

營養狀態及發炎狀況是慢性呼吸照護病房病人脫離呼吸器的重要因子 臨床組-從業

The Impact of Nutritional and Inflammatory Status on Weaning from Prolonged Mechanical Ventilation in Respiratory Care Ward

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Purpose:

Previous studies have demonstrated that nutrition support is a significant factor associated with successful weaning from mechanic ventilator in respiratory care center (RCC)¹ and the relationship between neutrophil-lymphocyte ratio and weaning process is equivocal in acute or subacute ill status^{2,3}. The aim of this study is to investigate whether these two factors are related to the successful weaning from prolonged mechanical ventilation (PMV) in respiratory care ward (RCW).

Materials and Methods:

This is a retrospective observational study performed in a 20-bed RCW at E-DA Cancer Hospital, data collected from May 2017 to August 2022. Successful weaning was defined as patient independence from MV for 5 consecutive days and nights. Demographic, clinical characteristics and laboratory data were compared using Student t test or Chi-Square test. Variables associated with successful weaning were performed both univariate and multivariate analyses. A p value of less 0.05 was considered statistically significant.

Results:

A total of 133 patients (59.4% male) with PMV were included in this study (Figure 1). The average age was 71.5±15.3 years (IQR 18.5-91). The median day on mechanical ventilator was 172 days (IQR 113-343 days). The significant factors for successful weaning included age, Acute Physiology and Chronic Health Evaluation II (APACHE II) scores, duration of mechanical ventilator, comorbidity of cancer diseases, rapid shallow breath index (RSBI), maximum inspiratory force (Pimax), body mass index (BMI), hemoglobin (Hb), neutrophile count, lymphocyte count, neutrophile/lymphocyte ratio (NLR), albumin, daily ingestion of calories and protein (p<0.05 for all) (Table1). The results of the stepwise multivariate logistic regression analysis revealed that Pimax (odds ratio [OR]=1.122 ; 95% CI=1.053-1.195; p<0.001), BMI<24 (OR=7.557; 95% CI=2.169-26.327; p=0.001), NLR ≤ 6 (OR=7.091; 95% CI=1.824-27.568; p=0.005) were significant predictors of successful weaning (Table 2). The variation of nutritional status and inflammatory marker between successful weaning and ventilator dependence were shown in Figure 2.

Conclusions:

Aside from traditional weaning parameter Pimax, nutritional status (BMI<24) and inflammatory marker (NLR ≤ 6) are important predictors of successful weaning in RCW.

References:

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Figure 1 Flow chart of patient selection

