

# Outcome of Infants Discharged Home from the Neonatal Unit with Partial Nasogastric Feeds

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**Abstract:** Aim: In our previous publication, we proposed an algorithm for safely discharging infants from the neonatal intensive care unit (NICU) on partial nasogastric feeds (NGF), thus avoiding gastrostomy tube placement (GTP) for infants who were unable to take full oral feeds. This follow up study post intervention, is to determine the number of patients discharged home on partial nasogastric (NG) feeds, the effectiveness of this intervention measured by reaching full oral feeds within 3 months of discharge and parent view on this intervention and outcome. We also investigated the success of this intervention based on the main discharge diagnosis. Study Design: Retrospective single-center study of infants discharged from the NICU from June 2019 to Dec 2020. Chart review was done to determine the rate of follow-up, time of achieve full oral feeds, and discontinuation of NG tube. We calculated NICU days saved by calculating the days from discharge to reaching full oral feeds at home. Results: Patient records were available for chart review regarding their outpatient follow-up in 96%. 82% of patients reached full feeds on an average of 35 days (range 1day to 10 weeks). 10% of patients required GTP due to the need for prolonged gavage feeding. 2 records were unavailable. Infants discharged home with NG tubes saved 587 NICU days. 88% of the parents contacted over phone responded positively in their choice of NG tube instead of GTP. Conclusion: Discharge from NICU on partial NG feeds for select infants is associated with reduced NICU stay without increased post-discharge complications or increased parent satisfaction.

**Keywords:** Neonatal Intensive Care Unit, Home Nasogastric Feeds Gastrostomy Tube Placement, Oral Feeds

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## 1. Introduction

Many studies have shown the effectiveness of established guidelines for infants discharged on HNG feeds [1-7]. However, the criterion for such discharge varies between different NICUs. This study investigates the time reached to full oral feeds on infants discharged on HNG feeds, NICU days saved and parent satisfaction. The study further investigates the success of HNG feeds with the primary diagnosis of the infant.

**Method:** This was a retrospective cohort study conducted in our level IV NICU from June 2019 – December 2021. Home NG eligibility guidelines were established in May 2019. (Figure 1).

All infants discharged home on partial HNG feeding were included. The medical charts were reviewed. Parents were

called with the following questions:

- 1) How comfortable you were with home NG feeds, and did you encounter any problems at home?
- 2) When did your baby reach full oral feeds?
- 3) Did you feel that it was the right decision instead of GT placement?

Approval of the Institutional Review Board of Valley Children's Hospital was obtained.

We defined home NG eligibility as at least more than 37 weeks post-menstrual age (PMA) and weight of more than 2 kilograms; five days without apnea, off caffeine for 5 days, on room air or low flow nasal cannula, age-appropriate weight gain, and taking a minimum of 30% of feeds by mouth at the time of discharge and having taken 50% of full

feeds at some point during the NICU stay. Parents should be willing to learn NG feeding and placement of NG tube on the manikin and on the baby and demonstrate correct placement and confirmation with stethoscope. Parents should also have adequate transportation for follow up visits in feeding clinic at 1, 2 and 3 months after discharge. Infants with complex diagnoses, having parents with transportation difficulties, maternal substance abuse, and foster placement were excluded. We enrolled all patients irrespective of language barrier.

## 2. Results

Among 30 infants who were discharge home on NG feeds during this 18 month period, 5 had a diagnosis of uncomplicated prematurity, 5 with diagnosis of Pierre Robin sequence/Cleft lip & palate, 6 with a diagnosis of infant of diabetic mother, 8 with diagnosis of congenital heart disease including 2 with diagnosis of trisomy 21. 2 with neurological disorder, 2 with persistent pulmonary hypertension (PPHN), one with congenital diaphragmatic hernia (CDH) and 1 a small for gestational age (SGA) infant.

