



Indications and outcome of mechanical ventilation in intensive care unit.

KEYWORDS

ICU, mechanical ventilation

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ABSTRACT *Introduction-* This study was conducted in an intensive care unit of a tertiary care Shri Bhusaheb Hire government medical college hospital, Dhule. In this retrospective study indications, outcome and discharge disposition in patients on mechanical ventilatory support in the intensive care unit were studied. *Methodology-Design:* Retrospective Observational study. All the records from registers were reviewed. All ventilator-dependent patients admitted over 7 years period from January 2009 to December 2015.

Results: A total of 926 patients were admitted over a period of 7 years from January 2009 to December 2015 in the intensive care unit. Maximum 307(33.15%) number of patients of organophosphorous poisoning required ventilator support followed by neurology patients of cerebrovascular accidents, epilepsy, hypoxic brain damage and cervical cord injuries 180(19.44%), acute myocardial infarctions with various complications 140(15.12%), neuroparalytic snake bite 94(10.15%). The highest mortality was associated with Organophosphorous poisoning 192/466 (41.20%), neurological disorders 92/466(19.74%), Fever with unconsciousness, undiagnosed comatose patients 41/466(8.80%). *Conclusions:* Commonest indication for ventilator support was organophosphorous poisoning followed by neurological diseases. Mortality rate was 50.32%. Multiple factors are responsible for the outcome of patients in the intensive care unit and most important factor might be monitoring. Authors recommend comparative study to confirm the finding.

Introduction

The most common reasons for instituting mechanical ventilation are acute respiratory failure with hypoxemia (acute respiratory distress syndrome, heart failure with pulmonary edema, pneumonia, sepsis, complications of surgery and trauma), which accounts for ~65% of all ventilated cases, and hypercarbic ventilatory failure—e.g., due to coma (15%), exacerbations of chronic obstructive pulmonary disease (COPD; 13%), and neuromuscular diseases (5%). The primary objectives of mechanical ventilation are to decrease the work of breathing, thus avoiding respiratory muscle fatigue, and to reverse life-threatening hypoxemia and progressive respiratory acidosis. In some cases, mechanical ventilation is used as an adjunct to other forms of therapy. For example, it is used to reduce cerebral blood flow in patients with increased intracranial pressure. Mechanical ventilation also is used frequently in conjunction with endotracheal intubation for airway protection to prevent aspiration of gastric contents in

otherwise unstable patients during gastric lavage for suspected drug overdose or during gastrointestinal endoscopy. In critically ill patients, intubation and mechanical ventilation may be indicated before the performance of essential diagnostic or therapeutic studies if it appears that respiratory failure may occur during those maneuvers.¹

The purpose of this study was to examine the epidemiology of mechanical ventilation use in a tertiary care centre Government Medical college and hospital, Dhule.

Material and Methods- This retrospective study was conducted on adult patients who required mechanical ventilation between January 2008 and December 2015 at a

tertiary care centre of Shri Bhusaheb Hire government medical college Intensive care unit. In this resource limited setting which is a six bedded intensive care unit staffed only by nursing staff and on duty non resident JR who also look after wards and casualty. There are no postgraduate students in this medical college. The medical college was started in 1989 and intensive care unit in 2007. There are no round the clock residents to look after ICU patients. The unit is equipped by invasive and non invasive (continuous positive airway pressure (CPAP) and Bilevel positive airway pressure (BIPAP)) mechanical ventilators. In this study all the register records from January 2009 till December 2015 were reviewed for patient's indication for ICU admission, and outcome of the patient. Collected data was entered in MS Excel 2013 and was analysed.

Results: A total of 926 patients were admitted over a period of 7 years from January 2008 to December 2015 in the intensive care unit of Government medical college hospital Dhule. There were 685(73.97%) male and 241female (26.03%) patients.

Table 1. Trend of patient admission in ICU from 2009 to 2015.

	2009	2010	2011	2012	2013	2014	2015	Total
OPP	9	24	49	60	35	44	86	307
Neurology	6	14	28	42	18	33	39	180
Cardiac	3	9	23	35	13	25	32	140
Snake bite	4	5	7	20	15	24	19	94
other	2	6	13	19	19	6	19	84

PNC	1	1	6	2	5	11	19	45
Surgery	0	3	8	6	6	10	11	44
ANC	1	1	1	6	4	9	5	27
Respiratory	-	-	-	-	-	1	4	05
Total	26	63	135	190	115	163	234	926

As seen in table number 1 maximum 307(33.15%) number of patients of organophosphorous poisoning required ventilator support followed by patients of cerebrovascular accidents, epilepsy, hypoxic brain damage and cervical cord injuries 180(19.44%), acute myocardial infarctions with various complications 140(15.12%), neuromuscular snake bite 94(10.15%). Other 84(9.07%) patients were of fever with unconsciousness, tubercular meningitis and undiagnosed unconscious patients. As there is no intensive care unit attached to surgery and obstetrics department post surgery patients are also admitted in this intensive care unit. There were 45(4.86%), 44(4.75%), and 27(2.92%) patients of post-delivery, postsurgery and ANC respectively.

