



## ROLE OF NONINVASIVE VENTILATION IN WEANING FROM MECHANICAL VENTILATION IN PATIENTS WITH RESPIRATORY FAILURE

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### ABSTRACT

Noninvasive ventilation (NIV) is the delivery of mechanical ventilation without using on Non invasive artificial airway for the management of acute respiratory failure caused by various etiologies. The aim of this study was to compare the efficacy and resource consumption of Non invasive ventilation against controlled mechanical ventilation (CMV) in patients with respiratory failure this study is conducted to find out role of NIV comparing CMV patients in respiratory failure.

**Aim:** To assess the role of noninvasive ventilation in respiratory failure patients comparing with control group under controlled mechanical ventilation.

**Methods:** This prospective observational study conducted on 50 adult patients, divided into two groups of 25 patients each. The control group studied by intubating and connecting to controlled mechanical ventilation and the study group directly by noninvasive ventilation admitted to the medical ICU of Rajah Muthiah Medical college and hospital, Chidambaram. In south India during the period 2016 Jan to 2018 March. Were evaluated for feasibility of NIV patients with respiratory failure were randomized to receive either NIV or endotracheal intubation and CMV.

**Results:** In our study length of ICU stay in NIV group was less than 5 days, in CMV it was less than 10 days. In CMV group, out of 25 patients, 4 patients undergone for tracheostomy. In NIV group ICU mortality was 2 out of 25 patients and 7 out of 25 in CMV group. Complications were not there in NIV group excepts skin bruises and discomfort due to ill fitting face mask in 4 out of 25 patients. Where as in CMV group complications has occurred mainly ventilator associated pneumonia (3/25) and pneumothorax (2/25).

**Conclusion:** This study has demonstrated that NIPPV is not only a feasible ventilator modality in developing countries but also a treatment that is associated with significant improvements in physiological and clinical outcomes. The application of NIV resulted in low rate of endotracheal Intubation, fewer complications and was well tolerated in our patients lower initial cost of Invasive ventilators, reduced duration of hospitalization and complication rates are likely to translate to favorable economic benefits.

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### INTRODUCTION

Non Invasive ventilation (NIV) is the delivery of mechanical ventilation without using an Invasive artificial airway for the management of acute respiratory failure caused by various etiologies. The aim was to compare the efficacy and resource consumption of non invasive ventilation against controlled mechanical ventilation (CMV) in patients with respiratory failure<sup>(1,2)</sup>.

Additional benefits of lesser need for sedation and a decrease in the risk of airway damage or pneumonia<sup>(3)</sup>. Non invasive ventilation can reduce the frequency of breathing, augment tidal volume, improve gas exchange and rest the muscles of respirations. Many patients with severe respiratory failure, impaired sensorium, haemodynamic instability or difficulty clearing secretions, however undergo direct intubation or intubation after a failed attempt at non-invasive ventilation.

Endotracheal Intubation and Non invasive mechanical ventilation, though life saving in critical care settings, are related to complications that may prolong hospital stay and increase nosocomial pneumonia<sup>(2)</sup> 1% per day continuous mechanical ventilation may be responsible for generalized myopathy.

### MATERIALS AND METHODS

This prospective observational study conducted on 50 adult patients divided into two groups 25 patients each. The control group studied by Intubating and connecting to controlled mechanical ventilation and the study group directly by Invasive ventilation admitted to the medical ICU of Rajah Muthiah medical college and Hospital, Chidambaram in south India during the period 2016 to 2018 march were evaluated for feasibility for NIV patients with respiratory failure were randomized to receive either NIV or Endotracheal intubation

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and CMV. The efficacy of non invasive ventilation analyzed by comparing with control group taking into consideration of the length of ICU stay and time taken for full recording. Patients excluded are Terminally moribund patients, Associated valvular heart diseases, and acute ventricular failure. Parameters like Arterial blood gas, chest Xray-AP, ECG, Serum Electrolytes. Monitored with continous cardiac, pulseoximetry, Temperature monitoring and ventilator parameters.

