

Can patients feed orally while on High Flow Nasal Cannula?

Recommendation:

For most patients¹, oral feedings² on HFNC are safe and the preferred way to provide hydration³ and nutrition. The benefit/risk ratio is better for oral feedings compared to keeping a patient NPO or placing a nasogastric tube (NGT).

Which patients are at increased risk of aspiration on HFNC?

High Risk: Do not recommend oral feedings

1. Altered mental status
2. Not interested to feed orally
3. Clinical assessment that patient may need escalated support (CPAP, BiPAP, MV)

Moderate Risk: Caution with oral feedings, weigh the risk and benefits

1. History of prematurity along with history of feeding difficulties
2. Acute (this admission) history of prolonged non-oral feeding status ie. prolonged intubation or tube feedings
3. Children with Medical Complexity (i.e. chronic lung disease, congenital heart disease, neuromuscular disease, etc.)
4. History of aspiration (pneumonia)

Low Risk: Recommend oral feeding

1. All other patients not meeting above criteria.

FAQs:

- **What are the benefits and risks of oral feeding?**

→The benefits of oral feeding include evidence that enteral nutrition leads to improved outcomes [Shadman, Slain, Conway, Sochet] such as:

- Shorter length of stay in the PICU
- Shorter length of hospitalization
- Shorter duration of HFNC therapy
- Improvement in vital signs (RR, HR) as it is a soothing measure
- Prevention of oral aversion

Unlike enteral tube feeding, oral feeding is also more physiologic and does not carry the risk of losing oral coordination, which could then lead to a cascade of consequences such as prolonging hospitalization, needing rehab therapies (inpatient and/or outpatient) for oral aversion, needing modified barium swallows (radiation), and potentially needing home health services with need to complete care-by-parent prior to discharge.

- Avoiding potential complications of NG/ND placement

It is also non-invasive as opposed to tube placement, which carries the risk of nasal/oral trauma, pneumothorax, increased radiation exposure secondary to confirmation chest x-rays, and aspiration. In one adult study of blind feeding tube placements, out of 1822 tubes placed 3.2% had respiratory tree misplacements and 1.2% developed pneumothoraxes [de Aguiar-Nascimento].

→The risks of oral feeding are aspiration events from above (oropharyngeal) as well as from below (reflux, emesis) the pharynx.

- **What is the risk or incidence of aspiration? What is the clinical significance?**

→This is a difficult question to answer since the very definition to diagnose aspiration is not universally accepted. Studies have used a combination of the following criteria: respiratory decompensation requiring increased support related temporally to a feeding event, clinical judgement from nursing/physician, chest x-ray findings of aspiration, starting of antibiotics, bronchial lavage with histological changes of aspiration, etc. At least in the studies we have reviewed, the pooled incidence of an aspiration-related respiratory failure event was ~0.5% (2 in 385) [Shadman, Conway, Slain, Sochet, Babl, Sochet].

→The clinical significance, particularly of an acute aspiration event and not of chronic aspiration is also unknown. In two studies that showed patients with lipid-laden macrophages in a blind laryngeal lavage suggesting aspiration events in their course of bronchiolitis, all children experienced spontaneous resolution in a 4 week follow-up assessment—suggesting no long-term effects [Kim].

- **Is there a rate of high flow that is unsafe for oral feeds?**

There is no high flow rate that contraindicates attempting to oral feed. Several studies have utilized flows of 1-2L/kg [Franklin, Milesi] with good results. In one study, 65% of infants were actually on equal or higher flow rates at time of oral feedings compared to their flow rates on admission or on HFNC initiation with safe results[Sochet]. However, if a patient is requiring high flow rates relative to their size, the clinician should consider whether the patient is at risk of needing escalated respiratory support (CPAP/BiPAP/mechanical ventilation (MV)), in which case patients should not be orally fed [Ferrara].

- **Are infants with a history of prematurity at increased risk of aspiration when feeding orally on HFNC?**

Currently, there is no high level of certainty that infants with a history of prematurity are at increased risk of aspiration. Several studies [Canning, Sochet, Shimizu] have included premature infants in their studied cohort with safe results after oral feedings. Anecdotally, our speech therapists have noticed that premature infants who have a history of poor feeding seem to be at high risk for renewed feeding difficulties during their acute respiratory illness. We have classified these infants (prematurity + history of feeding problems) as **moderate risk**.

