

## CRITICAL CARE MEDICINE

# Acute Lung Injury/Acute Respiratory Distress Syndrome: a Need for Education

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**Objective.** To examine the timeliness of the diagnosis of patients with ALI/ARDS at the San Juan VA Medical Intensive Care Unit. We were also interested in determining the incidence and the overall 28-day mortality for ARDS during the study period.

**Methods.** Retrospective record review of all admissions to the San Juan Veterans Affairs Medical ICU during a two-year period (1997-1998).

**Results.** During the study period, 587 patients were admitted to the medical ICU. All had APACHE II scoring performed during their first 24 hours of admission. Twenty-three patients were found to have an A-a gradient of 350 or less. However, two patients were later identified as having radiographic changes compatible with

Congestive Heart Failure and were excluded from the study. The incidence of ALI/ARDS was found to be 3.6% at our institution. Of the 21 patients with ARDS, in only 4 the diagnosis of ARDS was documented on their charts.

**Conclusion.** Our findings suggest that education in the recognition of ARDS should be aggressively done. In order to implement the recently published successful strategies in the mechanical ventilation of patients with ARDS, it should be first recognized. Our patients need it.

*Key words:* Respiratory distress syndrome, Intensive care, Respiratory care unit

First described in 1967 by Ashbaugh and his colleagues, acute lung injury (ALI) and the acute respiratory distress syndrome (ARDS) are common causes of respiratory failure (1). This syndrome had a new working definition established by the 1994 American - European Consensus Conference on ARDS. ALI is said to occur when the ratio of partial pressure of arterial oxygen ( $\text{PaO}_2$ ) to the fraction of inspired oxygen ( $\text{FIO}_2$ ), also known as the hypoxemic ratio, is below 300, regardless of the level of positive end expiratory pressure (PEEP). Other findings should include bilateral pulmonary infiltrates on the frontal chest radiograph and a pulmonary-artery occlusion pressure below 18 mm Hg or no clinical evidence of elevated left atrial pressure on the basis of the chest radiograph and other clinical data. The definition of ARDS includes the same three components, except that the hypoxemic ratio is equal or below 200. As part of the definition, ALI/ARDS should have an acute onset (2).

ARDS is a rapidly progressive illness that is often fatal, despite the provisions of advanced technological support in a modern intensive care unit (3). The National Institutes of Health (NIH) early estimates suggested an incidence of 75 cases per 100,000 inhabitants (4). The currently reported mortality is approximately of 50% (5). No evidence for a relationship between incidence and age, sex, or race has been found up to this date (2). Most ARDS series indicate that severe sepsis is the most common culprit for ARDS, with aspiration of gastric contents being relatively common, and trauma, although less frequent, but still important (7). Cirrhosis of the liver is a comorbid condition that also appears to positively influence both the incidence and the severity of ARDS (10). Additionally, ARDS appears to be more common with increasing age in patients with similar underlying risk conditions (8). The severity of ARDS at the time of first diagnosis as measured by oxygenation abnormality ( $\text{PaO}_2/\text{FIO}_2$ ) has generally not been associated with differing outcomes except at the very extremes of abnormality (7).

At the San Juan VA Medical Center, a large number of patients are admitted to the Medical Intensive Care Unit (MICU) and placed on mechanical ventilation due to respiratory distress or respiratory failure. However, not all patients are actively screened for ARDS during their admission to the MICU. Our purpose was to examine the

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timeliness of the diagnosis of patients with ALI/ARDS at the San Juan Veterans Affairs Medical Intensive Care Unit. We were also interested in determining the incidence and the overall 28-day mortality for ARDS during the study period.

### Methods

A retrospective record review of all admissions to the Medical ICU during a two-year period (1997-1998) was performed. APACHE II score data gathered during that period was used to identify patients during the study's time frame. All patients with alveolo-capillary (A-a) gradients of 350 or more as reported on their 24 hour APACHE II score were selected for evaluation. The medical records of patients that met these criteria were reviewed and clinical data obtained for analysis. Demographic data selected for evaluation included age, sex, admitting diagnosis, initial chest radiographical findings, A-a gradient, and PaO<sub>2</sub>/FiO<sub>2</sub>. We also sought to answer questions, such as, at what time was the diagnosis of ARDS made, whether or not the diagnosis of ARDS was recorded on the patient chart, what was the incidence of ARDS at our institution as well as the patient's mortality and its care. In those patients with ARDS who died, the reason for death was recorded.

