



# PROGNOSIS AND OUTCOME OF PATIENTS ADMITTED IN ICU DIAGNOSED TO HAVE RESPIRATORY FAILURE

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## Abstract

*Prognosis and outcome of patients admitted in ICU, diagnosed to have respiratory failure. **Introduction:** Acute respiratory failure is one of the most common reasons for ICU admission. In some ICUs, >75% of patients require mechanical ventilation during their stay. It is useful to identify patients at the time of admission who are likely to have poor outcome. This study was carried out to evaluate efficacy of the predictors of mortality in patients with acute respiratory failure and use this scoring system using the baseline physiological variables for prognosticating these patients. **Material and method:** A prospective observational study was conducted in Dept of internal medicine at tertiary care hospital in Ahmedabad for a period of 6 months. Patients having breathlessness requiring Intensive care were observed and 100 patients having respiratory failure were enrolled in study. Clinical profile including APACHE II score and Glasgow coma scale was recorded at the time of admission to ICU. In addition, acid base disorders, renal functions, liver functions and serum albumin were recorded at the time of presentation. Primary outcome measure was hospital mortality. Results were assessed using chi square test. **Results:** In our study we found male predominance. Majority patients were in the age group 60-70 years. Among the study group, cause of respiratory failure were Acute COPD exacerbation (37%) followed by LRTI (26%), Cardiac (22%), Bronchiectasis (7%), ARDS/ Sepsis (5%) and Pneumothorax (3%) in decreasing order. Majority of the patient who had high APACHE 2 score on first day of their stay in ICU, had high mortality. **Conclusion:** APACHE 2 score is a good predictor of patient's mortality. Using this routinely can help to prioritize the patients especially in resource limited setups. Hence better outcomes can be achieved.*

**Keywords:** Acute respiratory failure, APACHE 2 Score

## INTRODUCTION

Acute Respiratory Failure is one of the most common reasons for ICU admission. In some ICUs, >75% of patients require mechanical ventilation during their stay. It is useful to identify patients at the time of admission who are likely to have poor outcome. This study was carried out to evaluate efficacy of the predictors of mortality in patients with acute respiratory failure and use this scoring system using the baseline physiological variables for prognosticating these patients.

Respiratory failure can be categorized on the basis of pathophysiologic derangements in respiratory functions.

Type 1:

Type 1 respiratory failure is defined as a low level of oxygen in the blood (Hypoxemia) without an increased level of carbon dioxide in the blood (Hypercapnia) and indeed the  $P_aCO_2$  may be normal or low. It is typically caused by a ventilation/perfusion (V/Q) mismatch; the volume of air flowing in and out of the lungs is not matched with the flow of blood to the lungs.



Examples: Pulmonary Edema, Pneumonia, ARDS, Sepsis, Gastric Aspiration, Multiple Blood Transfusion, Pancreatitis.  
Type 2:

Type 2 respiratory failure is caused by inadequate alveolar ventilation; both oxygen and carbon dioxide are affected. Defined as the buildup of carbon dioxide levels ( $P_aCO_2$ ) that has been generated by the body but cannot be eliminated.

Examples:

- Increased airways resistance (Chronic Obstructive Pulmonary Disease, Asthma)
- Reduced breathing effort (drug effects, brain stem lesion, extreme obesity)
- A decrease in the area of the lung available for gas exchange (such as in chronic bronchitis)
- Neuromuscular problems (Guillain-Barre syndrome, Motor neuron disease) ☞ Chest wall Disease (kyphoscoliosis), (ankylosing spondylitis), or flail chest.

Type 3:

This form of respiratory failure results from Lung Atelectasis. Commonly occurs at perioperative period. After general anesthesia, decrease in functional residual capacity lead to collapse of dependent lung units.

Type 4:

This form results from hypoperfusion of respiratory muscles in patients in shock. Patients in shock often experience respiratory distress due to pulmonary edema, lactic acidosis and anemia.

