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ScienceDirect
General Hospital Psychiatry 32 (2010) 147–155
General Hospital Psychiatry

Risk factors for depression and anxiety in survivors of acute respiratory distress syndrome

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Received 28 August 2009; accepted 9 November 2009

Abstract

Objective: Depression and anxiety are common morbidities of critical illness. We assessed risk factors of depression and anxiety in Acute Respiratory Distress Syndrome (ARDS) survivors at 1 and 2 years post-hospital discharge.
Method: Risk factors for depression and anxiety at 1 and 2 years were assessed using stepwise multiple regression analyses, with and without 1-year outcomes.
Results: ARDS survivors had depression (16% and 23%) and anxiety (24% and 23%) at 1 and 2 years, respectively. Predictors of depression at 1 year were alcohol dependence, female gender and younger age (P=.006). Predictors of anxiety were ratio of arterial oxygen tension to inspired oxygen fraction and duration of mechanical ventilation (P<.005). Predictors of depression at 2 years were depression at 1 year and the presence of cognitive sequelae (P<.0001). Predictors of anxiety at 2 years was anxiety at 1 year (P<.0001).
Conclusions: Medical variables that predicted depression or anxiety at 1 year no longer predicted depression and anxiety at 2 years. Medical variables appear to have a short-term effect on psychiatric outcomes. At 2 years lifestyle behaviors including history of smoking along with cognitive sequelae, depression and anxiety at 1 year predict depression and anxiety.

Keywords: Psychiatric disorders; Depression; Anxiety; Critical illness; ARDS

1. Introduction

Acute respiratory distress syndrome (ARDS) is a common critical illness that has disabling long-term physical and neurologic consequences for some survivors. Each year, ARDS affects approximately 190,000 people per year in the United States and is associated with 74,000 deaths and 3.6 million hospital days [1]. Acute respiratory distress syndrome is characterized by acute lung injury with respiratory failure, arterial hypoxemia, reduced total thoracic compliance and diffuse bilateral infiltrates on chest radiographs [2,3]. Acute respiratory distress syndrome occurs in response to a variety of insults including sepsis, trauma, pneumonia, massive transfusion and other medical/surgical conditions. Treatment of ARDS requires aggressive supportive care including positive pressure ventilation [4] and increased oxygen concentrations with the attendant risks of barotrauma, oxygen toxicity and nosocomial infection. Acute respiratory distress syndrome may result in multiple organ system dysfunction, including the central nervous system [5,6].

Individuals with a critical illness are faced with disease or injury that is life threatening requires intensive care unit (ICU) hospitalization, and invasive medical treatment. The legacy of critical illness and ICU treatment, including long-

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doi:10.1016/j.genhosppsych.2009.11.003

term outcomes has been under recognized and studied. Over 100,000 ARDS survivors per year [1] are at risk for long-term morbidity [7,8] including decreased physical function [8], decreased quality of life [9,10], development of psychiatric disorders [7,11,12] and neurologic injury (i.e., polyneuropathy, encephalopathy, and cognitive sequelae) [7,8]. Psychiatric morbidity such as depression and anxiety are common morbidities of critical illness [10,12–14]. The combination of medications, traumatic stress, pain, inflammation, hypoxemia and brain injury may contribute to psychiatric disorders following critical illness and ICU treatment [13,15,16]. The prevalence and severity of psychiatric disorders in survivors of critical illness is heterogeneous [15–19], and the reported prevalence of these disorders range from 17–48% to 60 months after ICU discharge. Depression occurs in 25% [7] to more than 50% of survivors of critical illness [10].

There is growing interest in the psychological impact of critical illness and its treatment; yet, most studies of psychiatric outcomes following critical illness are cohort studies that assess the prevalence of psychiatric morbidity, with few studies assessing risk factors for such disorders. Little is known regarding which factors of the critical illness and/or ICU treatment contribute to development of depression and anxiety in these patients. Further, no studies have assessed the impact of cognitive sequelae and its relationship to development of psychiatric morbidity in ICU survivors. The purpose of this study was to evaluate risk factors for depression and anxiety at 1 and 2 years after hospital discharge in ARDS survivors.