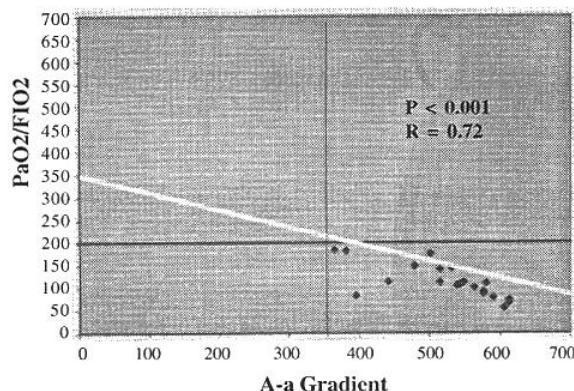
### Results

During the study period, 587 patients were admitted to the medical ICU. All had APACHE II scoring performed during their first 24 hours of admission. Twenty-three patients were found to have an A-a gradient of 350 or less. However, two patients were later identified as having radiographic changes compatible with congestive heart failure and were excluded from the study. The incidence of ALI/ARDS was found to be 3.6% at our institution. The demographic data for these patients is shown in Table 1.

A-a gradients were compared against hypoxemic ratios. A strong correlation was observed with a P < 0.001 and a R = 0.72 as shown in Figure 1. Of the 21 patients in our

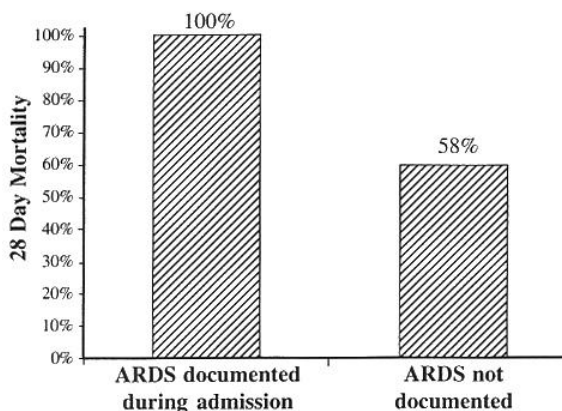
**Table 1.** Age interval, sex, and number of patients with ARDS/ALI during the study period

Age	
40-54	1
55-64	3
65-74	11
>74	6
Male sex	
	100%



**Figure 1.** Hypoxemic ratio for patients versus alveolo-capillary gradient.

study group, 86% had an admission diagnosis related to an infectious process, the most common being non-pulmonary sepsis (56%), followed by pneumonia (44%). The diagnoses of the remaining 14% (three patients) were: upper gastrointestinal bleeding, chronic obstructive pulmonary disease, and paraquat intoxication. Of the 21 patients, 17 (81%) did not have the diagnosis of ARDS documented on their charts. Chest radiographs were scored using the lung injury scoring method proposed by Murray and his colleagues (9). The average chest radiograph score was 3.6. When patients in whom ARDS was documented during admission and those in which ARDS was not documented were compared in terms of mortality at 28 days (Figure 2) and APACHE II scores (Figure 3), there was no significant differences among the two groups. When we evaluated the Apache II scores of our ARDS and ICU admitted patients during the same study period, we found that the ARDS patients have and increased mortality at comparable APACHE II score



**Figure 2.** 28 day mortality compared to ARDS documentation

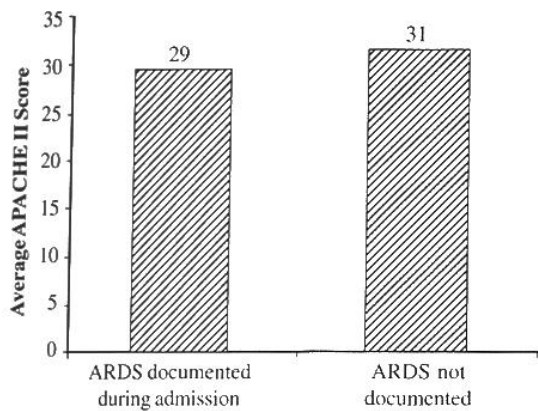


Figure 3. APACHE II Scores compared to ARDS documentation

intervals. However in both groups there was an increased mortality at the measured APACHE II intervals (Figure 4). The average hypoxemic ratio ( $PaO_2/FiO_2$ ) for our study group was 105. Our data also did not show a correlation between the hypoxemic ratio and 28 day mortality ( $p = 0.1$ ). We found that the 28-day survival for this group was 33%. 91% of the 14 patients died of complications from sepsis.

