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Research Article

Study on the clinical profile in hospital outcomes and 30 day survival of non surgical patients receiving mechanical ventilation.

Kiran G Kulirankal[1], Sudhagar Mookkappan[2]

[1,2]Amrita institute of medical sciences, Amrita Vishwa Vidyapeetham

Abstract:

Introduction: The ability of modern technology to substitute for life threatening respiratory failure is the signature technology of intensive care medicine where mechanical ventilation has played a primary role. The main aim for Mechanical ventilation should be to provide for supportive life support with least risk to the patient. The aim of this study was to study the clinical outcomes and its determinants in mechanically ventilated patients in ICU.

Methods : This prospective observational study was conducted in the medical ICU of Pondicherry Institute of Medical Sciences, Pondicherry, during the period from august 2013 to august 2015.Primary objective was to determine the In–hospital outcomes and 30 day survival of non surgical patients receiving mechanical ventilation and secondary objective to determine the association of demographic factors with In-hospital outcome and 30 day survival of non surgical patients receiving mechanical ventilation.

Results: 245 patient were included in the study of which 168 (68%) were males and 77 (32%) were females. Most common diagnostic group for admission to ICU was Respiratory infections accounting for 32%.Of the 245 patients , 53 (22%) patients died during hospital stay and 40(16%) discharged against medical advice .Of the 152 patients discharged 12 (7%) died at home after discharge.126 (51%) patients were alive post discharge after 30 days .87 (36%) patients developed VAP.APACHE II score was independently associated with 30 day mortality.

Conclusion: APACHE II scoring is one of the most important determinants of 30 days survival in mechanically ventilated patient. Hence APACHE II scoring can used to find the high risk patients and special care should be focused on these patients.

Introduction:

The ability of modern medicine to substitute for life threatening respiratory failure is the signature hallmark of intensive care where mechanical ventilation has played a lead role. Even though a distressing process requiring sedation and paralysis, the modern era has progressed to provide options to reduce patient's effort on breathing and improve coordination between the patient and ventilator. The main aim of Mechanical ventilation is to provide for life support with least risk to the patient.

Ventilators are used in patients with possible or established organ failure or ineffective gas exchange. Injury to lung is one of the common reasons mechanical ventilation(1). New advances and improvements in mechanical ventilation have improved the overall outcome of intensive care management, but it is also associated with complications and risk which affect the overall outcomes.

Complications occurring during mechanical ventilation, involving the lungs and other organs play a significant role in increasing the morbidity and mortality of ventilated patients.(1) Among the first harsh lessons to be learned from studies was that the use of an endotracheal tube increased the airway resistance and increased the rate of infections and caused damage to the laryngeal tissue .Ventilator associated lung injury and its management have been a major concern in every modern medical intensive care unit. Complications do not occur in every patient, but because of their seriousness and severity, their management requires in depth knowledge, experience, training and responsibility by the healthcare workers.

While studies have documented the outcomes of mechanical ventilation in specific disease and patient groups, only a few studies have looked at unselected broad patient group population .It has been found that apart from the severity of the underlying disease, mechanical ventilation and care related parameters also influence the outcome.

The spectrum of patients admitted to ICUs, health care resources available and health care practices in developing countries are entirely different from the developed countries.(2) Hence it is essential to have information on the outcome of mechanical ventilation in resource limited settings. This study will also help us to know about the mortality in our ICU settings and will also reveal the areas where we need to improve our delivery of care. With this in mind the present study is to be carried out to study the clinical outcomes and its determinants in mechanically ventilated patients in ICU.

Aim: To determine the association of various factors

associated with 30 day survival of non-surgical patients receiving mechanical ventilation.

Materials and methods: This is a prospective observational study conducted at Pondicherry institute of medical sciences, Pondicherry, from August 2013 to August 2015. The study population included patients who were admitted to the medicine ICU and were mechanically ventilated at Pondicherry institute of medical sciences from August 2013 to August 2015

Inclusion Criteria: Patients aged 18 years and above, presenting with medical illness and requiring mechanical ventilatory support

Exclusion Criteria: Patients intubated and transferred from other hospitals, patients who have received mechanical ventilation for a period less than 24 hours and patients in which base line investigations could not be done in first 24 hours were excluded.

