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Post-ICU Mechanical Ventilation: Updates to Mortality and 12-Month Post-Discharge Survival

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INTRODUCTION

For more than three decades, patients who fail to wean in the critical care setting, becoming dependent on mechanical ventilation, have been transferred to long-term care hospitals for continued attempts at weaning from prolonged mechanical ventilation (PMV). Barlow Respiratory Hospital (BRH) is a 105-bed long-term acute care (LTAC) hospital network that serves as a regional weaning center, accepting chronically critically ill (CCI) patients transferred from the ICUs of hospitals in southern California. Herein we report updates to patient mortality and 12-month post-discharge survival from our Ventilation Outcomes Database (VOD). We also provide a perspective comparison analysis of selected data for three distinct time periods.

METHODS

Data were abstracted by trained personnel from transfer documents and BRH medical records of all adult ventilator-dependent patients receiving invasive mechanical ventilation admitted for weaning. Custom queries were constructed to obtain electronic medical record (EMR) data. Successful weaning had been defined as ventilator independent for > 7 days for earliest cohort; weaning outcomes scored at discharge for latter two cohorts. Pre-morbid functional status was determined using the Zubrod Score (0 = Fully active to 4 = Bedridden with no self-care). Zubrod scores of 0-2 were deemed “good” functional status; scores of 3-4 were “poor” functional status. Social services and discharge planning records, and Social Security Death Index determined post-discharge survival.

RESULTS

Historical comparison data are presented in Table 1 and Figure 1 . From 1/1/2010 – 6/30/2012, 702 patients admitted for weaning were discharged from BRH. Survival analysis employs data of 630 live discharges.

Table 1

Weaning Outcomes and 12-month Post-Discharge Survival

Outcome	1988-1990 (n=274)	2002-2003 (n=186)	2010-2012 (n=702)
Weaning outcome:	n (%)	n (%)	n (%)
Weaned	146 (53.3)	92 (49.5)	373 (53.1)
Ventilator-dependent	46 (16.8)	40 (21.5)	257 (36.6)
Died	82 (29.9)	54 (29.0)	72 (10.3)
Discharge disposition:	n=192	n=132	n=628*
Home	82 (42.7)	30 (22.7)	74 (11.8)
ECF, acute rehab	101 (52.6)	84 (63.6)	479 (76.3)
Short-term acute care	9 (4.7)	18 (13.6)	75 (11.9)
12-month post-DC survival	21.3%	31.0%	64.6%

*2 patients discharged AMA excluded from %

Figure 1

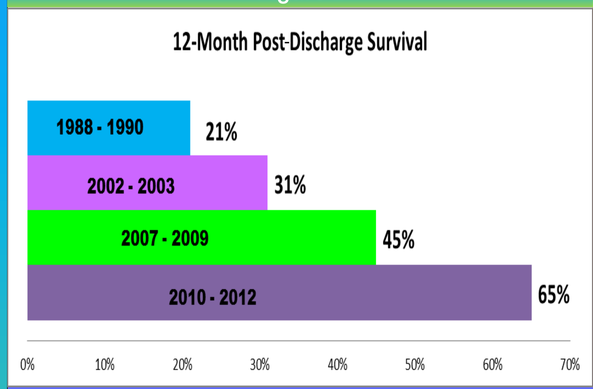


Table 2

Selected Demographics & Characteristics of 702 Patients Admitted for Weaning from PMV (2010-2012)

Characteristic	Data
Age (years)	73.2 [22 – 101]
Medicare	59%
Gender, male	48.1%
Race	
Caucasian	56.6%
Non-Caucasian	43.4%
Pre-morbid location, home	72.5%
Pre-morbid functional status, good	54.1%
	Mean ± SEM
Serum albumin (g/dl)	2.4 ± .02
Hematocrit (%)	31.1 ± .16
BUN (mg/dl)	31.9 ± .88
Serum creatinine (mg/dl)	.96 ± .03
APACHE © III APS	40.0 [8 -111]
Glasgow Coma Score	14.0 [3 -15]
Pressure ulceration >= stage II	48.3%
Multiple pressure ulcerations	19.7%

Table 3

Comparison of Admission Characteristics by 12-Month Post-Discharge Survival (N=628)*

