

Guidelines for the use of nasal positive airway pressure ventilation device perioperatively.

The following clinical use protocol has been authored by to offer guidelines for the use of the SuperNO₂VA[®] Et mask and system in the operating room (OR), non-operating room anesthesia care areas (NORA), and the post-anesthesia care unit (PACU). This protocol is intended to be used as an example for the perioperative use of nasal positive airway pressure that includes the SuperNO₂VA Et mask and system. SuperNO₂VA Et mask and system is intended for short term use (< 24 hours) on adult patients (> 30 kg).



SUMMARY

Scope: Anesthesiologists, Certified Registered Nurse Anesthetists (CRNA), Registered Nurses (RN), and Respiratory Therapists (RT).

Delegation: Nasal PAP is recommended for the following patients receiving moderate or deep procedural sedation or recovering from general anesthesia in the PACU:

- BMI \geq 30 kg/m²
- Obstructive sleep apnea (OSA) or STOP BANG \geq 3
- Congestive heart failure (CHF)
- Chronic obstructive pulmonary disease (COPD)
- Oxygen saturation < 95% on supplemental oxygen

Nasal PAP is also recommended postoperatively for the procedures:

- Bariatric surgery
- Thoracic surgery
- Abdominal surgery
- Cardiac surgery

Targeted Procedures:

- Upper endoscopy (EGD)
- Endoscopy-colonoscopy, bronchoscopy, diagnostic laryngoscopy
- Endoscopic ultrasound (EUS)
- Otolaryngology (ENT)
- Orthopedic
- Bariatric Surgery
- Laryngoscopy
- Post-endotracheal tube (ETT) extubation

Equipment:

- SuperNO₂VA Et mask and system
- Hyperinflation bag or anesthesia circuit with APL valve
- Supplemental oxygen
- Gas sampling line to connect to your capnography monitor

PURPOSE

Upper airway obstruction and severe atelectasis induced by sedation and/or opioids are known causes of hypoxemia, hypoventilation, and acute respiratory failure perioperatively.¹⁻³ Patients with a history of obesity (BMI \geq 30 kg/m²), obstructive sleep apnea (OSA)/STOP BANG \geq 3, or limited cardiopulmonary reserve such as congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD) are at significantly higher risks for perioperative respiratory failure.³⁻⁵ Nasal positive airway pressure (nPAP) has been shown to be an effective means of relieving upper airway obstruction, preventing and treating atelectasis, and reducing the incidence of acute respiratory failure.³⁻⁶ The objective is to provide guidelines for the use of nasal PAP and continuous EtCO₂ monitoring in the perioperative setting.

POLICY

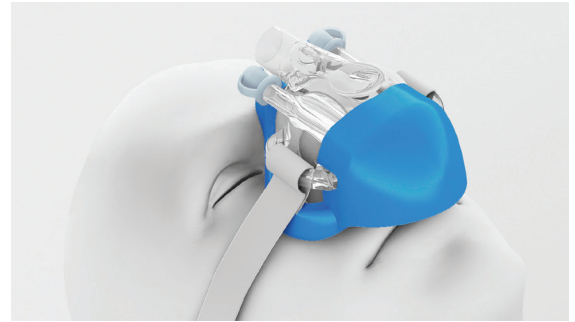
Nasal PAP with continuous EtCO₂ monitoring will be used on all patients receiving moderate or deep procedural sedation or recovering from general anesthesia in the PACU that have a past medical history for BMI \geq 30 kg/m², obstructive sleep apnea (OSA) or STOP BANG \geq 3, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), or have an oxygen saturation < 95% on supplemental oxygen unless contraindicated. Nasal positive airway pressure ventilation will also be used postoperatively for patients that underwent cardiac, bariatric, thoracic, or abdominal surgery unless contraindicated.

PROCEDURE

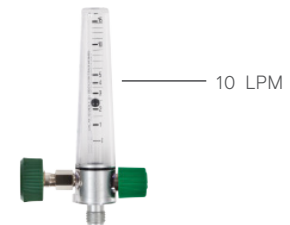
SETTING UP THE SUPERNO₂VA[®] ET SYSTEM

1. Slide the head strap under the patient's head with the SuperNO₂VA[®] Et system on the patient's right side. Place the SuperNO₂VA Et mask over the patient's nose and ensure the lower seal is between the upper lip and nose.

NOTE: To ensure an air-tight seal, apply firm downward pressure to the mask and use the head strap to secure in place.