In resource-limited settings such as India, there is perennial shortfall in health care resources. Well-equipped critical care beds are at a premium, and the available numbers fall well short of the number of patients that could potentially benefit by admission to these units. Such a scenario makes appropriate utilization of resources, including the critical care beds, imperative. It stands to reason in such a scenario to offer intensive care unit admission to the patients that are at a higher risk of developing complications, including need of Mechanical Ventilation. Apart from ensuring close monitoring with prompt intervention as needed, such an approach may even aid in obviating the need of MV in some of these patients. Currently, there is limited information on the outcomes and prognosis in patients who have respiratory failure. The aims of this study are to assess the prognosis and outcome of patients suffering from acute respiratory failure and to identify temporal association between etiological factor and chances of mortality.

## AIMS

1. To study the demographic data of the study group.
2. To find the correlation between etiological factors and disease progression.
3. To assess the prognosis and outcome of patients suffering from acute respiratory failure

## MATERIAL AND METHOD

A prospective observational study was conducted in Dept of internal medicine at tertiary care hospital in Ahmedabad for a period of 6 months from June 2018- December 2018. Patients having breathlessness requiring intensive care were observed and 100 patients having respiratory failure were enrolled in study. Clinical profile including APACHE II score was recorded at the time of admission to ICU. In addition, acid base disorders, renal functions, liver functions and serum albumin were recorded at the time of presentation. Primary outcome measure was hospital mortality. Statistical significance was noted using chi square test.

Inclusion Criteria:

- 1) Patient who give consent for enrollment in study.
- 2) Patient who require intensive care.
- 3) Patient's age  $\geq 18$  years.
- 4) Patient who fulfilled criteria for acute respiratory failure

Exclusion Criteria:

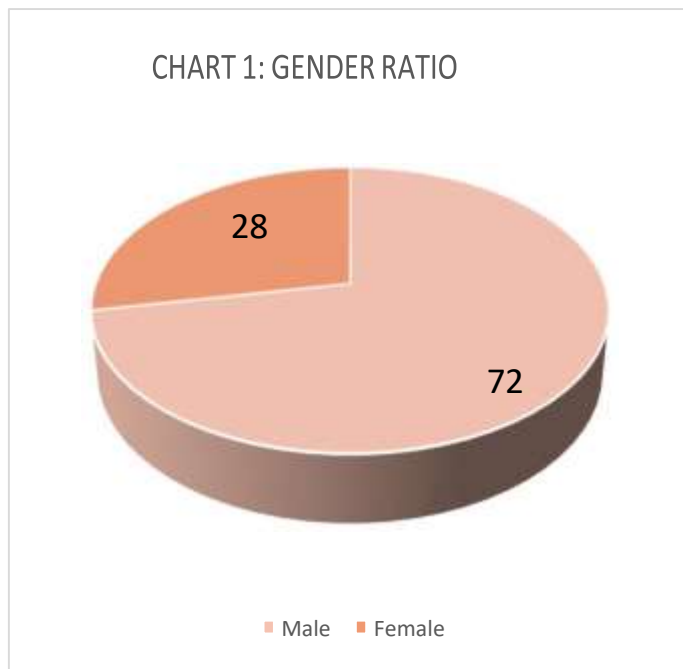
- 1) Patient not willing to give consent
- 2) Patient younger than 18 years

## RESULTS

In this study, total population studied was 100 patient who has acute respiratory failure and admitted in ICU.

