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"OUTCOME OF VARIABLES WITH RESPECT TO NON INVASIVE VENTILATOR IN TYPE 1 AND TYPE 2 RESPIRATORY FAILURE IN INTENSIVE CARE UNIT"

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ABSTRACT The study aimed to investigate the predictive value of the quick sequential organ failure assessment (qSOFA),P/F ratio and N:L ratio for clinical outcomes in emergency patients with respiratory failure. **Aim & Objective:** To compare the clinical and laboratory parameters of patients being treated by non invasive ventilation in type1 and type 2 respiratory failure. **Materials And Methodology:** This was a prospective study performed at tertiary care centre over period of 1.5 year. **Conclusions:** qSOFA was not inferior in predicting the ICU-admission, ARDS and mortality of patients presenting in the ED with respiratory failure.

KEYWORDS : Quick sequential organ failure assessment, respiratory failure

INTRODUCTION:

At present, there are no parameters to predict duration of noninvasive ventilation accurately. Duration of non invasive ventilation would mainly depend upon the severity of illness in Respiratory failure which in turn depends on:

Age, Sex, Abg BMI, Underlying disease process, Pre/coexisting morbidities, Physiological derangements, Type I/II respiratory failure

In the Berlin definition, acute respiratory distress syndrome (ARDS) is stratified into three
stages according to oxygenation severity at the onset.

BERLIN OXYGENATION INDEX :

MILD	200-300 mmHg
MODERATE	100-200 mmHg
SEVERE	≤100mmHg

The Sepsis-3 task force recommends the quick Sequential (Sepsis-Related) Organ Failure Assessment (qSOFA) score for identifying patients with suspected infection who are at greater risk of poor outcomes

qSOFA (Quick sequential Organ Failure Assessment)
Altered Mental Status GCS<15 YES/NO
Respiratory Rate >/ = 22 YES/NO
Systolic BP </= 100 YES/NO

AIM AND OBJECTIVE:

1. To identify predictors of Mortality.
2. To identify, quick sequential organ failure assessment, berlin oxygenation index, arterial blood gas parameters as predictors of duration of non invasive ventilation in Type I and Type II Respiratory Failure.
3. To assess the Non Invasive Ventilation parameters with Arterial Blood Gas and clinical signs of patient outcome.

MATERIAL & METHODS:

This was a prospective study performed at tertiary care centre over period of 1.5 year.
1. Data was collected from the patients admitted in respiratory medicine department with chief respiratory complaints, in SAMC and PGI, Indore.
2. Thorough history taking and physical examinations, radiological findings, hematological and serum biochemical profiles were recorded.

RESULTS:

We had included 120 patients with respiratory failure, of whom, 60 patients had type-I respiratory failure and 60 patients had type-II respiratory failure. In the present study, we evaluated the severity criteria in the Berlin definition in consecutive patients with ARDS and showed that they might be associated with the prognosis and organ failure. Prognostic values of various clinical parameters were also assessed.

On **Day-1,P/FI** was found to be severe in 100% patients of Type-I respiratory failure and 60% patients of Type-II respiratory failure. The difference was found to be statistically significant (Fisher's Exact test P value =0.001), which shows a higher incidence of severe P/FI in Type-I respiratory failure group in comparison to Type-II respiratory failure group. While the incidence of moderate P/FI was seen only in Type-II respiratory failure group (40%).

On **Day-5,P/FI** in Type-I respiratory failure group, severe P/FI was seen in 84.8% of patients, moderate P/FI in 10.9% of patients and mild P/FI in 4.3% of patients. In Type-II respiratory failure group, severe P/FI was seen in 77.6% of patients, moderate P/FI in 6.9% of patients and mild P/FI in 15.5% of patients. Proportional comparison of severe, moderate, and mild P/FI between the two groups showed no statistically significant difference (P>0.05). By Day-5, severity of P/FI were comparable between the two groups.

On **Day-10,P/FI** in Type-I respiratory failure group, severe P/FI was seen in 93.5% of patients, and mild P/FI was seen in 6.5% of patients. In Type-II respiratory failure group, severe P/FI was seen in 85.2% of patients, moderate P/FI was seen in 1.9% of patients andmild P/FI was seen in 12.9% of patients. Proportional comparison of severe, moderate, and mild P/FI between the two groups showed no statistically significant difference (P>0.05). By Day-10 also, severity of P/FI were comparable between the two groups.

In Type-I respiratory failure group, the mean **pH level** on Day-1 was 7.34 ± 0.04, on Day- 5, it was 7.4 ± 0.07 and on Day-10, it was 7.43 ± 0.07. In Type-II respiratory failure group, the mean pH level on Day-1 was 7.28 ± 0.08, on Day-5, it was 7.38 ± 0.09 and on Day-10, it was 7.40 ± 0.09. On Day-1, the mean pH was significantly higher in Type-I respiratory failure group, in comparison to Type-II respiratory failure group (P=0.001); while the mean pH was comparable between the two groups on Day-5 (P=0.194) and on Day-10 (P=0.119).