Variable	Dead @ 12 months (n=222)	Alive @ 12 months (n=406)	p
Age	75.6 [37 – 101]	70.0 [22 – 99]	*p<.001*
Gender, % Male	105 (47.3)	192 (47.3)	*ns*
Race			
% Caucasian	56.3%	55.6%	*ns*
% Non-Caucasian	43.7%	44.2%	
Pre-morbid Location			*ns*
Premorbid, home	165 (74.3)	283 (70.2)	
Premorbid ECF	57 (25.7)	120 (29.8)	
Pre-morbid Functional Status			*ns*
Premorbid, good	110 (49.5)	229 (56.4)	
Premorbid, poor	112 (50.5)	177 (43.6)	
Weaning Outcome			
Weaned	104 (46.8)	268 (66.0)	*p<.001*
PU on Admit >= Stage II	121 (54.5)	173 (42.6)	*p<.01*
APS	41.5 (8 - 111)	37.0 (11 - 97)	*p<.05*
	Mean ± SEM	Mean ± SEM	
Albumin	2.3 ± .04	2.5 ± .02	*p<.05*
Creatinine	1.0 ± .06	.90 ± .05	*ns*
BUN	34.7 ± 1.6	28.2 ± 1.0	*p<.01*

Independent samples t-tests and Chi-square tests for comparison of frequencies between groups.
*2 records had insufficient information to determine 12M post discharge mortality

Figure 2

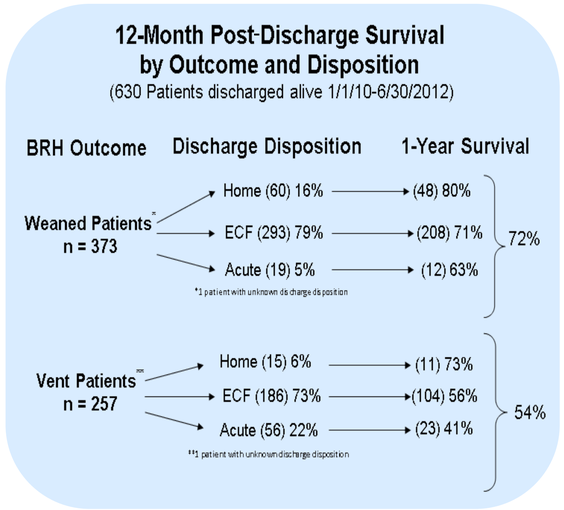
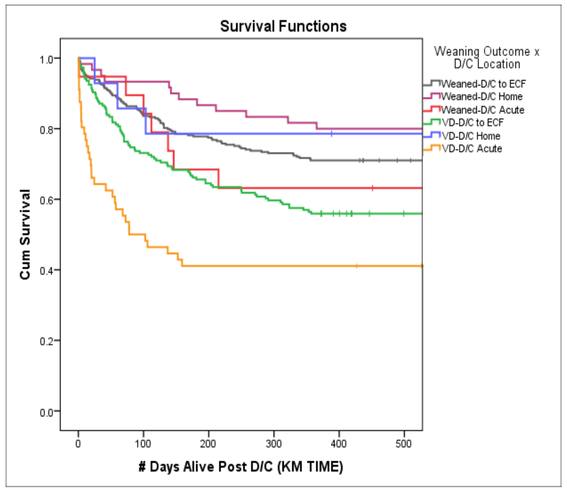


Figure 3



*Kaplan-Meier Survival Curve, p<.001, Log Rank Test (Mantel-Cox) for equality of survival distribution

COMMENTS, CONCLUSIONS & LIMITATIONS

This is an interesting look at three distinct time period “snapshots” over two decades of post-ICU mechanical ventilation at a single facility with additional data on the most recent cohort.

- The increase in 12-month post-discharge survival is most striking.
- There are obvious trends toward increasing ventilator dependency with a corresponding decrease in mortality; weaning success remained largely unchanged.
- Increased discharge to ECF is therefore not surprising as the majority of ventilator-dependent patients are discharged to these post-acute venues, and fewer weaned patients are discharged home.
- The population of ventilator-dependent patients requiring readmission to acute care warrants further study in view of the relatively significant number and short post-discharge survival.
- For the most recent cohort, in general patients surviving 12-months post-discharge from BRH were younger, weaned from mechanical ventilation, and with less physiologic instability on BRH admit.
- The experience and outcomes of this single center study may not be applicable to other centers or the chronically critically ill population in general.

The numbers of separate transitions in post-acute care are unknown, but could prove to be significant relative to cost and resource utilization in view of survival. Efforts to determine patient location, and airway and ventilator status at this time point with corresponding assessment and interpretation of physical function and quality of life in these survivors are particularly important challenges. As one year survivors are reportedly left with a serious burden of pervasive, persistent disability these data may provide opportunities to inform treatment decisions throughout the episode of critical illness.

REFERENCES

■ Unroe M, Kahn JM, Carson SS, et al. One-year trajectories of care and resource utilization for recipients of prolonged mechanical ventilation: a cohort study. *Ann Intern Med.* 2010 August 3; 153(3): 167–175

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