Table No. 2. Outcome of patients admitted in the ICU.

	Discharge	Death	DAMA
Neurology	36	92	52
Opp	64	192	51
Cardic	30	66	44
Other	14	41	34
Snake bite	40	31	23
Surgery	18	12	14
PNC	10	22	13
ANC	8	10	9
Total	220	466	240

As seen in table number 2 out of 926 patients 220(23.76%) patients were discharged, 466(50.32%) patients died and 240(25.92%) patients went against medical advice.

Discussion- In the 1950s, patients receiving mechanical ventilation were a relatively homogeneous population mostly suffering from a single disease – poliomyelitis; at the peak of the epidemic, there were 50–60 new cases per day. In his paper delivered to the Royal Society of Medicine, Bjorn Ibsen² reports that the mortality rate of patients with poliomyelitis treated with negative pressure ventilation was almost 90%. By carefully and systematically observing this situation, Ibsen theorized that many patients were dying because of inadequate ventilation; by maintaining a patent airway, providing sedation and administering intermittent positive pressure-ventilation, he achieved a drastic absolute risk reduction in mortality on the order of 70%. Two decades later, large reductions in mortality were also seen with the creation of dedicated units to care for patients receiving mechanical ventilation³. The practice of critical care today continues to evolve with changes in the distribution of critical illness in different populations and with advances in scientific knowledge.

In the present study most common indication for mechanical ventilation was organophosphorous poisoning(33.15%) followed by neurological diseases like cerebrovascular accidents, epilepsy in 180(19.44%), acute myocardial infarctions with various complications 140(15.12%), neuromuscular

lytic snake bite 94(10.15%). Other 84(9.07%) patients were of fever with unconsciousness, tubercular meningitis and undiagnosed unconscious patients. There were 45(4.86%), 44(4.75%), and 27(2.92%) of postdelivery, postsurgery and ANC patients respectively.

In this study the highest mortality was associated with Organophosphorous poisoning 192/466 (41.20%), followed by neurological disorders 92/466(19.74%), Fever with unconsciousness, undiagnosed comatose patients 41/466(8.80%) snake bite 31(6.65%), pnc patients 22(4.72%), postsurgery 12(2.58%), and ANC patients 10(2.15%). Mortality rate in organophosphorous poisoning patients was 41.20%. Dr. Kiran. B. R, Dr. Vishwas. G. K, et al studied the pattern and outcome of 120 cases of organophosphorus (OP) poisoning cases requiring mechanical ventilation in an intensive care unit(ICU) of a tertiary hospital overall mortalityrate was 10%⁴. Early diagnosis and treatment can significantly improve the outcome in OPP patients. Mortality from OP compound poisoning is directly proportionate to the severity of poisoning, delay in starting PAM, and duration of mechanical ventilation. In the present study overall mortality rate was 50.32% (466/926). In a study by Nadkarni⁵, among the 19,819 adults and 524 children who regained any spontaneous circulation, in-hospital mortality rates were 67% and 55%, respectively. In a study done by Nolan⁶, patients in the United Kingdom who were admitted to critical care units after cardiac arrest, the in-hospital mortality rate was 71%. The cause of these differences is multifactorial but includes variability in patient populations, reporting methods, and potentially postcardiac arrest care^{7,8}. Among all ventilated patients, early estimates of mortality rates in mechanical ventilation were as high as 40–45%^{9,10} but subsequent reports provide progressively

lower estimates of mortality. A retrospective analysis of national databases from Australia and New Zealand found a trend of decreasing mortality between 1993 and 2003¹¹. On the contrary, Needham et al.¹² identified a trend of increasing ICU mortality in Ontario between 1992 and 2000, climbing from 27 to 33% over that period. Carson et al.¹³ reported a similar trend in North Carolina. Two large international prospective studies of mechanical ventilation were carried out in year 1998¹⁴ and 2004¹⁵. In 1998, 31% of the 5183 patients from 361 ICUs died in the ICU and the hospital mortality rate was 40%. In 2004, the ICU mortality rate among 4968 patients from 349 ICUs was also 31% and the overall hospital mortality rate was 37%. In the subgroup of patients from each study who were cared for in ICUs that participated in both studies, ICU mortality was not statistically significantly different but hospital mortality decreased from 45 to 41%. In the present study mortality rate was 50.32% and it is observed that along with multiple other factors round the clock patient care and expert monitoring might be a very important factor and investigators recommend further studies to confirm this finding.

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