

# EVALUATION OF SUPERNOVA™ MASK TECHNOLOGY IN A CLINICAL SETTING

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## Submission Categories:

*Airway equipment, Novel techniques, Case report, Imaging of airway, Assessment and planning for airway management, Airway outside the OR (ICU/ED), Education and training, Airway management inside the OR, Pediatric airway management, Obstetric airway management*

**Study Design:** Observational prospective descriptive study.

## Introduction

Recent evidence suggests that nasal mask ventilation may be superior to, or as effective as, full facemask ventilation.<sup>1</sup> Providing nasal ventilation during the “apneic period”, defined as the time between the end of bag-mask ventilation and successful placement of an appropriate airway device, may allow for improved oxygenation throughout the process in which the airway is secured. SuperNOVA™ is a new nasal mask which allows this to occur. The primary objective of this study was to obtain data pertaining to clinical performance, safety, and tolerability of SuperNOVA™ technology (Revolutionary Medical Devices, USA) in a clinical setting.

## Methods

Following IRB/ethical board approval and written informed consent, 30 adult (>18yo) patients scheduled for elective surgery requiring general anesthesia and tracheal intubation participated in this study. Instead of the standard full face mask, patients were preoxygenated and ventilated with SuperNOVA™ nasal mask prior to induction. Following intravenous induction of general anesthesia, the anesthesia provider attempted ventilation with the SuperNOVA™ nasal mask. The *Ease of Use* of the nasal mask was based on the Han, et al.<sup>22</sup> classification scale. Numerous measurements were recorded to assess the feasibility of the device, including previous airway status/past medical history, facial features (males), time required for entire away procedure, and lowest oxygen saturation (SpO<sub>2</sub>) during the intubation procedure. Data was summarized as mean ± standard deviation for continuous variables, along with frequency and percentage for categorical variables.

## Results

The SuperNOVA™ nasal mask provided oxygenation and successful ventilation in 29 of 30 patients, resulting in an overall success rate of 97%. However, one patient was unsuccessfully ventilated with the SuperNOVA™ mask and was noted a grade IV (**Figure 1**), possibly resulting from user error and familiarity with the mask’s usage; while one other patient was listed as a grade III. **Table 1** summarizes the patient demographics and other clinical variables between patients with either a ventilation grade I (N=22) or II (N=6) assessment.

## Discussion

This observational study demonstrated that the SuperNOVA™ nasal mask facilitates non-invasive positive pressure ventilation, while allowing adequate oxygenation and ventilation during the process of securing the airway. However, considering the novelty of this particular study, further research is warranted to determine its usefulness in patients with known or predicted difficult airways.

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**Figure 1:** Han, et al.<sup>22</sup> classification scale used for assessment of the SuperNOVA™ nasal mask.

*Ease of Mask Ventilation Scale: Han, et al.<sup>22</sup>*

Grade	Description
I	<i>Ventilated by mask</i>
II	<i>Ventilated by mask with oral airway/adjutant with or without muscle relaxant</i>
III	<i>Difficult ventilation (inadequate, unstable, or requiring two providers) with or without muscle relaxant</i>
IV	<i>Unable to mask ventilate with or without muscle relaxant</i>

**Table 1:** Comparison of baseline characteristics by different ventilation scales

Variable	Total	Ventilation Grade I	Ventilation Grade II
<b>History_of_snoring, n (%)</b>	N=28	N=22	N=6
no	18 (64.3%)	14 (63.6%)	4 (66.7%)
yes	10 (35.7%)	8 (36.4%)	2 (33.3%)
<b>OSA, n (%)</b>	N=28	N=22	N=6
no	22 (78.6%)	16 (72.7%)	6 (100.0%)
yes	6 (21.4%)	6 (27.3%)	0 (0.0%)
<b>Ant_DMV, n (%)</b>	N=28	N=22	N=6
no	25 (89.3%)	21 (95.5%)	4 (66.7%)
yes	3 (10.7%)	1 (4.5%)	2 (33.3%)
<b>History_of_DMV, n (%)</b>	N=28	N=22	N=6
no	28 (100.0%)	22 (100.0%)	6 (100.0%)
<b>BMI&gt;30, n (%)</b>	N=28	N=22	N=6
no	12 (42.9%)	10 (45.5%)	2 (33.3%)
yes	16 (57.1%)	12 (54.5%)	4 (66.7%)
<b>Elderly (55_years), n (%)</b>	N=28	N=22	N=6
no	19 (67.9%)	17 (77.3%)	2 (33.3%)
yes	9 (32.1%)	5 (22.7%)	4 (66.7%)
<b>Edentulous, n (%)</b>	N=28	N=22	N=6