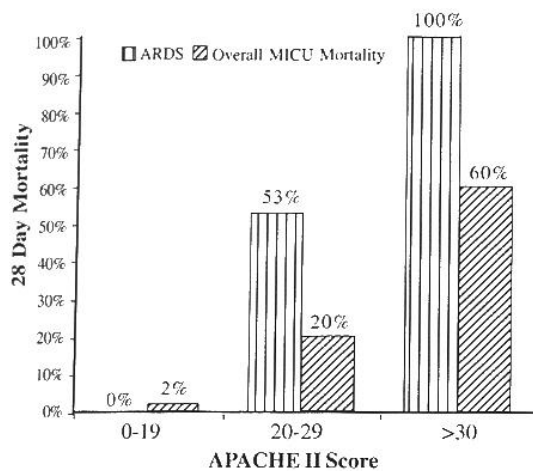


Figure 4. APACHE II Scores and 28 day mortality

### Discussion

The predictive ability of a scoring system to determining how frequently ALI/ARDS occurs may be difficult for a physician, especially in the presence of severe underlying medical conditions, such as sepsis or trauma. In the literature review we didn't find any previous study that

aimed to establish a relationship between the A-a gradient as a screening tool at 24 hours of admission and the development of ALI/ ARDS. Our sample population showed that an A-a gradient above 300 had a strong predictive ability for this syndrome. In our study, the majority of the cases of ALI/ARDS were not identified by their caregivers. Based on our findings, APACHE II scores, hypoxemic ratios, patients' age, chest radiograph scoring and other factors evaluated, we cannot explain why physicians were not able to establish the diagnosis.

When APACHE II score of ARDS patients were compared with other MICU patients with similar APACHE II, as proposed by Knaus and his colleague's (12), we noted a similar mortality trend. From our study results, we cannot establish that this tendency is attributed to the severity of the illness and not to the development of ALI/ ARDS. We found a higher incidence of ALI/ARDS in our MICU than the one reported in recent literature (6, 11). Our population does not completely represents the whole spectrum of patients with ARDS. For example, no surgical trauma patients were in our patient sample and non-pulmonary sepsis was the most common cause of ARDS in our study.

Further investigation is needed in order to improve strategies that may advance our skills in establishing an early diagnosis of ARDS. The effectiveness of a predictive measure and its effect in patient's survival are not clear, as our study did not look at response to treatment in these patients. However, data published by the ARDS network suggests that ARDS patient may benefit from protective lung strategies in mechanical ventilation (5).

Our findings highlight the need for further physician education in the recognition of this syndrome. Although from different ethnical and possible health care infrastructure origin, studies across the world have shown a similar mortality trend for this entity. (13-19) A global and concerted effort should be strongly considered.

### Resumen

El propósito de esta revisión fue evaluar la prontitud en el diagnóstico de pacientes con daño agudo pulmonar/ síndrome de angustia respiratoria aguda en los pacientes admitidos a la Unidad de Cuidado Intensivo de Medicina del Hospital de Veteranos de San Juan. También determinamos la mortalidad a 28 días de pacientes con este síndrome durante el período estudiado. Se llevó a cabo una revisión retrospectiva de todos los expedientes médicos de pacientes admitidos a la Unidad de Cuidado Intensivo de Medicina del Hospital de Veteranos de San Juan durante un período de dos años (1997-1998). Durante el período estudiado, se admitieron 587 pacientes a la

Unidad de cuidado Intensivo de Medicina. A todos se le realizó el conteo de APACHE II durante las primeras 24 horas de haber sido admitidos. En veintitrés pacientes se encontró que tenían un gradiente alveolo-capilar de 350 o menos. Ahora bien, en dos pacientes se encontró posteriormente que tenían cambios radiográficos compatibles con insuficiencia cardiaca congestiva, por lo que se excluyeron del estudio. Se encontró que la incidencia de daño agudo pulmonar/síndrome de angustia respiratoria aguda en nuestra institución era de 3.6%. De los 21 pacientes con el síndrome de angustia respiratoria aguda en sólo 4 se había documentado el diagnóstico en sus expedientes médicos. Nuestros hallazgos sugieren que se debe de hacer un esfuerzo agresivo en educar a nuestros médicos en reconocer el síndrome de angustia respiratoria aguda. Para poder implementar las estrategias de ventilación mecánica en el síndrome de angustia respiratoria aguda recientemente publicadas, el síndrome de angustia respiratoria aguda debe de ser reconocido.

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