

Post-ICU Mechanical Ventilation: Updates to Weaning Outcomes and Survival in the Very Elderly Chronically Critically Ill

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INTRODUCTION

For more than three decades patients who fail to wean in the intensive care setting, becoming chronically critically ill (CCI), 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 CCI patients transferred from ICUs of hospitals in southern California.

The US Census Bureau projects the oldest old (age 85 and over) to be the fastest growing part of the elderly population in this century. It follows that there has been mounting attention paid to the care provided to elderly ICU patients, as they comprise a rapidly increasing proportion of the ICU, and potentially the CCI, patient population. Herein we characterize CCI patients ≥ 85 years old admitted for weaning and compare their outcomes, discharge disposition, and survival to that of younger patients. We also provide a perspective comparison analysis of two time periods.

METHODS

The Ventilation Outcomes Database (VOD) was queried for patients ≥ 85 years of age admitted on invasive mechanical ventilation for weaning from 7/1/98 - 6/30/03, and a later cohort with discharge dates from 1/1/2008-12/31/2012. Data were abstracted by trained personnel from transfer documents and BRH medical records. Custom queries were constructed to obtain electronic medical record (EMR) data. Pre-morbid functional status was determined using the Zubrod Score (0 = Fully active to 4 = Totally bedridden with no self-care). Zubrod scores of 0-2 were deemed "good" functional status; scores of 3-4 were "poor" functional status. Weaning outcomes were scored at BRH discharge. Post-discharge follow-up telephone calls and the Social Security Death Index (SSDI) determined post-discharge survival.

RESULTS

Historical comparison data are presented in Table 1 and Figure 1. From 1/1/2008 – 12/31/2012, 1494 patients admitted for weaning were discharged from BRH; 230/1494 (15%) of patients were ≥ 85 years of age.

Table 1

	1998-2003 (n=134)	2008-2012 (n=230)	p
Weaning Outcomes and 12-month Post-Discharge Survival			
On BRH Admit			
Age ≥ 85 years	134/993 (14%)	230/1494 (15%)	
Age, years	87.5 [85-97]	88.6 [85-101]	
Gender, % male	43%	38%	
APS III	44 [15-104]	46 [15-93]	
Pressure ulcer ≥ stage II	54%	41%	
Weaning Outcome			
Weaned	45 (34%)	107 (47%)	<.001
Ventilator-dependent	26 (19%)	88 (38%)	
Died	63 (47%)	35 (15%)	
Live Discharges			
Discharge Disposition	71 (53%)	195 (85%)	<.001
Discharge Disposition			
Home	8 (11%)	11(6%)	
SNF, sub-acute, rehab	59 (83%)	158 (81%)	
Short-term acute care	4 (6%)	26 (13%)	
12-month Post-DC Survival (live discharges)			
Overall 12-month Post-DC Survival	14/60 (23%)	91/195 (47%)	<.001
Overall 12-month Post-DC Survival	14/134 (10%)	91/230 (40%)	<.001