Sample size was calculated based on a study by Esteban et al[1](2) where bnb overall mortality rate was 30.7% among patients receiving mechanical ventilation. With estimated mortality of 30 % and error of 6 %, sample size was calculated to be 245.Patients were included in the study after obtaining informed written consent from the next of kin. Parameters such as age, sex, provisional diagnosis, presence of co morbidities such as diabetes, hypertension, bronchial asthma, smoking and alcohol consumption were recorded. Baseline laboratory parameters such as complete blood count, blood urea , serum creatinine , serum electrolytes, liver function tests and blood gases analysis were noted within the first 24 hours .Severity of illness scores (acute physiology and chronic health evaluation II (APACHE II)(3) and simplified acute physiology score II (SAPS II)(4) were noted.

Patients were followed up during the ICU stay and disease related outcomes were assessed as

In-hospital mortality and 30 day mortality. The 30 day survival status was assessed through telephonic enquiry on day 30 (from the day of intubation). If patients could not be contacted even after three attempts, then the patient was considered as Lost to follow up.

The study protocol was reviewed and approved by the Ethics committee

Table 1: Baseline characteristics of patients

Age Distribution	**Number Of Patients**	**Percentage**
18-30 years	34	14%
31-40 years	20	8%
41-50 years	34	14%
51-60 years	38	15.5%
Above 60 years	119	48.5%
Sex Distribution	**Number Of Patients**	**Percentage**
Male	168	68%
Female	77	32%
Co Morbidities	**Number Of Patients**	**Percentage**
Systemic hypertension	147	60%
Diabetes mellitus	136	55%
Smoking	134	54%
Alcohol abuse	115	47%
Chronic kidney disease	24	9%
Coronary artery disease	26	10%
COPD/asthma / PTB	27	11%

Table 2:Clinical details and outcomes of the mechanically ventilated patients

Indication for admission (n==245)	**No. of patients**	**Percentage (%)**
Respiratory infections	78	32%
Neurologic disease	69	28%
Sepsis	51	21%
Poisoning	40	17%
Cardiovascular disease	43	18%
Others	54	22%
Indication for ventilation		
Impending respiratory failure	98	40%
Type 1 respiratory failure	101	41%
Type 2 respiratory failure	28	12%
Airway protection	18	7%
In hospital outcome (n=245)		
Survived	152	62%
Expired	53	22%
Discharged against medical advice	40	16%
After 30 days of hospital discharge (n=152)		
Survived	126	82.89%
Expired	12	7.8%
Lost to follow up	14	9.21%

Table 3: Determinants of survival of the patients after 30 days

Age group	Estimate	Std.Error	95% Confidence Interval	Log Rank (Mantel-Cox)
18 - 50	23.324	1.419	20.542 - 26.106	.227
> 50	22.314	1.091	20.175 - 24.453	
APACHE score				
0 -15	27.878	1.179	25.566 - 30.190	.000
16 -30	22.359	1.073	to20.256 - 24.461	
> 30	14.200	2.866	8.582 - 19.818	
SAPS score				
0 -30	26.628	1.418	23.849 - 29.407	0.000
31 -60	22.540	1.097	20.391 - 24.690	
> 60	16.640	2.588	11.568 - 21.712	
Hypertension				
Yes	21.198	1.164	18.916 - 23.480	0.008
No	24.961	1.230	22.550 - 27.371	
Diabetes				
Yes	21.835	1.214	19.456 - 24.214	0.104
No	23.674	1.223	21.277 - 26.071	
Chronic kidney disease				
Yes	18.000	2.931	12.255 - 23.745	0.046
No	23.172	.899	21.410 - 24.935	

The above table is the statistical analysis depicting Kaplan meier survival analysis:

Age: The mean in 18-50 year age group is 23.3 (95%CI- lower limit-20.5 upper limit-26.1).In the above 50 years group is 22.3(95%CI- lower limit-20.1 upper limit-24.4). And the log rank (mantel cox) p value is 0.22 which is not statistically significant.

