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Depressive Disorders during Weaning from Prolonged Mechanical Ventilation

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Abstract

Purpose—Patients who require mechanical ventilation are at risk of emotional stress because of total dependence on a machine for breathing. The stress may negatively impact ventilator weaning and survival. The purpose of this study was to determine whether depressive disorders in patients being weaned from prolonged mechanical ventilation are linked to weaning failure and decreased survival.

Methods—A prospective study of 478 consecutive patients transferred to a long-term acute care hospital for weaning from prolonged ventilation was undertaken. A clinical psychologist conducted a psychiatric interview to assess for the presence of depressive disorders.

Results—Of the 478 patients, 142 had persistent coma or delirium and were unable to be evaluated for depressive disorders. Of the remaining 336 patients, 142 (42%) were diagnosed with depressive disorders. In multivariate analysis, co-morbidity score (odds ratio [OR], 1.23, $p=0.007$), functional dependence before the acute illness (OR, 1.70, $p=0.03$), and history of psychiatric disorders (OR, 3.04, $p=0.0001$) were independent predictors of depressive disorders. The rate of weaning failure was higher in patients with depressive disorders than in those without such disorders (61% versus 33%, $p=0.0001$), as was mortality (24% versus 10%, $p=0.0008$). The presence of depressive disorders was independently associated with mortality (OR, 4.3; $p=0.0002$); age (OR, 1.06; $p=0.001$) and co-morbidity score (OR, 1.24; $p=0.02$) also predicted mortality.

Conclusion—Depressive disorders were diagnosed in 42% of patients who are being weaned from prolonged ventilation. Patients with depressive disorders were more likely to experience weaning failure and death.

Index Words

Mechanical ventilation; weaning; depressive disorders

Descriptor: Mechanical Ventilation: weaning

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INTRODUCTION

Critically-ill patients who require mechanical ventilation are at risk for mental stress because they know that their ability to breathe depends on assistance from a machine. The presence of an endotracheal (or tracheostomy) tube makes it extremely difficult for most ventilated patients to communicate their physical and emotional needs [1]. Moreover, the inability to talk decreases a patient's sense of control leading to feelings of helplessness, anger and despair [2]. Coping mechanisms can become overwhelmed, resulting in feelings of "wanting to give up" and a desire to die [3]. As the duration of mechanical ventilation increases, adverse emotional reactions are likely to increase, which may negatively impact a patient's ability to wean from the ventilator.

In some countries, patients who repeatedly fail weaning attempts in the ICU are transferred to a facility that specializes in weaning from prolonged ventilation [4]. These patients typically have several co-morbid conditions -- obstructive lung disease, cardiovascular disease, diabetes mellitus -- that were present before the onset of acute respiratory failure [5-7]. Depressive disorders have been reported to be prevalent in patients with these chronic illnesses [8,9]. Accordingly, the presence of co-morbidities together with the emotional stress secondary to acute respiratory failure may be a catalyst for developing depressive disorders in patients who are being weaned from the ventilator. Research on ventilator weaning has primarily focused on physiological variables that predict weaning outcomes [10-12] and the use of different techniques to facilitate weaning [13-15]. In contrast, studies that explore the impact of mental well-being on weaning outcomes and, in particular, the influence of depressive disorders is virtually non-existent.

The aim of the study was to determine whether the presence of depressive disorders is associated with weaning failure and decreased survival in patients who were being weaned from prolonged ventilation at a weaning facility. Specifically, we hypothesized that the presence of a depressive disorder would be associated with an increased likelihood of weaning failure and decreased survival.

METHODS

Patients

Between August 2005 and November 2006, 478 consecutive patients transferred to RML Hospital (RMLH), a long-term acute care hospital, for weaning from mechanical ventilation were recruited. All patients were tracheotomized before arrival. The study was approved by the Institutional Review Board of RMLH. Informed consent was waived because this non-interventional study posed no added risk to the patient.