Patients were eligible for entry to the study if they presented with respiratory failure without a clinically perceived need for immediate life saving endotracheal intubation. On Intiation of NIV, continous application was encouraged supplemental oxygen therapy was administered with NIV and titrated to achieve a saturation of 88-92% unless clinically determined otherwise. Oximetry was correlated with arterial blood gas analysis at the end of 1 hr of application of NIV and at subsequent intervals determined by the treating physician. Previous studies have suggested that clinical and oximetric improvements at 1 h protend a favorable, response<sup>(4,5)</sup>. If there is deterioration at the end of 1 hr endotracheal intubation was considered.

The primary outcome measure in this study was the need for endotracheal intubation due to early NIPPV failure (i.e. lack of response after 1 h of treatment). Secondary outcomes included changes in arterial blood gas (ABG) parameters, hospital mortality, duration of ICU and hospital stay and complications. Some complications include gastric distention aspiration pneumonia hypotension and pneumothorax<sup>(6)</sup>. The control group intubated and connected to mechanical ventilator. Assit control ventilation was applied in 25 patients admitted in ICU sedation was administered in all patients. The 2 hr weaning of spontaneous breathing with additional O2 and air humidification within 24 hrs. The three criteria met are minute volume 10L/min, VC 10ml/kg, VT.5ml/kg, f<35/min, F/VT<105 cycles /min/L and SaO2 90% for an FIO2 of 40%. In case satisfied patients were extubated and given nasal oxygen.

## RESULTS

A total of 300 patients admitted to the medical ICU during the period 2016 to 2018 march were evaluated for feasibility of NIPPV.

