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Transnasal High-Flow Humidified Oxygen for a Difficult Airway

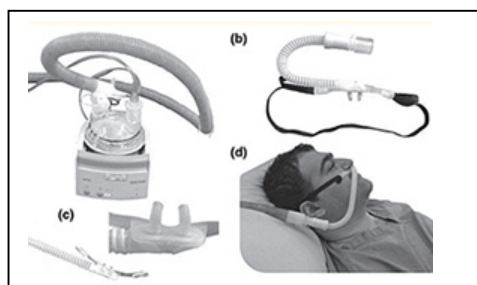
R. Eleanor Anderson, MD, Ron M. Walls, MD, FRCPC, FAAEM

A physiologic pharyngeal oxygen reservoir extends the safe apnea window.

Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE) is a technique for providing high-flow, positive-pressure, humidified oxygen via nasal cannula. When compared with traditional methods of apneic oxygenation, THRIVE has been shown to decrease the rate of rise of carbon dioxide during apnea.

In an observational, cross-sectional study, researchers in the U.K. used the THRIVE technique in 25 patients with known or anticipated difficult airways who were undergoing general anesthesia for otolaryngology procedures. With head elevation to 40 degrees, patients were pre-oxygenated at 70 L/minute for 10 minutes using a commercial device (OptiFlow) to deliver high-flow, humidified oxygen via a modified nasal cannula (see figure). After induction, head elevation was decreased to 20 degrees for laryngoscopy, and the same oxygenation parameters were maintained until a definitive airway was established.

The median Mallampati grade was 3. Twelve patients were obese and 9 had stridor. The mean apnea time was 17 minutes, and no patient desaturated below 90%. There were no cardiac arrhythmias or other complications suggesting hypercarbia.



The OptiFlow high-flow humidified oxygen delivery system. The oxygen humidification unit (a) receives oxygen from a standard oxygen regulator and delivers humidified oxygen to a custom-built transnasal oxygen cannula (b and c) like a standard nasal oxygen cannula (d). Reprinted with permission from Patel A and Nouraei SAR. Copyright © 2014, The Association of Anaesthetists of Great Britain and Ireland. Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): A physiological method of increasing apnoea time in patients with difficult airways. *Anaesthesia* 2014 Nov 10; [e-pub ahead of print].

Comment: Optimizing pre-oxygenation and apneic oxygenation are key steps in intubation, particularly in high-risk patients. The apneic oxygenation times in this study are far longer than those seen with 5 L/minute nasal cannula flow ([NEJM JW Emerg Med Jun 11 2010](http://dx.doi.org/10.1111/anae.12923)). High-flow devices likely increase the apnea window by both splinting the upper airway via positive pressure and improving gas exchange through flushing of dead space. This small study suggests that THRIVE may prolong the safe apnea window and thus allow for a smoother, less-pressured approach to definitive airway management in patients with difficult airways. Emergency department clinical leaders should evaluate this device and consider incorporating it into their practice.

Citation(s):

Patel A and Nouraei SAR. Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE): A physiological method of increasing apnoea time in patients with difficult airways. *Anaesthesia* 2014 Nov 10; [e-pub ahead of print].

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