Baseline Assessment

Upon arrival at RMLH, the following data were obtained from the medical record: demographics, premorbid characteristics (Charlson CoMorbidity Index, previous history of psychiatric illness), reason for instituting mechanical ventilation (at the transferring hospital) and its duration before transfer to RMLH. Acute Physiology and Chronic Health Evaluation (APACHE II) scores were calculated within 24 hours of admission to RMLH to quantify current severity of illness. Functional level before the onset of respiratory failure, was assessed using the Zubrod scoring system: 0 = fully active; 1 = restricted in strenuous activity; 2 = ambulatory, capable of self care but not work; 3 = bed-ridden 50% or more of the time, limited self-care; 4 = totally bed-ridden and disabled, no self-care [16]. The scores were obtained by interviewing the patient or family caregiver.

Psychiatric interview

Within 3 days of admission to RMLH, patients underwent a two-part psychiatric interview conducted by one of our two doctoral-level clinical psychologists. In the first part, the patient's cognitive status was evaluated using the Neurobehavioral Cognitive Status Examination (Cognistat) (see Appendix) [17]. Patients who were unresponsive to verbal or tactile stimuli were classified as comatose; patients who were minimally responsive and had evidence of cognitive impairment were classified as delirious using the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for delirium [18]. Patients who were classified as comatose or delirious upon admission to RMLH were reevaluated on a daily basis; if their mental status improved, a complete psychiatric evaluation was then performed.

Patients who had normal cognition underwent the second part of the interview --the psychiatric evaluation. At that time, the psychologist examined the patient for signs and symptoms of depression (see Appendix). Patients were then classified as having *depressive disorders* (major depressive disorder, dysthmic disorder, or depressive disorder not otherwise specified) if they met the DSM-IV criteria for depressive disorders.

Weaning Status

Patients underwent daily weaning trials as tolerated, consisting of either pressure-support ventilation or spontaneous breathing trials through a tracheostomy (see Appendix). A patient who was able to breathe spontaneously without mechanical ventilation at discharge from RMLH was considered a weaning success. A patient who was not successfully weaned at discharge or died while at RMLH was considered a weaning failure. Patients were followed daily until hospital discharge.

Data Analysis

Categorical variables are reported as proportions and continuous variables are reported as medians and interquartile range. Comparison of continuous variables between two subgroups was performed using Mann-Whitney U test and Kruskal-Wallis one-way ANOVA test for multiple subgroups. Comparison between categorical variables was performed using the Pearson chi-square test or Fisher's exact test, as appropriate. Multivariate logistic regression analysis was performed to evaluate the impact of baseline characteristics on the presence of depressive disorders. Multivariate logistic regression analysis was also performed to determine variables independently associated with death. Variables included were clinically relevant baseline characteristics (age, Charlson Comorbidity, previous history of psychiatric illness); data related to the previous ICU stay (reason for intubation, days on ventilator before transfer to RMLH); data related to RMLH stay (APACHE II, presence of transient delirium, presence of depressive disorders, number of days a patient received anxiolytics and anti-depressants).

RESULTS

Of the 478 patients, 184 (38.5%) were judged to have a normal sensorium and were evaluated for depressive disorders on admission to RMLH (Figure 1; Table 1). The remaining 294 could not be evaluated because they were comatose (48 patients) or delirious (246 patients). Of 294 comatose-delirious patients, 142 (29.7%) remained comatose or delirious and were unable to be evaluated for depressive disorders. This cohort was termed the persistent coma-delirium group and not included in the outcome analysis. The other 152 (31.8%) comatose-delirious patients had an improvement in sensorium. This cohort, termed the transient coma-delirium group, was evaluated for depressive disorders when alert, and was included in the outcome analysis. The final evaluable cohort consisted of 336 patients (Figure 1). Compared with the non-evaluable group (persistent comatose-delirium group), the evaluable group (normal sensorium and transient coma-delirium groups) had a lower APACHE score (median 15 [range

12 to 18] versus 17 [range, 14 to 21], $p < 0.002$) and a lower rate of neurological disorder as cause of respiratory failure (13% versus 32%, $p < 0.0001$).