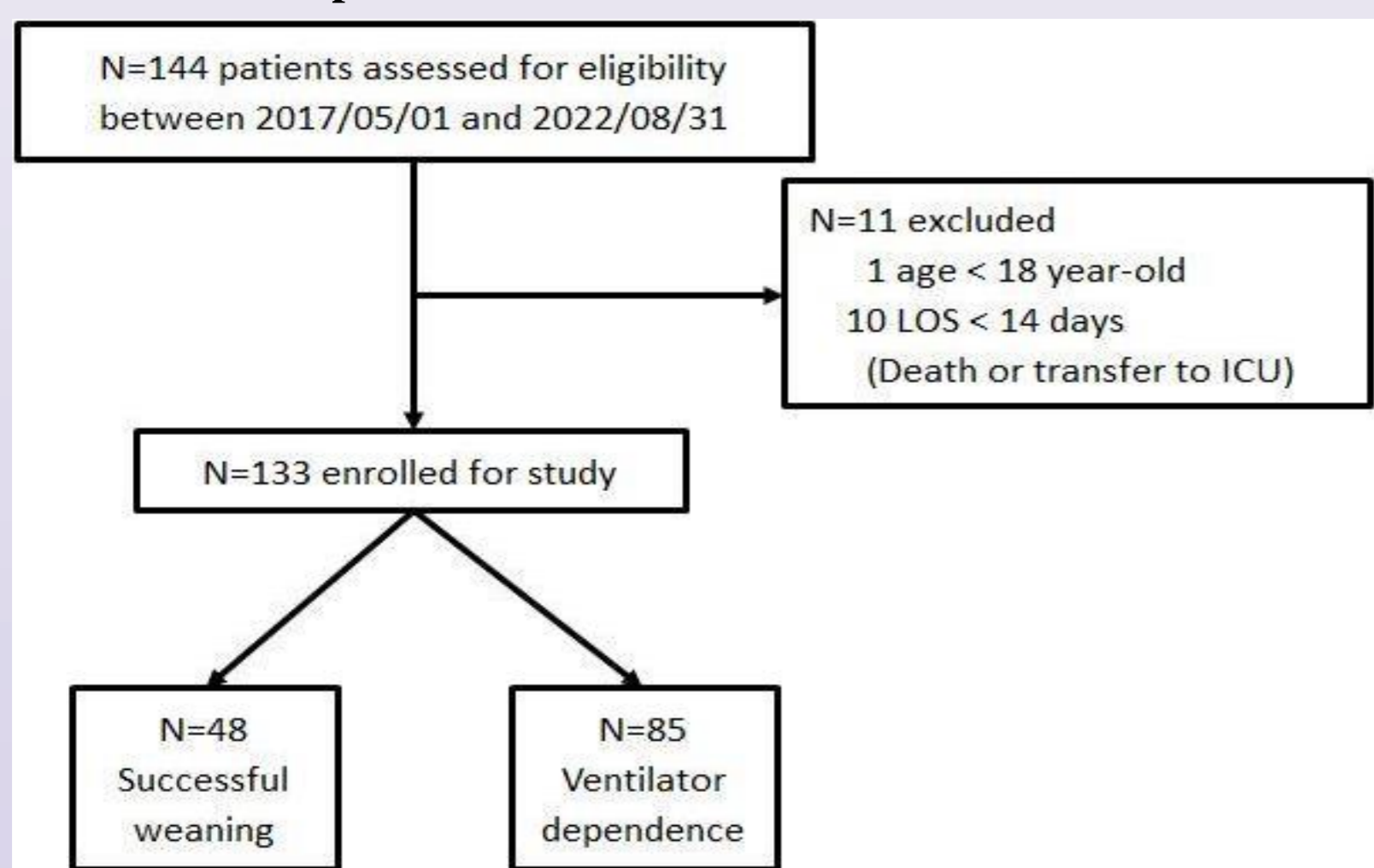


Table 1 Clinical characteristics of patients who were successful weaning or ventilator dependence

	All patients (N=133)	Successful weaning (N=48)	Ventilator dependence (N=85)	P value
Basic Characteristics				
Age (Years)	71.5 ± 15.3	66.0 ± 17.3	74.6 ± 13.2	0.002*
Male gender	79 (59.4)	30 (62.5)	49 (57.6)	0.587
APACHE II score	22.3 ± 4.6	20.3 ± 4.4	23.5 ± 4.4	<0.001*
Days of ventilator use**	172 (113-343)	137 (113.8-211)	233 (119-450)	<0.001*
Comorbidities				
Respiratory disease	21 (15.8)	7 (33.3)	14 (66.7)	0.776
Cardiovascular disease	102 (76.7)	35 (72.9)	67 (78.8)	0.443
Neuromuscular disease	47 (35.3)	17 (35.4)	30 (35.3)	0.989
Chronic kidney disease	29 (21.8)	11 (22.9)	18 (21.1)	0.817
Malignancy	42 (31.6)	9 (18.8)	33 (38.8)	0.011
Diabetes mellitus	56 (42.1)	22 (45.8)	34 (40.0)	0.517
Others	37 (27.8)	12 (25.0)	25 (29.4)	0.589
Weaning Profile				
RSBI	103.7 ± 80.7	68.9 ± 70.6	127.5 ± 78.9	<0.001*
Pimax	-24.5 ± 11.9	-31.0 ± 11.7	-20.2 ± 10.0	<0.001*
Nutrition Status				
BMI (kg/m ²)				
At RCW admission	23.1 ± 4.5	23.1 ± 4.4	23.1 ± 4.6	0.973
Transfer out or due date	24.4 ± 4.6	22.6 ± 3.7	25.4 ± 4.8	<0.001*
Energy intake				
Kcal/Day	1604.3 ± 327.1	1724.4 ± 227.5	1536.5 ± 355.4	<0.001*
Protein/Kg/Day(gm)	1.2 ± 0.4	1.3 ± 0.3	1.1 ± 0.4	0.001*
Albumin(g/dL)	3.2 ± 0.5	3.5 ± 0.4	3.1 ± 0.5	<0.001*
Laboratory Data				
Hemoglobin(g/dL)	9.5 ± 1.9	10.2 ± 1.7	9.1 ± 2.0	0.001*
Neutrophile(%)	72.3 ± 13.6	68.1 ± 9.8	74.5 ± 14.8	0.004*
Lymphocyte(%)	15.7 ± 10.1	20.5 ± 8.0	13.2 ± 10.2	<0.001*
NLR	10.4 ± 15.9	4.2 ± 2.7	13.6 ± 18.8	<0.001*

Data presented as mean ± standard deviation or n (%).
*Indicates a statistically significant between group difference (p<0.005)
** Days of ventilator use presented with median (interquartile range (IQR)).

Table 2 Factors associated with successful weaning from prolonged mechanic ventilation- multiple logistic regression mode

	OR	95% CI	P value
APACHE II score	1.066	0.915-1.241	0.410
Days of ventilator use	1.004	0.999-1.009	0.097
BMI<24 (kg/m ²)	4.755	1.142-19.792	0.032*
Kcal/Day	0.998	0.995-1.000	0.097
RSBI	1.007	0.999-1.016	0.089
Pimax	1.094	1.021-1.173	0.011*
Albumin>3.3(g/dL)	0.655	0.191-2.252	0.502
NLR ≤ 6	8.058	1.993-32.582	0.003*

*Indicates a statistically significant between group difference (p<0.05)

Figure 2 Comparison of BMI, Albumin and NLR between successful weaning and ventilator dependence