2. Methods

Acute respiratory distress syndrome survivors from a single-center mechanical ventilation randomized clinical trial of higher vs. lower tidal volume target strategies conducted from February 1994 to December 1999 [20] were eligible for, and invited to join this outcome study by the first author (R.O.H.). The inclusion criteria were tracheal intubation, ratio of arterial oxygen tension to inspired oxygen fraction (PaO_2/FiO_2) ≤150 mmHg, pulmonary artery balloon occlusion pressure ≤18 mmHg (when available), no clinical evidence of left atrial hypertension, diffuse infiltrates in three out of four quadrants on chest radiographs, age >16 years and presence of an ARDS risk factor (e.g., aspiration, multiple trauma, pancreatitis, pneumonia, sepsis). The exclusion criteria were disease states that were deemed to be rapidly terminal (e.g., liver failure, malignancy, AIDS), traumatic brain injury, prior neurologic disease (e.g., stroke, dementia, multiple sclerosis, etc.) or enrollment in another ARDS study (e.g., National Institute of Health and National Heart Lung and Blood Institute [NIH/NHLBI] ARDS Network studies) [4].

One hundred twenty consecutive ARDS patients were evaluated for this study, 42 patients died, three survivors were excluded (two cognitive disability, one Alzheimer's disease) and one patient declined the study. Of the 74 ARDS survivors enrolled in the study, three died in the first year following hospital discharge from: pulmonary fibrosis/cor pulmonale, liver failure or diabetic complications. Five survivors declined to return for 1-year follow-up (e.g., busy schedules or not interested), which resulted in 66 survivors who completed the 1-year evaluation. Two ARDS survivors died in the second year (bowel obstruction or cardiac failure), and two declined to return for the 2-year follow-up, resulting in 62 survivors who completed the 2-year evaluation.

Patient demographic and medical data were collected and recorded prospectively using hospital-wide clinical electronic medical records [21]. Data included length of stay, Acute Physiologic and Chronic Health Evaluation II (APACHE II) scores [22], laboratory values (including blood and plasma glucose measurements), mechanical ventilation data, and outcome (e.g., length of stay, survival). APACHE II is a widely used and validated severity of disease classification system [22] which scores patients on a number of variables including age, previous health status, comorbid disorders, initial routine physiologic measurements, admission type (medical or surgical) and the patient diagnosis. The scores range from 0 to 71, with higher scores indicating increased illness severity [22]. Alcohol dependence was defined using *Diagnostic and Statistical Manual of Mental Disorders IV* criteria [23]. A preexisting diagnosis of alcohol dependence or history of smoking was confirmed if documented: (1) on admitting note or (2) by treating physician in any record during the hospitalization for ARDS.

Depression was assessed using the Beck Depression Inventory (BDI) [24] and anxiety was assessed using the Beck Anxiety Inventory (BAI) [25]. Beck depression inventory scores of 0–9 indicate minimal, 10–16 mild, 17–29 moderate and 30–63 severe depression. Beck anxiety inventory scores of 0–7 indicate minimal, 8–15 mild, 16–25 moderate and 26–63 severe anxiety.

Standardized neurocognitive tests were administered at discharge, 1 year and 2 years post discharge and included tests that assessed general intelligence, attention/concentration, memory, mental processing speed, executive function and visuospatial abilities. The 1- and 2-year tests were administered in a private office at LDS Hospital or at the patient's home if they were unable to travel. There were no reports or indications of severe anxiety for any patients during any test session. The tests included Wechsler Adult Intelligence Test-Revised [26], Wechsler Memory Scale-Revised (WMS-R) [27], Rey Auditory-Verbal Learning Test (RAVLT), Rey-Osterrieth Complex Figure Test (copy, immediate recall and 30-min delay recall; RCOF) [28], Trail Making Test Parts A and B [29] and Verbal Fluency test [30]. Neurocognitive sequelae were defined as two or more cognitive test scores >1.5 S.D. or 1 test score >2 S.D. below the normative population mean values using age, gender and education corrected T-scores (mean=50,