Prevalence of Delirium (excluding comatose patients)

On arrival to RMLH, delirium was diagnosed in 246 (52%) of the patients. Compared with the normal mentation group, the delirium group was older (73 [64 to 80] versus 68 years [57 to 77], $p < 0.0003$), had a higher APACHE score (16 [13 to 19] versus 14 [12 to 16], $p < 0.0001$), and a higher Charlson co-morbidity index (2 [1 to 3] versus 1 [0.75 to 3], $p < 0.002$). The number of days patients received anxiolytics at RMLH was similar in the delirium group and normal mentation group (3 [0 to 13.25] versus 7 [0 to 18] days, $p = 0.26$). Length of stay at RMLH was higher in the delirium group than in the normal mentation group (35 [26 to 44] versus 31 [21 to 42] days, $p = 0.04$). Mortality rate, however, was equivalent in the delirium and normal mentation group: 18% versus 16%, $p = 0.59$.

Prevalence of Depressive Disorders

Of the 336 patients evaluated by the psychologist, 142 (42%) were diagnosed with depressive disorders. Of those 142 patients, 17 (12%) were diagnosed with major depression, 6 (4%) with dysthmic disorder, and 119 (84%) with depressive disorder not otherwise specified (NOS). In the 142 patients who were diagnosed with a depressive disorder, 90% received antidepressants and psychotherapy, 6% received psychotherapy alone, and 4% refused antidepressants but agreed to psychotherapy (see Appendix).

Patients with depressive disorders had a higher APACHE score ($p = 0.04$), Charlson co-morbidity index ($p = 0.0002$), and spent longer on the ventilator before transfer to RMLH ($p = 0.005$) than those without such disorders (Table 2). The percentage of patients who were functionally dependent (Zubrod scores 3–4) before the onset of respiratory failure was greater among patients with depressive disorders than among those without such disorders (47% versus 29%, $p = 0.0006$) (Figure 2). Age, gender, and cause of acute respiratory failure were similar among patients with and without depressive disorders. In patients diagnosed with depressive disorders, 35% had a previous history of psychiatric disorders compared with 17% of patients not diagnosed with this condition ($p < 0.0001$). Depressive disorders were more prevalent in patients with transient delirium than in patients with normal mentation (58.6% versus 28.8%, $p < 0.0001$).

Multivariate logistic regression analysis showed that Charlson co-morbidity index (odds ratio 1.2), functional dependence before acute illness (odds ratio, 1.7) and history of psychiatric illness (odds ratio, 3.0) were significant predictors of depressive disorders after controlling for age, gender, APACHE, cause of acute respiratory failure, and days on the ventilator before transfer (Table 3).

Effect of depressive disorders on patient outcome

The number of patients who could not be weaned from the ventilator was greater among patients with depressive disorders than among those without such disorders (Figure 3). Indeed, patients with depressive disorders were 3 times more likely to fail weaning as those patients without such disorders (odds ratio 3.1, range 1.9 to 4.9, $p < 0.0001$). Mortality was 2.4 times higher among patients with depressive disorders than among those without such disorders (Table 4). While the duration of mechanical ventilation at RMLH was twice as long in patients with depressive disorders compared to patients without such disorders, length of stay was equivalent in the two groups (Table 4).

Multivariate logistic regression analysis showed that depressive disorders (odds ratio, 4.32, $p = 0.0002$), age (odds ratio, 1.06, $p = 0.001$), and Charlson co-morbidity index (odds ratio, 1.24,

$p=0.02$) were associated with an increased risk for dying at RMLH (Table 5). Factors associated with a decreased mortality included transient delirium (odds ratio, 0.38, $p=0.02$), and number of days on anti-depressant agents (odds ratio, 0.95, $p=0.007$).

DISCUSSION

Of patients capable of undergoing a psychiatric interview on arrival to a weaning facility, 42% were diagnosed with depressive disorders. The presence of depressive disorders appeared to be related to factors present before the onset of acute respiratory failure, namely the co-morbidity index, functional level before acute illness, and previous psychiatric illness. The severity of medical illness at the time of arrival to the weaning facility did not contribute to the presence of depressive disorders. The presence of depressive disorders was associated with weaning failure and a higher mortality rate.

Prevalence of depressive disorders

To our knowledge, this is the first study to prospectively evaluate the prevalence of depressive disorders during weaning from prolonged mechanical ventilation. The prevalence of depression has largely been examined in survivors of critical illness several months after hospital discharge, rather than while hospitalized [19–22]. Using the same diagnostic technique that we used (structured interview), Weinert et al [23] found that 32% of ICU patients who required mechanical ventilation were diagnosed with depressive disorders two months after discharge – a rate comparable to ours (42%). Other investigators have reported that when patients requiring mechanical ventilation were surveyed after ICU discharge, the prevalence of depression was 35% at two months and 32% at 12 months; that is, depression showed little decrease [6,24].

