weaning Outcomes</b>				
Weaned	88 (88%)	154 (59%)	242 (67%)	184 (58%)
Decannulated	51 (58%)	33 (22%)	84 (35%)	Not Available
Days to Wean (Median)	15 [3-162]	11 [2-261]	13 [2-261]	10 [1-124]
Ventilator Dependent	8 (8%)	83 (32%)	91 (25%)	106 (33%)
Died	4 (4%)	23 (9%)	27 (8%)	28 (9%)
Length of stay, days (Median)	39 [5-246]	48 [8-315]	40 [5-315]	31 [7-320]
Discharge Location (live discharges)	n=96	n=237	n=333	n=290
Home	21 (22%)	27 (11%)	48 (14%)	23 (8%)
Acute rehab facility	34 (35%)	24 (10%)	58 (17%)	22 (8%)
Subacute/skilled nursing facility	29 (30%)	134 (57%)	163 (49%)	186 (64%)
Short-term acute care hospital	12 (13%)	50 (21%)	62 (19%)	59 (20%)
Hospice	0	2 (1%)	2 (1%)	0

From 6/1/2020-12/31/2021, 360 patients admitted for weaning were discharged from BRH. 100/360 (28%) were patients admitted to BRH following index admission to short-term acute care hospital ICUs for COVID-19 pneumonia. The table above presents comparisons between post-COVID and non-COVID patients from 2020-21, and overall comparisons to the 2019 patient population.

## COMMENTS AND CONCLUSIONS

LTCH hospitals continue to play an increasingly critical function in the continuum by resuming and relieving care initiated in the acute hospital setting, now extended to patients recovering from COVID-19 infection. Utilization of LTCHs as "load balancing centers" increases the available ICU resources in the regional acute care hospitals. We report several significant differences between the study cohort and non-COVID CCI patients, most notably pre-morbid location and function, and weaning success rate.

These findings engender many questions as to how best to examine these and other potential distinctions between the cohorts and assess whether the outcomes reflect differences in patient characteristics, disease trajectories, treatment or combinations thereof in the emerging evidence base of COVID-19 infection. Both COVID and non-COVID CCI patients continue to require considerable medical interventions and treatments owing to the numerous sequelae of the infection, and the burden of acute-on-chronic diseases.

Patient characteristics and outcomes from this single center study may not be applicable to other centers or the post-COVID pneumonia population in general due to geographic differences in patient demographics, referral patterns, and facility-specific treatment capabilities.

## REFERENCES

- Dolinay, T., June, D., Chen, L., & Gornbein, J. Mechanical ventilator liberation of COVID-19 patients in long-term acute care facility. CHEST, Feb. 2022. ISSN 0012-3692, (In Press) <https://doi.org/10.1016/j.chest.2022.02.030>
- Hassenpflug, M., Jun, D., Nelson, D., & Dolinay, T. (2021). Post-COVID recovery: characteristics of chronically critically ill patients admitted to a long-term acute care hospital. F1000Research, 9. 1241. <https://doi.org/10.12688/f1000research.26989.2>
- Saad, M., Laghi, F., Brofman, J., Undevia, N., & Shaikh, H. (2021). Long-Term Acute Care Hospital Outcomes of Mechanically Ventilated Patients With Coronavirus Disease 2019. Critical Care Medicine. <https://doi.org/10.1097/CCM.00000000000005193>
- Dichter JR, et al. Task Force for Mass Critical Care Writing Group. Mass Critical Care Surge Response During COVID-19: Implementation of Contingency Strategies - A Preliminary Report of Findings From the Task Force for Mass Critical Care. Chest. 2022 Feb;161(2):429-447. <https://doi.org/10.1016/j.chest.2021.08.072>

## AUTHOR CONTACT INFORMATION:

Meg Stearn Hassenpflug, MS, RD • (213) 308-6852  
[MHassenpflug@BarlowHospital.org](mailto:MHassenpflug@BarlowHospital.org)

David R. Nelson, MD • (213) 202-6857  
[DNelson@BarlowHospital.org](mailto:DNelson@BarlowHospital.org)