APACHE score: There was a progressive increase in the risk of mortality in the upper quartiles as compared to the lower quartiles. Mean in the 0-15 group is 27.8 with standard error of 1.17. Mean in the 16-30 group is 22.3 with standard error of 1.07. Mean in the above 30 group is 14.2 with standard error of 2.8 .This difference in survival among various quartiles is statistically significant (p=0.001)

SAPS score: There was a progressive increase in the risk of mortality in the upper quartiles as compared to the lower quartiles. The mean in 0-30 group is 26.6 with standard error of 1.41. The mean in 31-60 group is 22.5 with standard error of 1.09. The mean in above 60 group is 16.6 with standard error of 2.5. The P value was 0.0001 which is statistically significant.

Hypertension: The mean estimate for patients with hypertension is 21.1 with standard error of 1.16 and for normotensives, the mean survival was 24.961and standard error 1.23 .The P value (0.008) is statistically significant.

Diabetes mellitus: The mean estimate for patients with Diabetes mellitus is 21.8 with standard error of 1.21 and in non-diabetics the mean survival was 23.674 with standard error 1.233. The P value (0.104) is statistically not significant.

Chronic kidney disease: The mean estimate for patients with chronic kidney disease is 18 with standard error of 2.9. The mean estimates in patients with normal renal functions was 23.172. The P value was 0.046 which is statistically significant.

Discussion:

The aim of the study was to know about the 30 day mortality of non-surgical patients receiving mechanical ventilation and to study on the clinical profile and in hospital outcomes of ventilated patients. The study showed differences in the

clinical profile and outcomes of patients receiving mechanical ventilation in our settings as when compared to studies from developed countries.

Of the 245 patient studied 168(68%) were males and 77(32%) were females. Studies done in developed countries show a higher mean age (59 years). 48% of the population in our study was found to be above 60 years of age. Similar male predominance has been observed in both Indian and international studies. In our study age was not found to influence mortality in 30 days in patients receiving mechanical ventilation.

In this study the admissions for respiratory and neurologic causes accounted for 32 % and 28 % of the total admissions requiring mechanical ventilation is comparable with the study done in developed countries.(5)

Poisoning accounted for 17% in this study which is a comparatively more when compared to studies done in the developed nations. Indian study done in Vellore showed a 28.5% admission due to poisoning. 22 % constituted of other indications such as snake bites, hanging. Sepsis accounted for 21% of total admissions. The case mix of patients requiring mechanical ventilation in this setting broadly reflects spectrum of poisonings, envenomations and infectious diseases among patients presenting to the casualty of our hospital.

Major portion of the population studied were intubated for impending respiratory failure and type 1 respiratory failure 40% and 41%. 7 percentage were intubated for airway protection which is less comparable to international studies where 17 % was intubated for airway protection.

Base line Apache II and Saps II score was assessed .Mean Apache II score was 22 and for SAPS II was 44. Patients were divide into 3 quartile based on the Apache II score. On plotting for mortality Apache II score was found to be independently significant with a P value of 0.0001.SapsII was also found to be significant in influencing mortality.

In a study done by Esteban et al(2) the overall in hospital mortality was 31% and in a study by Douglas et al(7) the mortality was 47%. The in hospital mortality was 37% in the study done by Karthikeyan et al.(8) In our study the in hospital mortality was 53 (22%).But 40 (16%) patients were discharged against medical advice. This is a huge number when compared to outside studies. Financial constraints of patients for prolonged intensive care in private institution could be the reason for such a high amount of discharge against medical advice. Poor prognosis of the patient also plays an important role for such a high amount of discharge against advice.

Patients who opted for AMA were considered to be dead during the 30 day mortality assessment. Post discharge mortality in our study was 7.8% when compared to 10.4% in the study done by Azoulay et al(9) and 7% in the study done in south India[5]. 126 (51%) were alive in our study at 30 day mortality assessment when compared to 44% and 38%in studies done by Unroe et al(10) and Papadakis et al(7) .This is because mortality was assessed after 1 year in then other studies while it was assessed at 30 days in our study .

It was found that Apache II, SAPS II, hypertension, presence of chronic kidney disease and coronary artery disease were associated with mortality but diabetes is not significantly associated. After adjusting for confounding, APACHE II score was the only independent factor associated with 30 day mortality. Our results are in consensus with a study conducted in India by Karthikeyan B et al.(8)

Conclusion:

APACHE II scoring is one of the most important determinants of 30 days survival in mechanically ventilated patient. Hence APACHE II scoring can used to find the high risk patients and special care should be focused on these patients.

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