In the present study, the presence of depressive disorders was not related to severity of the acute illness (APACHE II score, etiology of respiratory failure, days on ventilator before transfer) (Table 3). Instead, the presence of depressive disorders was related to the patient's previous health status (Charlson co-morbidity index, previous psychiatric history, and functional dependence). Studies in medical in-patients have revealed that pre-morbid status is a predictor of depressive disorders [25,26]. These data suggest that ventilated patients with a previous psychiatric history or long-term physical disability may be at risk for developing depressive disorders.

Delirium

On the basis of a semi-structured interview conducted by an experienced psychologist, patients were considered to have delirium if they met the DSM IV criteria for delirium. Other investigators have used screening tools, such as Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) or Intensive Care Delirium Screening Checklist (ICDSC) to identify delirium in ICU patients [27–30]. Half of our patients had delirium on arrival at RMLH. This incidence of delirium is lower than the incidence of 82% reported by Ely et al [29] who used the CAM-ICU to define delirium, but higher than the value of 16% reported by Bergeron et al [31] who used the ICDSC to define delirium.

Although length of hospital stay was greater in our delirium group than in our normal mentation group, mortality was almost identical in the two groups. These findings are in sharp contrast with studies of ICU ventilated patients, where delirium was associated with increased in-hospital mortality [27,30] and increased mortality 6 months later [29]. Several factors may explain the differences. One, our patients were in the recovery stage whereas ICU patients were in the acute phase of a critical illness. Possibly, it is the acute illness, not delirium per se, which explains the association between delirium and increased mortality in ICU patients. Indeed, in

ventilated patients, delirium paralleled shock and APACHE score as a predictor of ICU mortality [30]. Moreover, when ventilated patients were transferred from the ICU to a step-down unit for weaning, delirium was not associated with increased risk of dying [32]. Two, the daily dosage of lorazepam in our patients (median, 0.8 mg) is 10% of the median dose reported for ICU ventilated patients [33]. Several groups have reported that sedatives are associated with the development of delirium [27,34,35], longer ventilator duration, and longer hospital stay [36]. Third, delirium in our patients was diagnosed by experienced psychologists, whereas screening tools, such as CAM-ICU or ICDSC, were employed to identify delirium in the ICU studies [29,30].

On post-hoc analysis, we identified two delirium groups: patients with persistent and transient delirium. Characteristics of the two groups were similar with the exception that a neurological disorder as the cause of respiratory failure was 2.4 times more frequent in the persistent-delirium group than in the transient-delirium group (26% versus 10%, $p=0.003$).

Delirium improved in 62% of patients following admission to RMLH (the transient delirium group). It seems plausible to infer that improved mentation signals an improvement in overall illness, leading to better survival. Although patients with transient delirium were older and had more severe illness than patients with normal mentation (Table 1), mortality was equivalent (16%) in the two groups. When corrected for these and other variables on multivariate logistic regression analysis, patients who experienced an improvement in delirium experienced a decrease in mortality (Table 5).

Depressive disorders and outcome

Patients with depressive disorders were three times more likely to fail weaning as patients without such disorders. This observation suggests that the presence of depressive disorders contributed to weaning failure. Conversely, inability to wean before transfer to RMLH may have contributed to depression. Persistent discomfort from a critical illness, prolonged bed rest, and ventilator dependency may have caused depression while the patient was in the ICU.

The presence of depressive disorders might also interfere with the pragmatics of weaning. Weakened or deconditioned respiratory muscles are believed to be a major reason that patients repeatedly fail weaning attempts [37]. One approach to reconditioning is the use of daily trials of spontaneous breathing [38]. Initiation of a spontaneous-breathing trial is under the control of the health-care team. Soon after a trial commences, however, many patients in a chronic weaning facility indicate that they wish to be placed back on the ventilator. Although our reasoning is speculative, it is possible that patients with depressive disorders will be more likely to make such a request. Apathy, loss of energy and diminished motivation are commonly seen with depression [8,39]. As such, depressed patients may not have the energy and motivation necessary to tolerate the challenge of daily spontaneous breathing trials. If so, depressive disorders would contribute to weaning failure.

