

# Outcomes of Mechanically Ventilated Critically Ill Geriatric Patients in Intensive Care Unit

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## ABSTRACT

**Introduction:** Increase in life expectancy across the globe has led to rise in geriatric population. Geriatric population is now living longer and healthier. This rise in geriatric population has also led to increase in the geriatric ailments leading to increased number of geriatric patients requiring intensive care including mechanical ventilation. Data on outcomes of geriatric patients requiring mechanical ventilation from India is scarce.

**Aim:** To study the profile and outcome of geriatric patients more than equal to 60 years requiring mechanical ventilation in Intensive Care Unit (ICU).

**Materials and Methods:** The data of all the geriatric patients, more than 60 years of age, admitted to ICU between January 2008 to August 2014 requiring mechanical ventilation for various reasons were extracted from the hospital records. Various reasons for ventilation, duration of ventilation/hospital stay, mortality and associated comorbidities were recorded and analysed.

**Results:** Total 140 geriatric patients were mechanically ventilated

in the study period, out of which 43.5% (61/140) were above 70 years of age and 67.8% (95/140) were above 65 years of age. Chronic Obstructive Pulmonary Disease (COPD) was the most common cause for mechanical ventilation constituting 20% of patients followed by severe sepsis (17.8%), cerebrovascular accident (12.8%), post-surgical patients (12.8%) and Coronary Artery Disease (CAD) in 10%. In our study, 44.28% of the geriatric patients requiring mechanical ventilation in the ICU were successfully weaned off the ventilator. Early tracheostomy helped in weaning off from ventilator as 83.33% (5/6) of patients requiring tracheostomy could be weaned off the ventilator suggesting that tracheostomy may help in improving the outcome. Reintubation carried a very poor prognosis and increased mortality, as 80% (4/5) of the patients who were reintubated in our study could not survive.

**Conclusion:** Our study revealed that in appropriate intensive care setting and with standard protocol based therapy for primary ailments, outcomes with mechanical ventilation in geriatric population can be comparable to outcomes in younger population.

**Keywords:** Chronic pulmonary obstructive disease, Reintubation, Sepsis, Tracheostomy

## INTRODUCTION

Increase in life expectancy across the globe has led to rise in geriatric population which is equally true in Indian subcontinent. With the improvement in the health care, the geriatric patients are now living a longer and healthier life. On the other hand the number of geriatric population requiring ICU care has also increased. Many of these geriatric patients require intensive care including mechanical ventilation. Advanced age is considered as an independent risk for mortality in the patients admitted to ICU [1]. It is believed by many clinicians that unplanned admission of sick geriatric patients in ICU may not be beneficial in term of survival [2]. In the developing countries where the resources are limited, the geriatric ailments are viewed with a palliative intent due to financial constraints and availability of beds in the ICU. Thereby, mechanical ventilation is discouraged in geriatric population especially in the developing countries like India. The data assessing the outcome of the geriatric patients, who require mechanical ventilation, from India is scarce. In government set up, especially in defence services, adequate resources are available and the treatment is free of cost and therefore, most of the geriatric patients requiring mechanical ventilation are placed on mechanical ventilator. Studies have shown that the mortality in the geriatric population on mechanical ventilator are comparable to the non geriatric patients (less than 60 years) and the geriatric patients, who were functionally independent for activities of daily living

prior to the onset of illness, should receive optimum medical care including ICU care [3]. Hence, this study was planned to study the outcomes of the geriatric patients requiring mechanical ventilation in ICU. Therefore, the aim was to study the profile and outcome of geriatric patients more than equal to 60 years requiring mechanical ventilation in ICU.

## MATERIALS AND METHODS

An observational retrospective study conducted in a 15 bedded ICU of Government Hospital in Northern India. The database of all the ICU patients aged 60 years and above, who required mechanical ventilation between January 2008 and August 2014 was extracted from hospital records. Inclusion criteria was all geriatric patients (>60 years) who were admitted to the ICU and required mechanical ventilation. The ICU had four ventilator beds with piped gas supply and arterial blood gas analysis machine. The patients on ventilator were managed with the help of anaesthesiologists and critical care specialist in consultation with treating physician. Mode of ventilation and ventilator parameters were decided by the critical care specialist depending upon the underlying disease and standard protocols recommended for the particular disease. Standard guidelines as recommended by Centers for Disease Control (CDC) and prevention of health care associated pneumonia were followed with Ventilator Associated Pneumonia (VAP) prevention bundles, hand hygiene