Figure 1

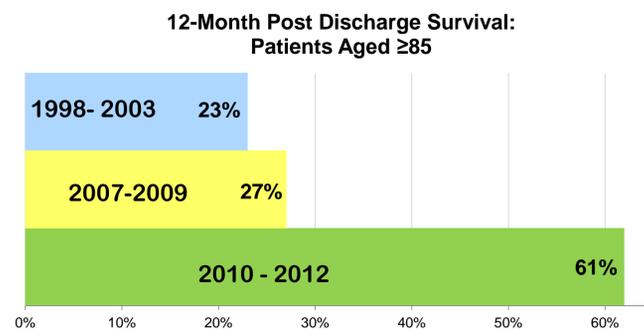


Figure 2

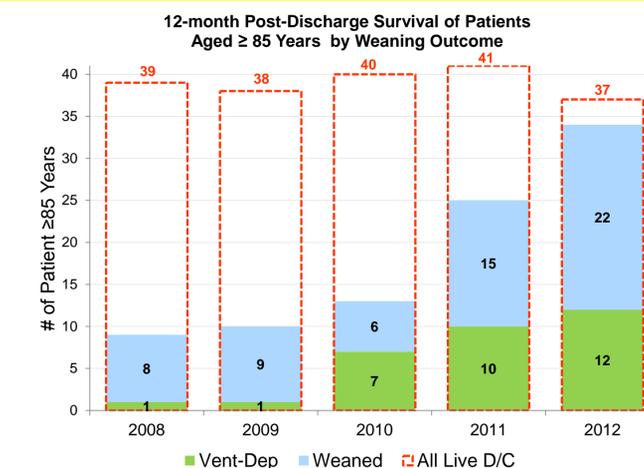


Table 2

	Age ≥ 85 Years (n=230)	Age ≤ 85 Years (n=1264)	p
Selected Demographics & Characteristics of Patients on Admission (2008 – 2012)			
Age (years)	88.6 [85-101]	70.2 [19-84]	<.0001
Medicare (%)	79.4	62.5	<.001
Gender, % male	37.8	49.7	<.001
Race (excluding unknown)	n (%)	n (%)	
Caucasian	139 (61.5)	675 (54.0)	
Non-Caucasian	87(38.5)	575 (46.0)	
Pre-morbid location, home	62.2	72.6	<.001
Pre-morbid functional status, good	47.4	56.1	<.01
<i>Mean ± SEM</i>			
Serum albumin (g/dl)	2.2 ± .04	2.4 ± .02	<.05
Hematocrit (%)	30.8 ± .37	31.1 ± .13	
BUN (mg/dl)	37.3 ± 1.7	30.4 ± .61	<.001
Serum creatinine (mg/dl)	.98 ± .05	1.0 ± .03	
<i>Median [Range]</i>			
APACHE © III APS	46 [15-93]	40 [8-111]	<.01
Glasgow Coma Score	12 [3-15]	14 [3-15]	
Pressure ulcers ≥ stage II	41.3%	34.0%	<.03
Single pressure ulcer	20.9%	19.8%	
Multiple pressure ulcers	20.4%	14.2%	<.02

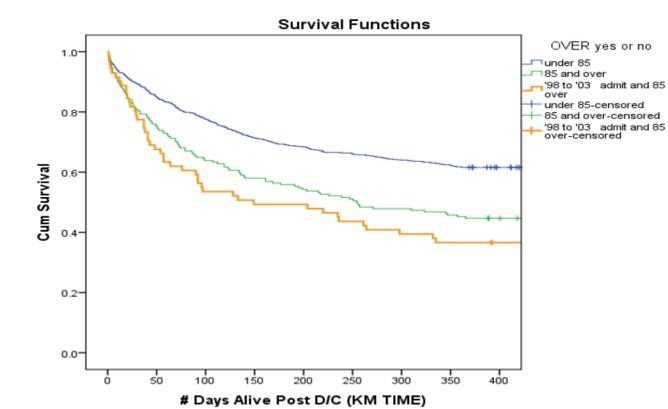
Table 3

	Age ≥ 85 Years (n=230)	Age < 85 Years (n=1264)	p
Comparison of Weaning Outcomes, Discharge Disposition, and Survival (2008 – 2012)			
Outcome	n (%)	n (%)	<.0001
Weaned	107 (46.5)	701 (55.5)	
Tracheostomy retained	80 (74.8)	479 (68.3)	
Ventilator dependent	88 (38.3)	428 (33.9)	
Died	35 (15.2)	135 (10.7)	
Time to wean (days)	18 [3-76]	17 [1-131]	
Discharge disposition	n=195 live DC	n=1129 live DC	<.02
Home	11 (4.8)	136 (10.8)	
ECF	159 (69.1)	835 (66.1)	
Short-term acute hospital	25 (10.9)	155 (12.3)	
<i>n (%)</i>			
12-month post-DC survival	91 (46.7)	696 (61.6)	<.001
Median survival time (days)	76.5 [1-1212]	116.0 [1-1628]	

REFERENCES

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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 distinct time period "snapshots" of post-ICU mechanical ventilation outcomes and post-discharge survival in very elderly CCI patients at a single facility, with additional data on the most recent cohort.

- There was no difference in the percentage of very elderly patients admitted for weaning between the two time periods.
- There are significant trends toward increased weaning success and ventilator-dependency at discharge, with a corresponding decrease in mortality between the two time periods.
- "Good" pre-morbid functional status for less than half of patients and nearly 40% residing in ECFs indicates a significant amount of disability/dependency for the majority prior to this episode of critical illness in the most recent cohort.
- 85% of very elderly CCI patients were discharged alive after an average of eight weeks of prolonged severe illness between the acute care hospital and BRH.
- Notably, there is a striking increase in 12-month post-discharge survival that warrants investigation.
- Nearly twice as many weaned patients survived 12 months post-discharge compared to those discharged ventilator-dependent.
- The experience and outcomes of this single center study may not be applicable to other centers or the CCI population in general.

Of note are the large percentage of patients with poor pre-morbid functional status, retention of tracheostomy at discharge, and dramatic increase in 12-month post-discharge survival. Efforts to establish patient location and airway and ventilator status at this time point, with determination of physical function and quality of life in these survivors are particularly important challenges. As one year survivors are almost certainly left with a serious burden of pervasive, persistent disability these data may provide opportunities to inform decision-making regarding ICU admission and treatment as well as to facilitate early determination of goals of care, highlighting the importance of addressing palliative care needs.