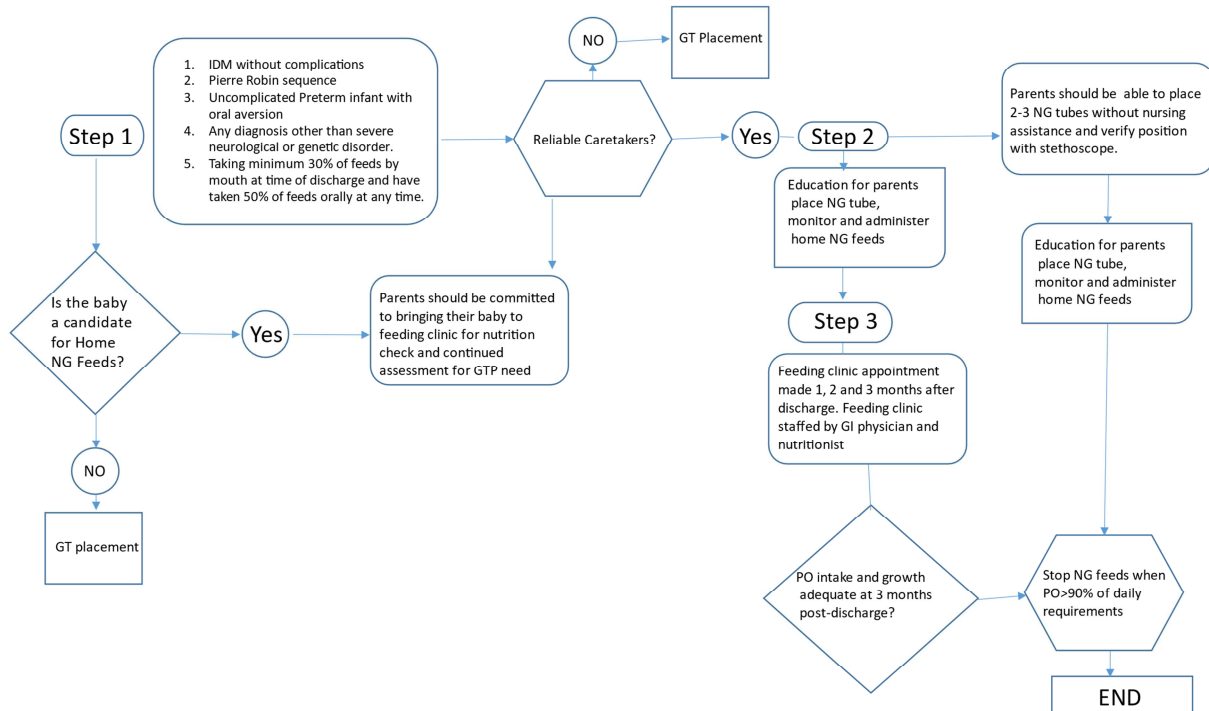


Figure 1. Home nasogastric feed guideline.

Table 1. Number and diagnoses of patients and time to reach full oral feeds after discharge.

Diagnosis	No of patients	Time to reach full feeds after discharge	Records unavailable
Uncomplicated preterm	5	4.2 weeks	1 records N/A
IDM	6	6 weeks	1records N/A
Cardiac conditions including 2 with T21	8	Of 7-Average 2 weeks	1 required GT after Glen
Neurological condition	2	11.2 weeks	
PPHN including 1 CDH	3	3.3 weeks	
Term with SGA	1	2 weeks	
Cleft lip/palate	5	Of 3- average 6 weeks	2 GT. 1 for aspiration and another due to distractors

Patient records were available for chart review regarding their outpatient follow up in 96%. 82% of patients reached full feeds on an average of 35 days (range 1day to 10 weeks). 10% of patients required GT placement due to the need for prolonged gavage feeding. 2 records were unavailable.

Of the IDM neonates, 5/6 patients reached full feeds on average of 5 weeks (range 4-10 weeks). Of the patients with prematurity, 4/5 reached full feeds on average of 4.2 weeks (range 3-7 weeks). Of patients with Pierre robin syndrome, 3/5 reached full feeds on an average of 6 weeks (range2-7

weeks). 2 required GT, one due to aspiration noted on swallow study and another one due to prolonged need for distractors impeding oral feeding. 7/8 babies with cardiac conditions reached full oral feeds on an average of 2 weeks. One infant required GT placement after Glen procedure due to poor oral feeding. 3 babies with PPHN (1 with CDH, 1 post ECMO) reached full oral feeds on an average of 3.3 weeks with range of 10 to 40 days.

In the parent satisfaction questionnaire, we were able to contact 25 out of 30 parents (83%). 88% of them responded

positively in their choice of NG tube instead of GT placement. None of them said that it was difficult to manage and will not do it again. Parents of 3 infants who went on to have GT placement eventually said they would have preferred to have GT placed during initial hospitalization instead of going through HNG feeding at home and then having GT placed. Of the 27 patients with home NG feeds and did not need GT placement, 26 patient information was available. If we speculate, that those patients had to stay in hospital till they reach full feeds without GT placement, they would have needed additional 587 days of hospitalization.

### 3. Discussion

Full oral feeding is one of the major determining factors for discharging infants from the NICU. In many NICUs, infants remain in NICU till they acquire this skill. If there is difficulty in achieving this goal, a gastrostomy tube is placed. [8] Very few NICUs discharge infants' home on NG feeds and they all vary in the criteria they use for discharge. This includes the percentage of oral feeds prior to discharge, their diagnosis, and the follow-up till they reach full feeds after discharge from NICU.