2. Connect the hyperinflation bag's oxygen tubing to the oxygen flowmeter/regulator. Turn on the oxygen tank's fresh gas flow to 10 LPM.



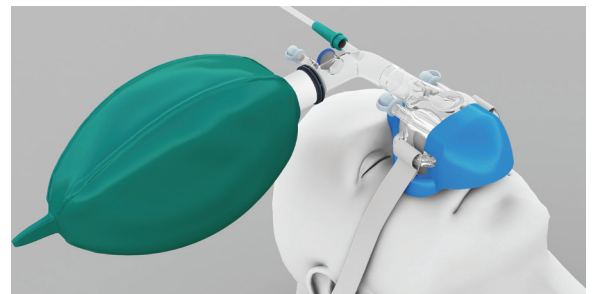
3. Completely close APL valve on the hyperinflation bag and firmly attach it to the SuperNO₂VA Et system.



Completely Open

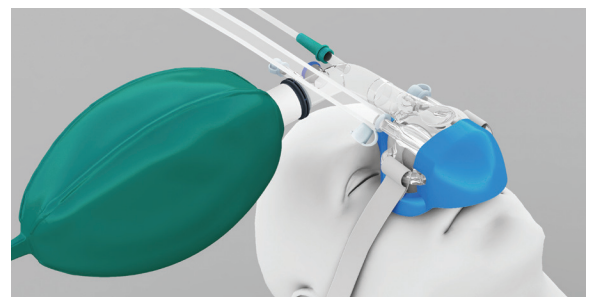
Completely Closed

4. The reservoir bag should completely fill within 4 – 5 breaths. Visualize reservoir bag completely inflating and staying inflated to confirm positive pressure is being delivered.



5. Connect one end of the gas sampling line to the EtCO₂ monitor. Connect the male luer gas sampling line to the EtCO₂ port on the SuperNO₂VA Et mask. Look for wave form capnograph on the EtCO₂ monitor.

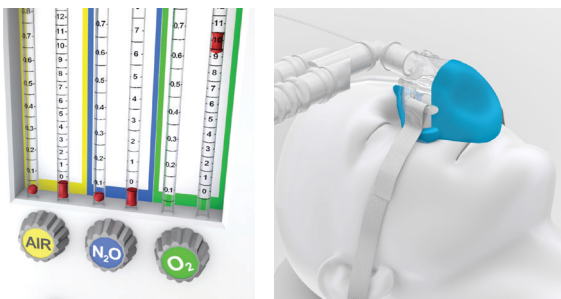
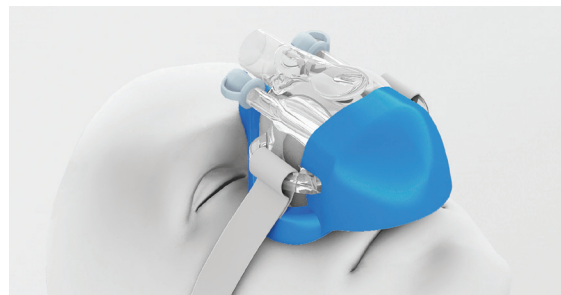
If the SuperNO₂VA Et hood is limiting access to the oral airway, the hood can be folded over the mask.



SETTING UP THE SUPERNO₂VA[®] ET DEVICE WITH AN ANESTHESIA MACHINE

1. Slide the head strap under the patient's head with the SuperNO₂VA[®] Et system on the patient's right side and place the SuperNO₂VA Et mask over the patient's nose. Ensure the lower seal is between the upper lip and nose.

NOTE: To ensure an air-tight seal, apply firm downward pressure to the mask and use the head strap to secure in place.
2. Set the fresh gas flow on the anesthesia machine to 10 LPM and connect the anesthesia circuit to the SuperNO₂VA Et system.

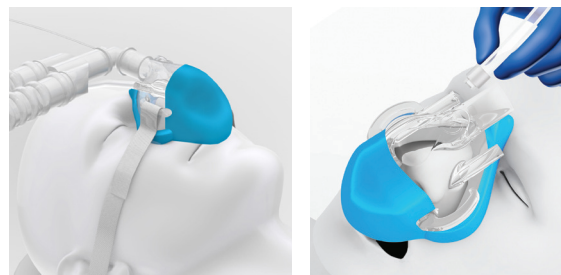


3. Set the APL valve on the anesthesia machine to 10 cm H₂O.



4. Connect one end of the gas sampling line to the female luer lock in the anesthesia machine or EtCO₂ monitor. Connect the male luer gas sampling gas sampling line to the EtCO₂ port on the SuperNO₂VA Et mask. Look for wave form capnograph on the EtCO₂ monitor.