Variable	Total	Ventilation Grade I	Ventilation Grade II
no	27 (96.4%)	22 (100.0%)	5 (83.3%)
yes	1 (3.6%)	0 (0.0%)	1 (16.7%)
<b>Gender, n (%)</b>	N=28	N=22	N=6
female	11 (39.3%)	9 (40.9%)	2 (33.3%)
male	17 (60.7%)	13 (59.1%)	4 (66.7%)
<b>Mallampati_Classification, n (%)</b>	N=28	N=22	N=6
1	12 (42.9%)	9 (40.9%)	3 (50.0%)
2	11 (39.3%)	9 (40.9%)	2 (33.3%)
3	5 (17.9%)	4 (18.2%)	1 (16.7%)
<b>Beard, n (%)</b>	N=28	N=22	N=6
no	24 (85.7%)	18 (81.8%)	6 (100.0%)
yes	4 (14.3%)	4 (18.2%)	0 (0.0%)
<b>Stubble, n (%)</b>	N=28	N=22	N=6
no	25 (89.3%)	20 (90.9%)	5 (83.3%)
yes	3 (10.7%)	2 (9.1%)	1 (16.7%)
<b>Mustache, n (%)</b>	N=28	N=22	N=6
no	17 (60.7%)	14 (63.6%)	3 (50.0%)
yes	11 (39.3%)	8 (36.4%)	3 (50.0%)
<b>Goatee, n (%)</b>	N=28	N=22	N=6
no	27 (96.4%)	21 (95.5%)	6 (100.0%)
yes	1 (3.6%)	1 (4.5%)	0 (0.0%)
<b>Shaven, n (%)</b>	N=28	N=22	N=6
no	25 (89.3%)	19 (86.4%)	6 (100.0%)
yes	3 (10.7%)	3 (13.6%)	0 (0.0%)
<b>Anesthetist_level, n (%)</b>	N=28	N=22	N=6
AA	18 (64.3%)	16 (72.7%)	2 (33.3%)
AA student	1 (3.6%)	0 (0.0%)	1 (16.7%)
Attending	1 (3.6%)	1 (4.5%)	0 (0.0%)
CA-1	4 (14.3%)	2 (9.1%)	2 (33.3%)
CA-2	1 (3.6%)	1 (4.5%)	0 (0.0%)
CA-3	3 (10.7%)	2 (9.1%)	1 (16.7%)
<b>Upper_Lip_Bite_Test_ULBT_, n (%)</b>	N=28	N=22	N=6
1	13 (46.4%)	9 (40.9%)	4 (66.7%)
2	7 (25.0%)	7 (31.8%)	0 (0.0%)
3	8 (28.6%)	6 (27.3%)	2 (33.3%)
<b>Age</b>	N=30	N=22	N=6
mean±SD	46.3±17.2	41.4±16.7	62.2±7.6

<b>Variable</b>	<b>Total</b>	<b>Ventilation Grade I</b>	<b>Ventilation Grade II</b>
<b>BMI</b>	N=30	N=22	N=6
mean±SD	34.1±9.9	33.0±9.7	35.4±9.1
<b>Height(cm)</b>	N=30	N=22	N=6
mean±SD	168.6±11.4	169.5±12.6	166.4±5.3
<b>Weight(kg)</b>	N=30	N=22	N=6
mean±SD	97.7±31.2	95.7±32.6	98.9±30.6
<b>Neck_Circumference (cm)</b>	N=30	N=22	N=6
mean±SD	42.9±5.9	41.7±5.3	46.1±7.3
<b>Inter_incisor_gap_distance (cm)</b>	N=30	N=22	N=6
mean±SD	4.3±0.7	4.2±0.6	4.7±1.1
<b>Thyromental_distance (cm)</b>	N=30	N=22	N=6
mean±SD	7.9±1.3	7.9±1.1	7.3±2.1
<b>Sternomental_distance (cm)</b>	N=30	N=22	N=6
mean±SD	14.2±1.9	14.4±2.0	13.0±1.9