Patients with depressive disorders experienced a higher mortality than those patients without such disorders. The increased mortality in patients with depressive disorders was still evident after controlling for age and co-morbidity. Moreover, treatment with anti-depressants was associated with a decreased risk for dying (Table 5). The fact that treatment for depressive disorders was associated with a decrease in mortality suggests a link between depressive disorders and mortality. Conceivably, the presence of depressive disorders may add to the distress that patients experience while receiving mechanical ventilation. Under such circumstances, coping mechanisms may become overwhelmed and, thus, a feeling of giving-up may have occurred [3].

The association between poor outcome (weaning failure and death) and depression raises another possible explanation: depression may be a reaction to the underlying physical illness before transfer to RMLH and depression may not be directly linked to mortality. If that is the case, the final cause of death should be related to the pre-existing physical illness that the patient had before admission to RMLH (as opposed to depression). We found, however, that only 53% of the deaths were a consequence of the illness that patients had before transfer to RMLH.

Study Limitations

First, the study was confined to a single center. The cohort, however, consisted of a mixed population of medical and surgical patients with diverse etiologies of acute respiratory failure (Table 1). Second, unmeasured covariates related to the original ICU stay (e.g., exposure to psychoactive medication, number of failed weaning attempts in the ICU) may have contributed to the presence of depressive disorders. If these factors made a significant contribution, one would have expected that duration of mechanical ventilation before arrival at RMLH to be a significant contributor to the presence of depressive disorders. That was not the case. On multivariate analysis, duration of mechanical ventilation before transfer was not a significant predictor of depressive disorders (Table 3). Third, the psychologists were blinded to the managing physician's forecasting of weaning outcome when they first assessed the patient, but it was almost impossible to blind the psychologists to the physician's opinion later in the patient's stay.

In conclusion, evidence of depressive disorders was present in almost half the patients being weaned from prolonged ventilation. The presence of depressive disorders was related to factors present before the onset of acute respiratory failure and associated with an increased risk of weaning failure and death.

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APPENDIX

METHODS

Psychiatric interview

Within 3 days of admission to RML Hospital (RMLH), patients underwent a two-part psychiatric interview conducted by one of our two doctoral-level clinical psychologists. These psychologists had over 15 years experience in evaluating the cognitive and emotional status of patients requiring mechanical ventilation. Because patients were tracheotomized, they communicated with the psychologist by head gestures, indicating yes or no, and by mouthing words. In the first part, the cognitive status of the patient was evaluated using the Neurobehavioral Cognitive Status Examination (Cognistat) – a widely used screening test for cognitive impairment [1]. The Cognistat assesses three general factors (consciousness, attention and orientation) and five major areas of ability (language, construction, memory, calculation and reasoning). Patients with cognitive impairment were then classified as either comatose or delirious. Patients who were unresponsive to verbal or tactile stimuli were classified as comatose; patients who were minimally responsive and had evidence of cognitive impairment were classified as delirious using the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for delirium [2]. Patients who were classified as comatose or delirious upon admission to RMLH were reevaluated on a daily basis; if their mental status improved, a complete psychiatric evaluation was then performed.

Patients who had normal cognition underwent the second part of the interview --the psychiatric evaluation. At that time, the psychologist examined the patient for signs and symptoms of depression. Specific symptoms included depressed mood, feelings of sadness, hopelessness or guilt, loss of interest in participating in daily activities (such as physical therapy, daily grooming), loss of energy, difficulty in sleeping, trouble concentrating or making decision, psychomotor agitation, suicidal ideation or passive death wishes. Specific physical signs that psychologists looked for during the interview included a flat or constricted affect, tears, agitation, and irritability. Patients were then classified as having *depressive disorders* (major depressive disorder, dysthmic disorder, or depressive disorder not otherwise specified) if they met the DSM-IV criteria for depressive disorders [2]. Patients who had a least five of these symptoms (one being a depressed mood or loss of interest) for at least 2 weeks were classified as having major depression; patients with fewer than 5 symptoms were classified as having a dysthmic disorder or depressive disorder not otherwise specified.

