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STUDY OF CLINICAL SPECTRUM AND MORTALITY PREDICTORS OF ARDS

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INTRODUCTION

Acute respiratory distress syndrome (ARDS) is a clinical syndrome of severe dyspnoea of rapid onset, hypoxemia, and diffuse pulmonary infiltrates leading to respiratory failure. The acute respiratory distress syndrome (ARDS), first described in 1967, remains difficult to treat and has significant morbidity and mortality. ARDS is caused by diffuse lung injury from many underlying medical and surgical disorders. The lung injury may be direct, as occurs in toxic inhalation, or indirect, as occurs in sepsis. These conditions result in inflammatory lung injury and hypoxemia that arise from disruption of the alveolar-capillary membrane and influx of protein-rich edema fluid, producing physiologic lung dysfunction. The annual incidence of ARDS is estimated to be as high as 60 cases/100,000 population. Approximately 10% of all intensive care unit (ICU) admissions involve patients with acute respiratory failure; ~20% of these patients meet the criteria for ARDS.

Diagnostic Criteria for ARDS: BERLING's score

Severity: Oxygenation Onset	Chest Radiograph	Absence of Left Atrial Hypertension
Mild: 200 mmHg < Pao2/Fio2 ≤ 300 mmHg	Acute Bilateral alveolar or interstitial infiltrates	PCWP ≤18 mmHg or no clinical evidence of increased left atrial pressure
Moderate: 100 mmHg < Pao2/Fio2 ≤ 200 mmHg		
Severe: Pao2/Fio2 ≤ 100 mmHg		

The natural history of ARDS is marked by three phases—exudative, proliferative and fibrotic—that each have characteristic clinical and pathologic features.

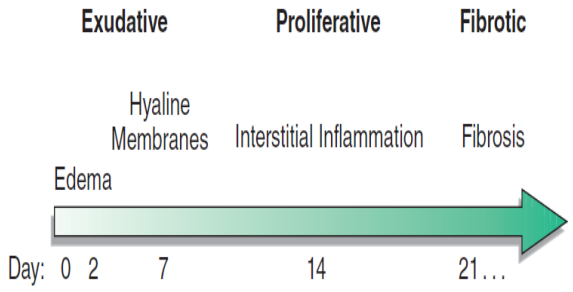


Diagram illustrating the time course for the development and resolution of ARDS

Recent reductions in ARDS mortality are largely the result of general advances in the care of critically ill patients and lung protective ventilation strategies.[5]

Thus, caring for these patients requires close attention to recognition and treatment of the underlying medical and surgical disorders (e.g. sepsis, aspiration, trauma). Appropriate treatment of any precipitating infection such as pneumonia or sepsis is critical to enhance the chance of survival.

In a patient with sepsis and ARDS of unknown source, an intra-abdominal process should be considered. Timely surgical management of intra-abdominal sepsis is associated with better outcomes.[6]

Minimizing procedures and their complications; prophylaxis against venous thromboembolism, gastrointestinal bleeding and central venous catheter infections; prompt recognition of nosocomial infections, provision of adequate nutrition. Non-invasive ventilator support through a tight-fitting facemask or nasal mask for PSV or bi-level positive airway pressure ventilation are preferred in selected patients.[5,6]

MATERIAL AND METHODS

This observational, retrospective study encompassed 43 patients of acute respiratory distress syndrome admitted to a medical intensive care unit (MICU) and intensive care unit (ICU) in R.L. Jalappa Hospital, Tamaka Kolar a tertiary care hospital from Jan 2015 to Dec 2015.

Aim of the study was to determine the etiology of ARDS and its outcome and to assess the correlation between clinical and biomedical parameters and morbidity/mortality.

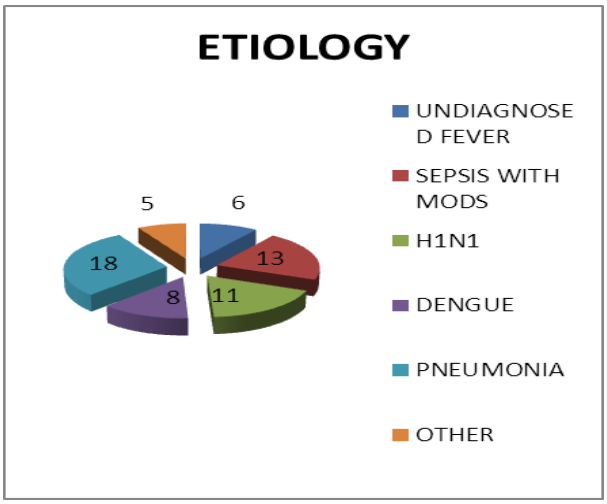
Institute's Ethics committee approval was taken for this study.

