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## High-flow nasal cannula (HFNC) oxygen therapy

High-flow nasal cannula (HFNC) oxygen therapy comprises an air/oxygen blender, an active humidifier, a single heated circuit, and a nasal cannula. It delivers adequately heated and humidified medical gas at up to 60 L/min of flow and is considered to have a number of physiological effects which include: reduction of anatomical dead space, PEEP effect, constant fraction of inspired oxygen, and humidification. HFNC can also be used in hypercapnic/hypoxemic respiratory failure, post extubation, pre intubation acute heart failure, sleep apnea.

HFNC has been gaining attention as an innovative respiratory support for critically ill adult patients. High flow nasal cannula is also gaining momentum because it is extremely simple to set up and equipment is readily available. HFNC equipment needed is: flow meter, air-oxygen blender, heated inspiratory circuit, active humidifier and nasal cannula because of the proper humidification and high flow HFNC washes out carbon dioxide in anatomical dead space. Since tidal volume does not change while a patient is using HFNC and respiratory rate is reduced, minute ventilation is lower. It can also be assumed that alveolar ventilation, along with PaCO<sub>2</sub>, is constant. This evidence points to there being less dead space. HFNC is an open system, high flow from the nasal cannula works against some of the resistance of expiratory flow and increases airway pressure thus causing an increase in PEEP.

Hypercapnic respiratory failure is a frequently seen problem in patients in the emergency room or ICU. Patients with this condition present a significant challenge to respiratory and critical care services, because mechanical ventilation wants to be avoided for these types of patients. Usually the first line of defense for these patients is non-invasive ventilation (NIV). Poor mask tolerance is the main problem with NIV. Some studies have shown successful use of HFNC oxygen therapy to manage the hypercapnic respiratory failure of a patient unable to tolerate conventional NIV.

HFNC can also be used for pre-intubation procedure. Before tracheal intubation we must enhance oxygenation, this can be done by using a non-rebreathing mask. It is when the mask has to be removed during laryngoscopy procedure, the patient is deprived of oxygen. Because nasal cannulas do not interfere with the laryngoscopy procedure HFNC could be used to deliver oxygen during the apneic period of intubation. Obstructive sleep apnea, upper airway collapse that can cause hypoxia, neurological dysfunction, and can increase cardiovascular morbidity. The traditional treatment of sleep apnea is CPAP.

While CPAP is the most effective treatment, patient compliance is suboptimal and a large number of patients are left untreated. HFNC delivery for OSA alleviated upper airway

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obstruction in both children and adults. OSA is also common among acute stroke patients and is associated with a decline in neurological function. Although CPAP is effective in treating sleep disordered breathing, with stroke patients, it is often abandoned due patient discomfort. It has been reported that HFNC was well tolerated and decreased the apnea and the oxygen desaturation, and increase of better quality of sleep was reported.

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