Weaning Status

Patients underwent daily weaning trials as tolerated, consisting of either pressure-support ventilation or spontaneous breathing trials through a tracheostomy.

Patients were weaned daily using a standard weaning approach that is routinely used at RMLH. Weaning was initiated by a respiratory therapist once a physician decided that a patient was clinically stable (not requiring vasopressors, $\text{SpO}_2 \geq 93\%$ on $\text{FiO}_2 < 50\%$ and $\text{PEEP} \leq 5 \text{ cm H}_2\text{O}$). The patient then underwent a daily spontaneous breathing trial as tolerated through the tracheostomy collar. If the patient developed respiratory distress or requested aborting the weaning trial, mechanical ventilation was then reinstituted in the assist-control mode. In patients who could only tolerate 2 hours or less of a spontaneous breathing trial three consecutive days, the weaning method was switched to pressure support. With the latter approach, patients received pressure support for 12–15 hours during the day followed by assist-control ventilation at nighttime. The level of pressure support was decreased by 2 $\text{cm H}_2\text{O}$ every day as tolerated. If respiratory distress developed, assist-control ventilation was reinstituted. When a patient was able to tolerate pressure support of $< 8 \text{ cm H}_2\text{O}$ for 12 hours, the patient was disconnected from the ventilator and allowed to breathe spontaneously through the tracheostomy.

A patient who was able to breathe spontaneously without mechanical ventilation at discharge from RMLH was considered a weaning success. A patient who was not successfully weaned at discharge or died while at RMLH was considered a weaning failure. Patients were followed daily until hospital discharge.

Treatment of patients with depressive disorders

Patients diagnosed with a depressive disorder on admission to RMLH received psychotherapy by the staff psychologists once or twice a week depending on the severity of depression. Patients with depressive disorders were also referred to a board-certified psychiatrist for treatment with antidepressants. In those patients who were already receiving antidepressants (37% of patients with depressive disorders were on antidepressants at time of arrival to RMLH), the psychiatrist either increased the dose of antidepressants or used a different antidepressant. The most common antidepressants were sertraline and citalopram. In the 142 patients who were diagnosed with depressive disorders, 90% received antidepressants and psychotherapy, 6% received psychotherapy alone, and 4% refused antidepressants but agreed to psychotherapy. Patients were seen weekly by the psychologist and twice a month by the psychiatrist to assess the response to therapy. Duration of therapy was left to the discretion of the psychologists and psychiatrist. In most cases, patients were treated until they were discharged from RMLH.

Reference List

1. Kiernan RJ, Mueller J, Langston JW, Van Dyke C. The Neurobehavioral Cognitive Status Examination: a brief but quantitative approach to cognitive assessment. *Ann Intern Med* 1987;107:481â485. [PubMed: 3631786]
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4. Washington D.C.: American Psychiatric Association; 1994.

Figure 1.
Study enrollment.

Figure 2.

Distribution of functional status among enrolled patients the month before onset of respiratory failure. Hatched area of each column represents the number of patients diagnosed with depressive disorders at the weaning facility; clear area represents the number of patients without depressive disorders. Functional dependence (partially or totally bedridden) was 1.6 times more frequent among patients with depressive disorders than among those without such disorders ($p=0.0006$).

Figure 3.

Number of patients with and without a depressive disorder. Hatched area of each column represents the number of patients who failed weaning (WF); clear area represent the number of patients who were successfully weaned (WS). Ventilator weaning was less frequent among patients with depressive disorders than among those without such disorders ($p < 0.0001$).

Table 1

Patient Characteristics

Variable	Persistent coma-delirium (n = 142)	Transient coma-delirium (n = 152)	Normal sensorium (n = 184)
Age, median years [IQR] *	73 [58-80]	72 [63-80]	68 [57-77] ^a
Sex, female/male, [% female]	64/78 (45%)	75/77 (49%)	94/90 (51%)
APACHE II, median [IQR] **	17 [14-21]	17 [13-19]	14 [12-16] ^{a,b}
Reasons for respiratory failure			
Post operative, %	23	32	33
Acute lung injury, %	20	28	22
COPD, %	4	5	7
Neuromuscular, %	32	11	15
Others, %	21	24	23
Charlson Comorbidity index, median [IQR] **	2 [1-3]	2 [1-4]	1 [0.8-3] ^a
Premorbid functional independence (Zubrod 0-2), %	67	57	69 ^c
Duration of mechanical ventilation before transfer, median days [IQR]	19 [15-27]	23 [18-30]	21 [15-31]