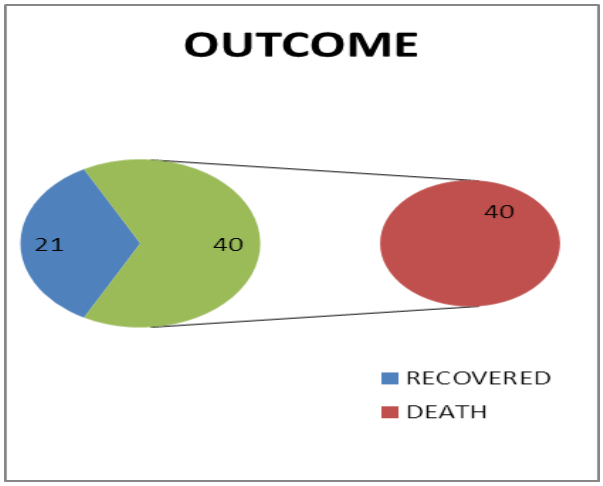
The following data were recorded: name, age, diagnosis, general and clinical examination, investigations namely complete blood count, liver function tests, renal function tests, arterial blood gas analyses, chest radiographs, details of ventilatory mode and weaning methods for patients needing mechanical ventilation and stay in the hospital. Diagnostic criteria for ARDS used as per Berlin definition was used.

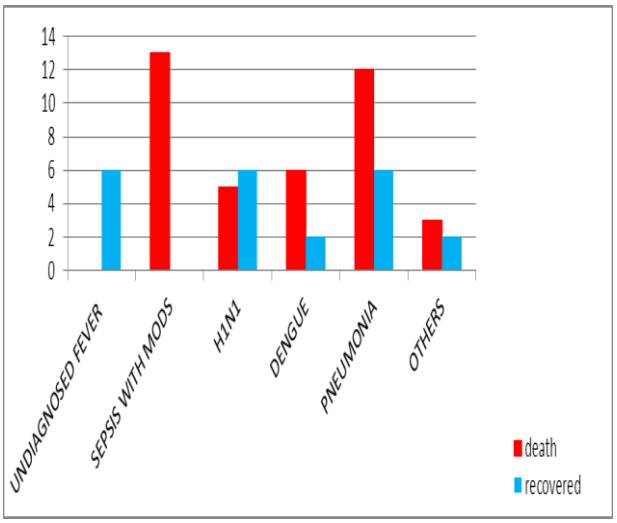
We included all patients who satisfied ARDS criteria according to Berlin definition in the study and excluded patients with cardiac failure, valvular heart disease, cardiomyopathies and chronic kidney diseases with fluid overload states, age below 18 years and patients with chronic kidney diseases with fluid overload states.