and proper endotracheal suction techniques. Diligent care was taken to provide good nutrition and prevention of catheter related infections. Patients having a malignant disease, history of cardiac arrest before reaching the ICU and poor pre morbid functional status defined as bedbound state for more than one month before the present admission were not included in the analysis. A total of 140 patients more than 60 years of age who required mechanical ventilation were identified and analysed. The data was extracted from the medical records for age, gender, past medical history, comorbidities, date of hospital admission, date of ICU admission, date of discharge/death, number of days of mechanical ventilation required, primary diagnosis at the time of admission and cause for intubation. Indications for reintubation and tracheostomy were also studied. The data was collected, collated and analysed. Study was approved by Institutional Ethical Committee and waiver of consent was taken as it was a retrospective study.

## RESULTS

A total of 168 geriatric patients above 60 years of age were ventilated from January 2008 to August 2014. Eighteen patients were referred to other hospitals on transport ventilator as the ventilator was not available and were not included in the study. Ten patients had a disseminated malignancy, cardiac arrest before reaching ICU and poor premorbid functional status, and were not included in the study. Total 140 geriatric patients [75 (53.57%) were males and 65 (46.42%) were females] who were mechanically ventilated were included in the final analysis. Baseline characteristics of the patients are shown in [Table/Fig-1]. Sixty one patients (43.5%) were above 70 years of age, 95 (67.8%) were above 65 years. The mean age of the patients was 70 years. Amongst the reasons for mechanical ventilation, COPD was the most common cause seen in 28 (20%) patients, followed by septic shock in 25 (17.8%), cerebrovascular accident in 18 (12.8%), post-surgical patients in 18 (12.8%) and CAD (including left ventricular failure, acute coronary syndrome and pulmonary oedema) in 14 (10%) patients, as shown in [Table/Fig-2]. Miscellaneous causes included Chronic Kidney Disease (CKD), pancreatitis, Organophosphate (OP) poisoning and cirrhosis of liver, which constituted 37 (26.4%) patients. Total 16.4% (23/140) of the patients had documented hypotension at time of intubation out of which 19 (13.5%) had severe sepsis, 2 (1.4%) had acute coronary syndrome with cardiogenic shock and one patient each had organophosphate poisoning and snake bite. Of all the 140 patients, 62 (44.28%) patients were successfully weaned off the ventilator and extubated. Highest extubation rate was in post surgical patients with 12/18 (66.66%) being extubated followed by CAD in 9 (64.2%), COPD in 15 (53.7%), Stroke in 7 (38.88%) and severe sepsis in 6 (24%) as shown in [Table/Fig-2]. Miscellaneous causes constituted 13 (35.13 %) extubated patients. Extubation rate in patients more than 70 years of age was 46%. Five patients were reintubated and six underwent tracheostomy. Of the reintubated patients only one survived with a mortality of 80% in reintubated patients. Five of six patients (83.33%) who underwent tracheostomy were weaned off the ventilator and discharged. Commonest mode of ventilation was synchronous intermittent mandatory ventilation with pressure support (P-SIMV) followed by assisted mandatory ventilation. Total 114 (81.4%) patients were initially placed on P-SIMV mode of ventilation and out of them 52 (45.6%) were weaned off and extubated.

## DISCUSSION

Due to changing demographic profile throughout the world, geriatric patients will constitute large percentage of patients requiring intensive care [4]. It is now recommended that geriatric population should also be included in the clinical practice guidelines in order to make the guidelines more patient centric [5]. Advanced age per se should not be the criteria for denying any acute care to the elderly including ventilation. Functional status plays an important role in selecting

Patient Characteristics	Observation	No. of Patients n=140 (100%)
Age	>90	2 (1.42%)
	80 – 89	14 (10%)
	70 – 79	45 (32.14%)
	65-69	34 (24.28%)
	60-65	45 (32.14%)
Mean Age	70 yrs	
M:F ratio	1.15:1 (75:65)	
Duration of Ventilation	<48 hrs	64/140 (45.72%)
	>48 hrs	76/140 (54.28%)
Patients Reintubated		5/140 (3.57%)
Patients Tracheostomised		6/140 (4.28%)
Total mortality		78/140 (55.71%)
Mortality	Ventilation < 48 hrs	44/64 (68.75%)
	Ventilation > 48 hrs	34/76 (44.74%)
	Reintubated	4/5 (80%)
	Tracheostomy	1/6 (16.66%)

[Table/Fig-1]: Baseline characteristics.