Sl.No	Name	Age	Sex	IP. No	BP	PR	RR	TEMP	GCS	PaCO <sub>2</sub>	PaO <sub>2</sub>	SPO <sub>2</sub>	HCO <sub>3</sub>
1.	Priyamvadha	31	F	416418	110/80	82	16	37	15	39	97	86	18
2.	Arumugham	39	M	418822	120/80	86	17	37	15	40	96	80	15
3.	Amudha	36	F	421567	130/90	88	18	37	15	38	93	82	14
4.	Krishnan	41	M	421922	126/80	80	19	37	15	36	91	86	22
5.	Abdul Jafar	45	M	421928	130/86	78	18	37	15	37	89	83	20
6.	Kalyani	48	F	422344	128/88	86	20	37	15	38	90	87	19
7.	Malliga	32	F	423917	126/86	84	18	37	15	39	88	85	17
8.	Amravathy	36	F	426635	130/70	85	22	37	15	37	87	81	18
9.	Anjalai	31	F	426632	132/88	86	22	37	15	40	83	83	22
10.	Sivagami	33	F	424413	138/82	88	24	37	15	40	86	84	21
11.	Tamizholi	35	F	427470	122/84	76	20	37	15	36	87	85	15
12.	Rathinambal	39	F	427470	126/82	82	26	37	15	33	83	81	11
13.	Mani	33	M	428748	130/88	86	28	37	15	34	86	83	14
14.	Subramanian	34	M	430305	128/90	78	27	37	15	34	85	84	15
15.	Kamarasu	36	M	433738	132/86	88	26	37	15	32	83	80	17
16.	Atchiyammal	37	F	436282	130/86	81	25	37	15	33	82	85	19
17.	Andhuvan	38	M	439216	126 / 82	83	18	37	15	39	80	83	13
18.	Selvaraj	40	M	439985	122/88	84	16	37	15	40	84	81	20
19.	Mohd. Beevi	45	F	445077	130 /80	79	19	37	15	39	86	80	23
20.	G. Kasinathan	47	M	440586	120/86	78	21	37	15	40	82	84	17
21.	Vairam	42	F	449715	124/80	76	23	37	15	38	83	83	18
22.	Halim	39	M	451717	120/80	82	24	37	15	32	81	82	16
23.	Madhuram	34	M	464186	130/88	88	26	37	15	31	85	86	15
24.	Amirtham	33	F	426287	136/90	86	19	37	15	35	86	84	20
25.	Pappathi	32	F	425100	134/80	84	18	37	15	34	83	88	18
26.	Thayalnayagi	36	F	424501	180/100	90	30	37	10	21	82	82	7
27.	Selvaraj	31	M	426063	170/110	92	28	37	11	58	83	84	18
28.	Saroja	46	F	426258	70/60	120	27	37	9	66	78	83	20
29.	Sridharan	42	M	427619	130/80	126	32	37	10	63	82	85	21
30.	Bhavani	40	F	427620	92/66	128	26	37	11	23	88	86	9
31.	Arumugham	41	M	428057	180/110	110	32	37	6	57	89	72	10
32.	Ulaganathan	48	M	430309	80/50	118	28	37	7	56	86	70	17
33.	Arputhamary	43	F	433871	160/110	100	25	37	12	70	73	68	11
34.	Hairunisa	44	F	434530	80/50	114	24	37	7	26	73	84	8
35.	Dandavarayan	41	M	435327	190/110	80	30	37	10	22	88	70	8
36.	Jayapal	40	M	435316	170/120	82	28	37	11	52	97	76	21
37.	Kalpana	47	F	437194	172/110	86	24	37	9	55	98	81	16
38.	Vasantha	43	F	437517	180/110	74	18	37	12	26	96	80	9
39.	Muthaiyan	48	M	437721	200/110	62	30	37	13	48	99	68	15
40.	Venkateshwaran	44	M	437972	160/110	86	26	37	10	65	80	55	13
41.	Abdul Lathif	45	M	439628	184/112	90	19	37	8	50	90	62	12
42.	R. Kunjammal	47	F	441811	170/114	84	32	37	7	30	86	82	16
43.	Selvarani	46	F	445768	176/112	96	29	37	10	56	89	68	13
44.	Azhagesan	41	M	448840	160/100	80	27	37	8	61	82	66	20
45.	Harikrishnan	39	M	449784	120/80	88	23	37	6	58	72	67	14
46.	Vasantha	37	F	455388	110/80	87	30	37	4	33	76	53	20
47.	Kuppusamy	38	M	462704	90/50	88	26	37	3	46	78	45	18
48.	Kanthsamy	34	M	462514	80/70	92	25	37	8	40	96	80	17
49.	Marimuthu	33	M	462376	110/70	100	18	37	6	41	97	86	20
50.	Tamilarasi	40	F	462742	160/80	110	21	37	7	38	81	70	19

Length of stay in Hospital (Days)		P- Value
NIV	CMV	
2+2	7+3	0.001 (S)

25 patients were assigned to NIV and 25 were assigned to CMV.

Failure rates in the hyperbaric respiratory failure group were 2/25 and the hypoxemic respiratory failure group 2/25. The Success rate with NIV was 85% with 21 patients weaned successfully off non invasive ventilation. In the group assigned to NIV, 4 patients were intubated vs 25 patients in the group intubated who were assigned to CMV. The length of stay in the NIV were less than 4 days and less than 10 days in CMV.

## DISCUSSION

In these studies, NIV was associated with are reduced need for invasive ventilation, decreased mortality and shorter length off hospital stay. It's found that NIV avoids intubation in almost 50% of patient with respiratory failure who need mechanical ventilation. The result also suggest that NIV might be associated with lower morality similar studies showed both NIV and CMV significantly improved gas exchange, long duration ICU stay for mechanical ventilated vs short duration of ICU stay for NIV patient. But in our study length & ICU stay in NIV group was less than 5 days, in CMV in was less than 10 days. In NIV group ICU mortality was 2 out of 25 patients and 7 out of 25 in CMV group.

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