NOTE: Visualize reservoir bag completely inflating and staying inflated to confirm positive pressure is being delivered. When you remove the circuit for the move to the PACU. The gas sampling line can stay with the SuperNO₂VA Et mask to continue monitoring EtCO₂.



WEANING OFF THE SUPERNO₂VA[®] ET SYSTEM

- Once the patient is awake and following commands, completely open the APL valve.
- Ensure the patient is breathing and the hyperinflation bag continuously inflating and deflating.
- Wait 60 seconds. If the patient is not obstructing, remove the hyperinflation bag.
- Also remove the green oxygen tubing from the hyperinflation bag as well as oxygen cap on the SuperNO₂VA Et system's supplemental oxygen port.
- Connect the green oxygen tubing to the SuperNO₂VA Et system's supplement oxygen port and lower the fresh gas flow to 3 – 5 LPM.
- Loosen the straps if needed.

Oral Leak

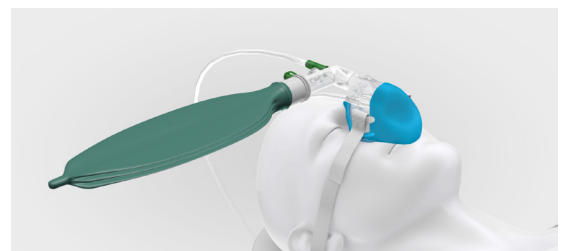
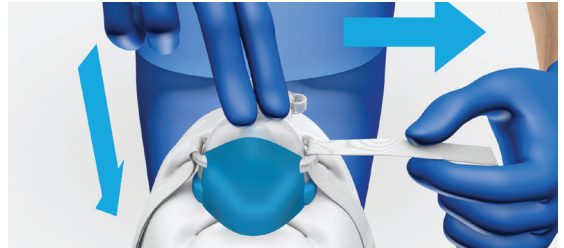
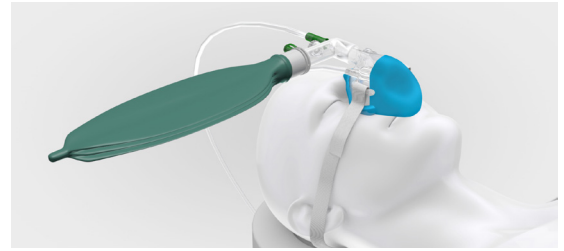
If there is a leak in the system you will notice that the reservoir bag fails to inflate.

First step is to determine where the leak is coming from by manually pressing the SuperNO₂VA® Et mask into the patient's face. If the reservoir bag inflates then the leak must be from around the mask. Tighten the straps to address leak.

If the reservoir bag does not inflate, the leak is most likely from the patient's mouth. Flex the patient's head.

If there is still leak from the patient's mouth and the reservoir bag does not inflate, apply submental pressure.

If patient is exhaling orally and no wave forms are showing on the EtCO₂ monitor, reposition the SuperNO₂VA Et mask hood to ensure it's over the mouth and not cephalad.



References

1. Yilmaz M, Aydin A, Karasu Z, Et al. Risk factors associated with changes in oxygenation and pulse rate during colonoscopy. *Turk J Gastroenterol* 2002;13(4):203-8. [PMID: 16378306]
2. Qadeer MA, Lopez AR, Dumot JA, Et al. Hypoxemia during moderate sedation for gastrointestinal endoscopy: causes and associations. *Digestion* 2011;84:37-45. [PMID: 21304242 DOI: 10.1159/000321621]
3. Jaber, Samir, Gerald Chanques, and Boris Jung. "Postoperative noninvasive ventilation." *Anesthesiology: The Journal of the American Society of Anesthesiologists* 112.2 (2010): 453-461.
4. Sutherasan, Yuda, Maria Vargas, and Paolo Pelosi. "NIV in the perioperative period." *ERS Practical Handbook of Noninvasive Ventilation* (2015): 135.
5. Gross, Jeffrey B., Et al. "Practice guidelines for the perioperative management of patients with obstructive sleep apnea an updated report by the American society of anesthesiologists task force on perioperative management of patients with obstructive sleep apnea." *Anesthesiology* 120.2 (2014): 268-286.
6. Cabrini, L., Et al. "Intraoperative prophylactic and therapeutic non-invasive ventilation: a systematic review." *British journal of anaesthesia* 112.4 (2014): 638-647.