Primary Indication for Mechanical Ventilation	Number	Number of patients weaned off the ventilator and extubated
COPD	28 (20%)	15/28 (53.7%)
Severe sepsis	25 (17.8%)	6/25 (24%)
Cerebrovascular accident	18 (12.8%)	7/18 (38.8%)
Post-operative	18 (12.8%)	12/18 (66.66%)
CAD	14 (10%)	9/14 (64.28%)
Miscellaneous	37 (26.42%)	13/37 (35.13%)
Total	140	62/140 (44.28%)

[Table/Fig-2]: Indications for mechanical ventilation.

the patients for intensive care including mechanical ventilation. In a study done in patients aged above 90 years of age, it was seen that out of 70% of patients who could be discharged from ICU, more than half of them had good long term outcome at one year [6]. Another study in patients above 80 years of age showed that although the overall ICU mortality was higher in patients above 80 years of age, the outcomes in the patients who were intubated and mechanically ventilated were comparable with non geriatric patients [7]. Gomes Bernardes Neto SC et al., noted that the overall survival in the patients more than 65 years of age undergoing mechanical ventilation was 35% and there was no significant difference in the outcome of patients who were mechanically ventilated on admission or were spontaneously breathing at admission [8]. In a study done in Israel, it was seen that the ICU mortality of the ventilated ICU elderly patients was 53% [7]. In another study, mortality of the ventilated ICU patients aged above 65 years of age was 53% [9]. A meta-analysis has shown that the independently functional geriatric patients more than 65 years of age, who were admitted to ICU, have a favourable long term outcome and should not be denied ICU admission [10]. Similar to international data in our study 44.28% patients were successfully weaned off the ventilator and extubated. Therefore, functional geriatric patients who are independent for activities of daily living should be treated at par with the non geriatric population and should be offered intensive care and mechanical ventilation if required. It was also noted that mortality in the geriatric patients who were ventilated for less than 48 hour was 56.41%. Higher mortality within 48 hours of ventilation in elderly could possibly be explained due to severity of primary disease at onset with fulminant downhill course. Eighty four percent of the patients, who underwent tracheostomy, could be weaned off the ventilator; whereas, in the patients who were reintubated, the mortality was

80%, suggesting that early tracheostomy may be beneficial and reintubation carries a poor prognosis. This was also seen in a recent study where extubation failure in geriatric patients more than 65 years of age was associated with rapid clinical deterioration and organ dysfunction [11].

In our study, it was noted that COPD was the commonest indication for mechanical ventilation with 20% of total patients. Fifty three percent of the COPD patients could be successfully extubated. In a meta-analysis on geriatric patients with COPD, it was observed that clinicians often underestimate and give suboptimal care to the elderly patients with respiratory failure assuming that less care is desired [12]. Thus, COPD patients should not be denied ventilation.

Patients with sepsis complicated with hypotension and multi organ dysfunction have high mortality ranging up to 60% [13]. In our study, it was seen that in post surgical patients requiring ventilation 67% of the patients could be weaned off the mechanical ventilator and extubated. Study done by Nabozny MJ et al., showed that although the outcomes in post surgical patients requiring mechanical ventilation is better but prolonged ventilation of more than seven days in geriatric patients of more than 66 years is associated with increased risk of mortality at one year with adjusted hazard ratio of 4.39 [14].

## LIMITATION

Limitation of the study was that it was a retrospective analysis and long term follow up of the patients was not available in our study.

## CONCLUSION

In our study, it was noted that 44.28% geriatric patients in ICU requiring mechanical ventilation could be weaned off and mechanical ventilation should not be refused in the geriatric patients especially in those with good functional status. In the resource limited setting, careful selection of geriatric patients requiring mechanical ventilation is important and may have favourable outcome. However, more prospective studies are required to formulate a protocol based

approach in selecting suitable geriatric patients who are likely to benefit from mechanical ventilation.

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