In Type-I respiratory failure group, the mean **pCO_2 level** on Day-1 was 31.48 ± 4.34, on Day-5, it was 32.67 ± 7.35 and on Day-10, it was 33.17 ± 7.62. In Type-II respiratory failure group, the mean pCO_2 level on Day-1 was 62.96 ± 21.49, on Day-5, it was 49.47 ± 14.18 and on Day-10, it was 44.17 ± 16.87. The mean pCO2 kept on increasing over the course of 10 days in Type-I respiratory failure group, the mean pCO_2 kept on decreasing over the course of 10 days in Type-II respiratory

failure group. The mean pCO_2 was significantly higher in Type-II respiratory failure group in comparison to Type-I respiratory failure group on Day-1 (P=0.001), on Day-5 (P=0.001) and on Day-10 (P=0.001). Over the course of 10 days, the mean pCO_2 remained significantly higher in Type-II respiratory failure group, when compared with the Type-I respiratory failure group.

In Type-I respiratory failure group, the mean **pO_2 level** on Day-1 was 62.03 ± 9.28 mm Hg, on Day-5, it was 110.76 ± 15.66 mm Hg and on Day-10, it was 96.74 ± 11.88 mm Hg. In Type-II respiratory failure group, the mean pO2 level on Day-1 was 90.05 ± 16.96 mm Hg, on Day-5, it was 112.10 ± 13.37 mm Hg and on Day-10, it was 97.33 ± 15.11 mm Hg.In both the groups, the mean pO_2 increased on Day-5 and then decreased by Day-10 but was still higher than the Day-1 pO_2 level. On Day-1, the mean pCO_2 was significantly higher in Type-II respiratory failure group, in comparison to Type-I respiratory failure group (P=0.001); while the mean pH was comparable between the two groups on Day-5 (P=0.638) and on Day-10 (P=0.830).

In Type-I respiratory failure group, the mean **HCO_3 level** on Day-1 was 23.12 ± 3.48 µmol/L, on Day-5, it was 25.46 ± 3.2µmol/L and on Day-10, it was 25.0 ± 3.9 µmol/L. In Type-II respiratory failure group, the mean HCO_3 level on Day-1 was 32.04 ± 4.16 µmol/L, on Day-5, it was 29.61 ± 4.31 µmol/L and on Day-10, it was 26.31 ± 5.57 µmol/L. In Type-I respiratory failure group, the mean HCO_3 increased over a period of 10 days, while in Type-II respiratory failure, the mean HCO3 decreased over this period. The mean HCO3 was significantly lower in Type-I respiratory failure group on Day-1 (P=0.001) and on Day-5 (P=0.001), while the mean HCO_3 was comparable between the two groups on Day-10 (P=0.192).

In Type-I respiratory failure group, the mean **qSOFA rank** on Day-1 was 61.60, on Day-5, it was 53.13 and on Day-10, it was 49.09. In Type-II respiratory failure group, the mean qSOFA rank on Day-1 was 59.40, on Day-5, it was 52.00 and on Day-10, it was 50.76. The mean qSOFA ranks decreased over a course of 10 days in both the groups. The mean qSOFA rank was comparable between the two groups on Day-1 (P=0.667), on Day-5 (P=0.814) and on Day-10 (P=0.623).

In Type-I respiratory failure group, there was 12 (20%) **mortality** and in Type-II respiratory failure group, there was 6 (10%) mortality. Mortality rate was slightly lower in Type-II respiratory failure group, but the difference was found to be statistically not significant (P=0.200).

Chandra *et al.* in their study reported that use of non-invasive ventilation in patients with COPD was associated with a 42% reduction in the invasive mechanical ventilation. They also showed an increase in mortality rate in patients who failed non-invasive pressure support ventilation.

In a study done on use of NIV in patients with ARDS, **Bellani*et al.*** found that NIV failure occurred in 22.2% of mild, 42.3% of moderate and 47.1% of patients with severe ARDS. Hospital mortality was higher in ICU patients on NIV, compared to those on invasive ventilation with PaO2/FiO2 lower than 150 mmHg.

Comparison of mean qSOFArank between the two groups

Day	Type-1 Group	Type-2 Group	Mann-Whitney U	Z statistics	P value
Day-1	61.60	59.40	1734.00	-0.430	0.667, NS
Day-5	53.13	52.00	1305.00	-0.236	0.814, NS
Day-10	49.09	50.76	1174.00	-0.491	0.623, NS

Mann-Whitney U test applied. P value <0.05 was taken as statistically significant

The above table shows the comparison of median qSOFA score between the two groups.

The qSOFA score failed the normality test (Shapiro-Wilk test), hence the comparison of ranks between the two groups was done using Mann-Whitney U test.

On Day-1:
The mean qSOFArank in Type-1 group was 61.60 and in Type-2 group was 59.40. The difference was found to be statistically not significant (P=0.667). The mean qSOFA rank between the two groups was comparable.

On Day-5:
The mean qSOFArank in Type-1 group was 53.13 and in Type-2 group was 52.00. The difference was found to be statistically not significant (P=0.814). The mean qSOFA rank between the two groups was comparable.

On Day-10:
The mean qSOFArank in Type-1 group was 49.09 and in Type-2 group was 50.76. The difference was found to be statistically not significant (P=0.623). The mean qSOFA rank between the two groups was comparable.

The mean qSOFA ranks were comparable between the two groups on Day-1, Day-5 and Day-10 (P>0.05).

LIMITATIONS:

The relatively small sample size and lack of a control group imposed limited value to statistical analysis of group differences between patients with type I respiratory failure and type II respiratory failure. This type of analysis in a small sample sizes may seem inconclusive.

SUMMARY & CONCLUSION:

According to the actual situation of emergency patients, qSOFA score and P/F ratio may be an effective and practical tool for the early prediction of ICU-admission, ARDS and morality among respiratory failure patients in the intensive care unit.

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