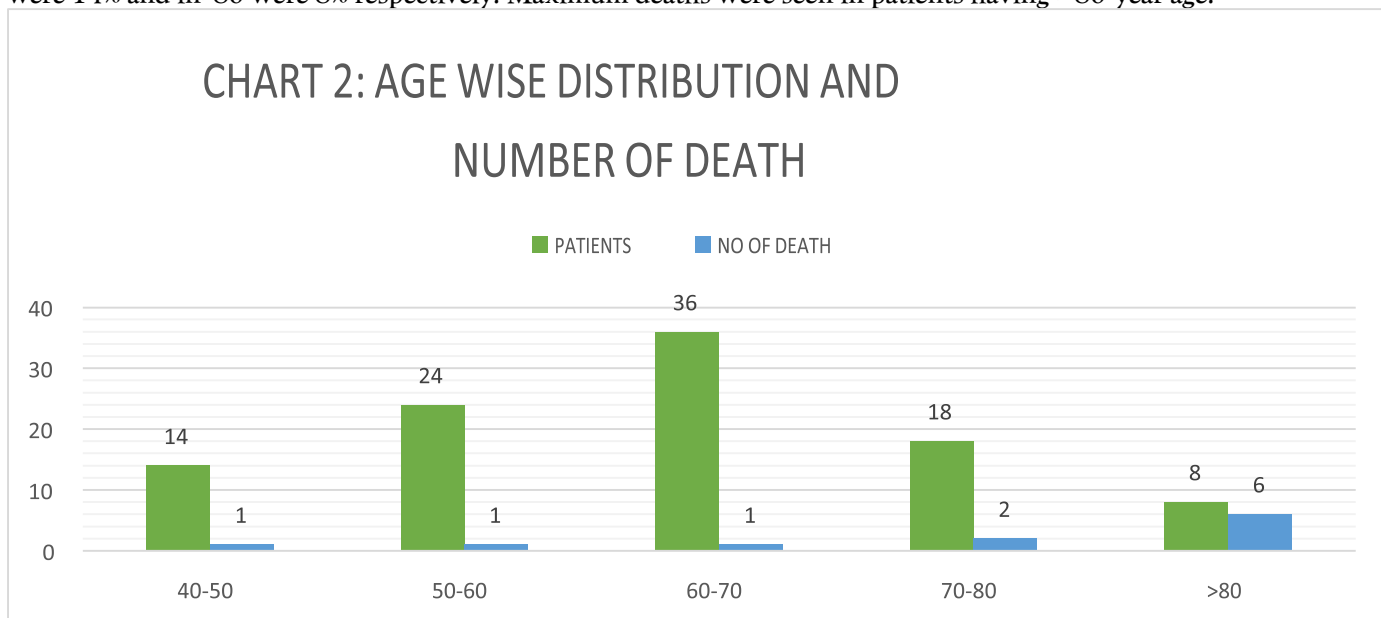
- 1) Gender Ratio:

In this study, total 72 (72%) male and 28 (28%) female patient were enrolled.



2) Age wise distribution and number of death

The majority patients were in the age group 60-70 i.e. 36 % followed by 50-60 i.e. 24%, in 70-80 were 18%, in 40-50 were 14% and in >80 were 8% respectively. Maximum deaths were seen in patients having > 80-year age.

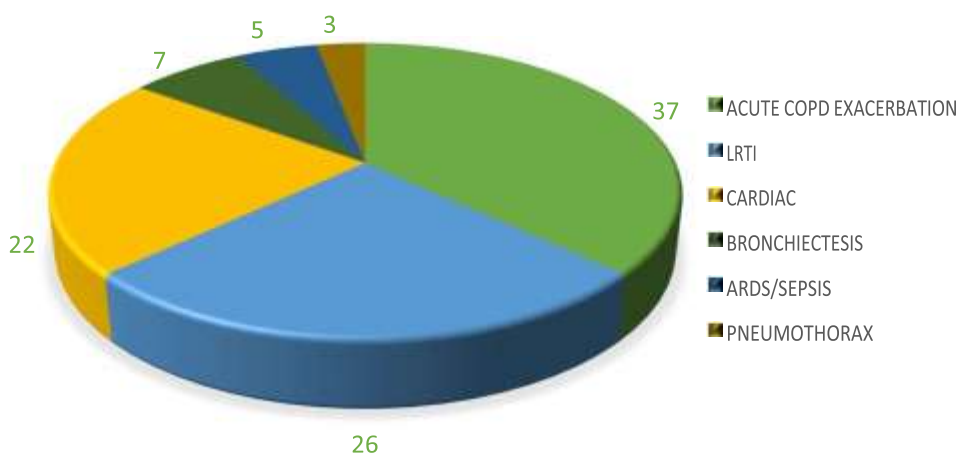


3) Causes of respiratory failure:

Among the study group, cause of respiratory failure were Acute COPD exacerbation (37%) followed by LRTI (26%), Cardiac (22%), Bronchiectasis (7%), ARDS/ Sepsis (5%) and Pneumothorax (3%) in decreasing order.



CHART 3: CAUSES OF RESPIRATORY FAILURE



4) Mean APACHE 2 score

In Baseline ICU Parameters the mean Arterial PH was  $7.22 \pm 0.25$ , the mean Arterial CO<sub>2</sub> was  $60.03 \pm 19.5$ , the mean Arterial O<sub>2</sub> tension was  $209 \pm 102$  and Median APACHE II Score was found was  $18.5 \pm 6.3$ .

Table 1:

Parameters	Mean +-SD n=100
Arterial Ph	7.22+ 0.25
Arterial Co <sub>2</sub>	60.03+ 19.5
Arterial O <sub>2</sub>	209+ 102
Mean Apache 2 score	18.5+ 6.3

5) Outcome of patient

Majority of the patients improved i.e. 84%, Discharge against Medical advice was given to 5 % and Deaths occurred in 11%.

Table 2:

Improved	89
DEATH	11
TOTAL	100

6) Mortality of the patient with comorbid condition:

Out of 11 patients died there are 6 patients who had comorbid conditions like hypertension, diabetes mellitus, IHD and organ failure, they had APACHE SCORE of more than 15. So in this study 55% of the death is involved with comorbid conditions.

Table 3:

DISEASE	HTN	DM2	IHD
DEATH	3	1	2

6) Majority of the patient who had high APACHE 2 score on first day of their stay in ICU, had high mortality, which shows correlation between high APACHE 2 score and mortality.



Table 4:

Apache score	2	Predicted death rate	No n=100	Actual mortality	Percentage:
0-4		4%	8	0	0%
5-9		8%	21	0	0%
10-14		15%	31	0	0%
15-19		25%	19	1	9.09
20-24		40%	11	2	18.18%
25-29		55%	3	2	66%
30-34		75%	2	1	50%
>34		85%	5	5	100%
Total			100	11	

## DISCUSSION

Our study showed male preponderance, M: F =2.5:1, Reasons behind male predominance is high male to female ratio in general population in Gujarat (M: F=1.08:1), moreover more prevalence of smoking leading to more cases of COPD seen in male patients. Also more healthcare benefit availabilities and negligent behavior towards female in few social groups should also be considered. Most commonly affected age group is 60-70 years.

Factors mostly associated with the deaths were extremely old age, multiple comorbidities and organ failure. Various physiological parameters estimated at the time of presentation were analysed to find predictors of mortality. Only two parameters, namely APACHE II score at admission to ICU and GCS in the first 24 hours of admission, were found to be independent predictors of hospital mortality. In the present study, although PaCO<sub>2</sub> and HCO<sub>3</sub> were not independent predictors of mortality they tended to be lower in patients who died and the difference was statistically significant on bivariate analysis. In our study the mortality was 11%.

There was a high incidence of need of Mechanical Ventilation (88%) that have taken into account all the patients with respiratory failure requiring hospitalization as compared them our study was having less mortality.

Results were tested using chi square test and were statistically significant (p value < 0.05).

## CONCLUSION

APACHE 2 score is a good predictor of patient's mortality. Using this routinely can help to prioritize the patients especially in resource limited setups. Hence better outcomes can be achieved.

**ACKNOWLEDGEMENTS:** None

**CONFLICTS OF INTEREST:** None

**FUNDING:** Nil

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