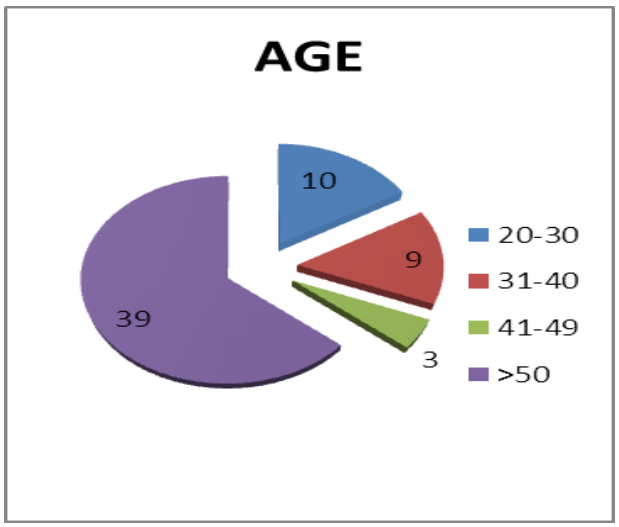
RESULTS

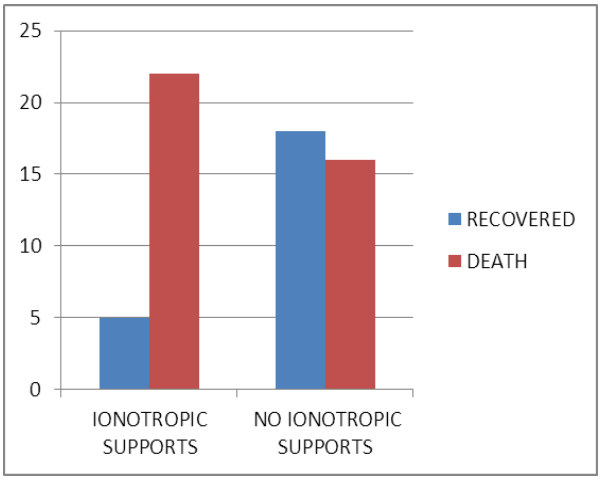
Total of 61 patients out of which Males comprised 49.1% (30), females 50.9% (31) of the study population and the presentation was more common in elderly age group with total mortality of 63.9% (39 out of 61). Etiology for ARDS were pneumonia in 18 patients (29.5%), H1N1 in 11 (18.03%), sepsis in 13 (21.3%), dengue in 8 (13.11%), undiagnosed fever in 6 (9.8%) others 5(8.19%).











DISCUSSION

Since its recognition in 1967,a lot of clinical studies and trials have been conducted in the field of ARDS. The present study attempts to establish the correlation between clinical profile and outcome of patients with ARDS in Indian rural perspective.

Numerous studies suggest that survival has improved over time. As an example, an observational study of 2451 patients who had enrolled in ARDS Net randomized trials found a fall in mortality from 35 to 26 percent between 1996 and 2005.[19-27]

The National Heart, Lung and Blood Institute ARDS Clinical Trials Network, a large multiple centre trial carried out at 10 university centers with 861 patients of ARDS is one of the most important studies.[9] This was the first study ever to demonstrate significant mortality benefit, a 22% reduction in mortality in patients ventilated with lung protective ventilation strategy.

Amongst the Indian studies, a three and half year retrospective study of 98 patients who died of ARDS at Apollo Hospital during January 1999 to June 2002, Vigga etal found that primary pulmonary infection was associated with ARDS in 1/3 rd of patients and sepsis was significant risk factor[11].Polytrauma (12 patients), post abdominal surgery and pancreatitis (10 patients each) were other etiologies.

Predictors — many studies have sought to identify factors during the acute illness that predict mortality. Such factors can be categorized as patient-, disease-, or treatment-related. No single factor has proven to be superior to the others.

Patient-related — Older patients appear to be at an increased risk for death. This was illustrated by a multicenter cohort study that followed 1113 patients with ARDS for 15 months. The mortality rate increased progressively with age, ranging from 24 percent among patients 15 to 19 years of age to 60 percent among patients 85 years of age or older. The overall mortality rate was 41 percent. Although it has been suggested that obesity may impact the mortality of critically ill patients with or without ARDS, evidence is conflicting.[12-18]

Disease-related — Disease-related predictors of mortality include severe hypoxemia, failure of oxygenation to improve, pulmonary vascular dysfunction, increased dead space, infection, a high severity of illness score, a non-traumatic cause of the ARDS and certain biomarkers and gene polymorphisms.

Treatment-related — Treatment-related predictors of mortality include a positive fluid balance, glucocorticoid therapy prior to the onset of ARDS, packed red blood cell transfusions and being in an ICU that does not mandate care by an intensivist.

In our study total mortality was 63.9%. Most common etiology was pneumonia in 18 patients (29.5%), H1N1 in 11 (18.03%), sepsis in 13 (21.3%), dengue in 8 (13.11%), undiagnosed fever in 6 (9.8%) others 5(8.19%). Direct lung injury –pneumonia, sepsis, H1N1, dengue were the main factors responsible for ARDS. Patient with moderate ARDS according to Berlins score predicted outcome as well as need for mechanical ventilation. Renal failure, metabolic acidosis and need for inotropes at the time of admission appeared to be good predictors of mortality.

Minimizing procedures and their complications; prophylaxis against venous thromboembolism, gastrointestinal bleeding and central venous catheter infections; prompt recognition of nosocomial infections, provision of adequate nutrition. Non-invasive ventilator support through a tight-fitting facemask or nasal mask for PSV or bi-level positive airway pressure ventilation are preferred in selected patients.[5,6]

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