* p < 0.05 comparing three groups using Kruskal-Wallis one-way ANOVA test

** p < 0.01 comparing three groups using Kruskal-Wallis one-way ANOVA test

^a p < 0.5 comparing transient coma-delirium group with normal sensorium using Dunn's test

^b p < 0.5 comparing persistent coma-delirium group with normal sensorium using Dunn's test

^c p < 0.5 comparing transient coma-delirium group with normal sensorium using chi-square

APACHE = Acute Physiology and Chronic Health Evaluation; IQR = interquartile range; COPD = chronic obstructive pulmonary disease

Table 2**Patient Characteristics Stratified by Depressive Disorders**

Variable	No Depressive Disorders (n=194)	Depressive Disorders (n=142)	p value
Age, median years [IQR]	69 [58–77]	72 [61–78]	0.17
Sex, female/male [% female]	99/95 (51%)	70/72 (49%)	0.75
APACHE II, median [IQR]	14 [12–17]	16 [12–19]	0.04
Reasons for respiratory failure			
Post operative, %	31	35	0.41
Acute lung injury, %	22	28	0.21
COPD, %	8	4	0.11
Neuromuscular, %	15	11	0.33
Others, %	24	22	0.61
Charlson Comorbidity index, median [IQR]	1 [0.3–2]	2 [1–4]	0.0002
Duration of mechanical ventilation before transfer, median days [IQR]	20 [15–29]	23 [18–34]	0.005

APACHE = Acute Physiology and Chronic Health Evaluation; IQR = interquartile range; COPD = chronic obstructive pulmonary disease

Table 3

Multivariate Logistic Analysis to Determine Relationship Between Depressive Disorders and Baseline Characteristics

Variable	Odds Ratio	95% CI	p value
Previous psychiatric history	3.04	1.74 to 5.30	0.0001
Premorbid functional dependence (Zubrod > 2), %	1.70	1.04 to 2.79	0.03
Charlson Comorbidity index	1.23	1.06 to 1.44	0.007
APACHE II	1.05	0.99 to 1.12	0.11
Etiology of respiratory failure			
Post operative	1.26	0.66 to 2.40	0.48
Acute lung injury	1.28	0.65 to 2.53	0.48
COPD	0.41	0.13 to 1.31	0.12
Neuromuscular	1.47	0.64 to 3.38	0.37
Age	1.00	0.98 to 1.02	0.88
Duration of mechanical ventilation before transfer	1.00	0.99 to 1.01	0.36
Female	0.94	0.58 to 1.53	0.80

Table 4

Effect of Depressive Disorders on Patient Outcome

Variable	No depressive Disorders (n=194)	Depressive Disorders (n=142)	p value
Weaning failure, %	33.0	60.6	0.0001
Mortality, %	10.3	23.9	0.0008
Duration of MV at RMLH, days Median [IQR]	13 [5-38]	24 [8-41]	0.007
Length of stay at RMLH, days Median [IQR]	33 [24-42]	35 [23-46]	0.55

IQR = interquartile range

Table 5**Multivariate Logistic Regression of Variables Predicting Mortality**

Variable	Odds Ratio	95% CI	p value
Depressive disorders	4.32	1.99 to 9.33	0.0002
Charlson Comorbidity index	1.24	1.03 to 1.49	0.02
Previous psychiatric history	0.85	0.38 to 1.90	0.69
Age	1.06	1.02 to 1.09	0.001
Etiology of respiratory failure			
Post operative	0.58	0.23 to 1.49	0.26
Acute lung injury	1.11	0.44 to 2.80	0.82
COPD	0.89	0.19 to 4.17	0.88
Neuromuscular	0.66	0.16 to 2.63	0.55
Duration of mechanical ventilation before transfer	1.00	0.99 to 1.02	0.17
APACHE II	1.06	0.97 to 1.16	0.22
Anxiolytics	0.99	0.96 to 1.02	0.57
Antidepressants	0.95	0.92 to 0.99	0.007
Transient delirium	0.38	0.18 to 0.83	0.02