High Flow Nasal Cannula Therapy Protocol

Bronchiolitis is a viral process, most often caused by respiratory syncytial virus (RSV), although other infectious agents have been implicated (i.e. rhinovirus, adenovirus). In our region, the viral bronchiolitis season typically begins in mid December, peaks in February, and subsides by late March. Medical management of bronchiolitis is largely supportive. Therapies are typically conservative and designed to ensure patients remain clinically stable during the acute phase of illness. Hospitalization of these infants may be required to provide careful monitoring of clinical status, oxygen delivery, and provide airway clearance. Historically, therapy often includes nasal suctioning, hydration, nutrition, and parental education.

Despite traditional therapy, a significant number of infants with bronchiolitis develop respiratory distress. Respiratory distress caused by bronchiolitis is more common in infants. Mechanistically, infants have smaller bronchioles that become more easily filled by cellular debris. Additionally, their relatively weaker musculature makes it more difficult to clear respiratory secretions effectively. Lastly, neonates are obligate nose breathers. RSV bronchiolitis typically causes formation of thick, tenacious nasal secretions that block the upper airway and worsen the infant's work of breathing.

In an effort to treat the respiratory distress associated with viral bronchiolitis, Children's Hospital at Erlanger has approved the use of noninvasive positive pressure ventilatory assistance in pediatric floor patients. This will be accomplished by High flow/ high humidity nasal cannula (HFNC). This form of ventilatory assistance is used primarily in the neonatal intensive care unit, often in place of nasal CPAP. The HFNC system consists of a standard nasal cannula connected to a heater device that allows 100% relative humidity at temperatures close to 38°C. Flows up to 8 liter/minute are typically used in the PICU population, but this degree of noninvasive support warrants very close observation.

The mechanism by which HFNC offers therapeutic benefit is unclear. It is known that high flow/high humidity nasal cannula delivers gas at flow rates that exceed the needs of the patient Researchers speculate that noninvasive positive pressure ventilation increases alveolar gas exchange by creating a transpulmonary pressure gradient. The continuous positive airway pressure seems to increase functional residual capacity and enlarges intraluminal diameter of the airways. It also stabilizes those airways that have less support, allowing trapped air to escape and relieve hyperexpansion of the lungs. Researchers also speculate that the HFNC washes out the CO_2-rich gas in the anatomical dead space. Another proposed benefit is that the gas is warmed to approximately body temperature and reaches 100% relative humidity. Thus, the patient does not expend energy in warming and humidifying the gas.