- **What are some things we can do to minimize the risk of aspiration with oral feeds while on HFNC?**

The following are recommendations from our Speech Therapists:

- Begin all oral feeds using slow flow (green rim) nipple
 - Position patients 0-3 months old in side-lying. Position patients 3 months+ in upright position (NO lying flat in crib)
 - Allow infant to drive the feed. If patient is refusing, lip pursing, lingual thrusting, turning away, or crying, do not force feed as this may be protective in nature.
 - Do not feed if patient is having difficulty managing secretions.
 - Monitor very closely for desaturations with feeds, wet breathing, excessive spillage, refusing of feeds, overt coughing and choking. If these signs occur, pause the oral feeding attempt, alert physician team and reassess readiness at a later time.
- **What about patients who are showing signs such as tachypnea, retractions, but who are alert and wanting to feed?**

While holding oral feeds when patients show signs of distress makes theoretical sense, the evidence is uncertain on whether this practice is necessary. For example, in one study that showed safety of oral feeds, the respiratory rates were higher in ~25% of the infants at the time they were started on feeds as compared to values on admission and HFNC initiation [Sochet]. Many clinicians anecdotally find that discomfort secondary to hunger confound a reliable respiratory assessment of distress. While the evidence is still uncertain, one study of 124 infants hospitalized for bronchiolitis on HFNC showed decreases in respiratory rates and heart rates following initiation of enteral (majority oral) feeds without clinically significant aspiration, thus suggesting that feeding in itself may be therapeutic [Sochet]. However, if there is concern that the respiratory support would need to be escalated to CPAP/BiPAP/MV, we do recommend holding off oral feeds. If the patient trajectory is de-escalating (getting better), clinicians should weigh the risks and benefits of starting oral feeds despite residual signs of distress for each individual patient.

- **I have seen patients that are orally fed on HFNC subsequently decompensate and then need higher escalation of care. Are you sure oral feeds are safe?**

There is clearly a non-zero risk that aspiration can occur with oral feedings. However, for the majority of patients, the benefits of oral feedings outweigh the risks of keeping the patient NPO or placing a feeding tube. In the situation described above, the oral feeding may also be a confounder. Some of our patients who are on HFNC and early in their hospitalization will get worse just from their natural course of illness. As such, it is important to recognize and remember that decompensation may have occurred regardless of the feeding event and not because of it.

Questions with not enough evidence as of last guideline review

- How do we define aspiration pneumonia?
 - What is the risk/incidence of clinically significant aspiration events on HFNC?
 - When do we decide to place a nasogastric tube? How long is necessary to determine that oral feedings will not provide adequate enteral nutrition to necessitate a NGT?
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1. For this guideline on oral feedings on HFNC, the population we focused on was infants with bronchiolitis. This was for a couple reasons. 1. Infants are at higher risk for swallowing dysfunction given their age compared to older children with established skills. 2. HFNC is a relatively new non-invasive respiratory support modality with the most (although still uncertain) evidence of benefit in bronchiolitis patients. While local practice may use HFNC in other diagnoses such as pneumonia or asthma/reactive airway disease, there is not enough evidence to make recommendations in this population. However, since the age distribution of pneumonia and asthma are typically older than the age distribution of bronchiolitis, we hypothesize that this population is at lower risk for not tolerating oral feedings on HFNC compared to infants with bronchiolitis.
 2. These guidelines had liquid feeds in mind (bottle/sippy cup)
 3. It is important to remember the importance of hydration in these patients. Often they will have a preceding history of poor PO intake as well as having increased insensible losses from their tachypnea. Clinical assessments should be made to see if NS boluses or maintenance IVFs should be given to maintain adequate hydration.

Contributors to Document and Diagram:

- Raymond Parlar-Chun, MD
- Veronica Gonzalez, MD
- Hunaid Gurji, DO/PhD
- Nikita Khetan, MD
- Monica Kodakandla, MD
- Neeru Narla, MD, MPH
- Courtney Stout M.S. CCC-SLP
- Kristina Tebo, MD
- Nathan Valenti, MD

Citations:

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