Historically, there have been concerns about discharging infants home with NG tubes due to the risks of malposition and replacement [9]. Khalil et al reported that the tube related emergency room visits and admissions are less than with Gastrostomy tube. [2]. More programs are now reporting positive experiences with home NG programs [1-6].

Our NICU had kept the infants in NICU till they reached full feeds or discharged home after placing gastrostomy tube for infants who were unable to take full oral feeds. In our previous study we evaluated the time to reach full feed for all the babies discharged home with gastrostomy tube. The study showed that most infants with uncomplicated prematurity, non- syndromic cleft lip and palate and infants of diabetic mothers reached full feeds within three months of discharge [1].

In our study, as with our clinical practice, inpatient care and discharge decisions were guided by protocol but left to clinician and family discretion.

We estimated the NICU days saved by discharging patients with NG tubes, as the number of days required for the infant to reach full feeds at home. This is with the assumption that the days for full oral feeding would be the same in the NICU as at home. Infants discharged with NGs who were not all orally fed by the end of the study were treated as 90 days of NG feeding, assuming a G tube was placed 3 months after discharge.

Parents of infants with NG tubes reported feeling well prepared to care for their infant after NICU discharge, without more tube-specific issues. We estimate that our home NG program saved over 587 NICU days in the first 18 months after its inception. Implementing a home enteral feeding transition program in one center increased the use of NG tubes and reduced NICU length of stay and GT placement.

Our study supports the feasibility and benefits of home NG as reported by other literature on outcomes for infants discharged with NG tubes. Our findings add confidence that home NG programs can be a reasonable alternative to prolonged NICU length of stay from a family perspective. Reducing NICU stay has positive consequences for families and healthcare systems. [10] However we must ensure adequate follow-up with speech therapist and dietitian for optimal growth in addition to a physician monitoring oral feeding progress.

We implemented outpatient follow up in our feeding clinic which consists of a gastroenterologist, dietitian and speech therapist.

To ensure a successful home NG program, expectations for hospital discharge need to match the structure of appropriate outpatient follow-up. [11] We found that infants discharged with home NG feedings had a median time to achieving full oral feeds of 35 days; this timeline is similar to other programs. [5, 12]

The patients who were unable to feed orally due to aspiration, on due to other medical conditions, were referred appropriately for GT placement.

Our center being the only regional location for pediatric subspecialty, we were able to perform chart review on all patients and confirmed 96% of visits by phone or electronic follow-up. We still missed some encounters at locations outside of our health system. We chose 3-month follow-up to match the timeline for anticipated G tube placement in our clinical guidelines as most NG-fed infants had progressed to full oral feeding by this point [13].

### 4. Conclusion

In conclusion, our study shows that home NG feeds are feasible and outcomes are favorable with improved parent's satisfaction. There should be an effective outpatient follow-up to identify the patients who may eventually need GT and ensure that it happens in a timely manner. Increasing use of home NG feeds to facilitate NICU discharge has the potential to further reduce NICU length of stay while also improving parent satisfaction. The outcomes can be further optimized by a robust feeding clinic follow-up for the HNG eligible patients.

### Abbreviations

NICU: Neonatal Intensive Care Unit  
HNF: Home Nasogastric Feeds  
NG: Nasogastric  
GTP: Gastrostomy Tube Placement  
PMA: Post Menstrual Age  
CDH: Congenital Diaphragmatic Hernia  
PPHN: Persistent Pulmonary Hypertension  
SGA: Small for Gestational Age  
IDM: Infant of Diabetic Mother

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## Conflicts of Interest

The authors declare no conflicts of interest.

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## References

- [1] Chandrasekar I, Ortiz E, Norgaard J, Rojas MA. (2021). Home Nasogastric Tube Feeding in Patients with Traditional Indications for Gastrostomy Tube Placement. *International Journal of Gastroenterology*, 5(2), 91-95.
- [2] Khalil ST, Uhing MR, Duesing L, Visotcky A, Tarima S, Nghiem-Rao TH. Outcomes of Infants with Home Tube Feeding: Comparing Nasogastric vs Gastrostomy Tubes. *JPEN Journal of parenteral and enteral nutrition*. 2017. November; 41(8): 1380–5.
- [3] Mago-Shah DD, Malcolm WF, Greenberg RG, Goldstein RF. Discharging Medically Complex Infants with Supplemental Nasogastric Tube Feeds: Impact on Neonatal Intensive Care Unit Length of Stay and Prevention of Gastrostomy Tubes. *American journal of perinatology*. 2020. June 4.
- [4] White BR, Ermarth A, Thomas D, Arguinchona O, Presson AP, Ling CY. Creation of a Standard Model for Tube Feeding at Neonatal Intensive Care Unit Discharge. *JPEN Journal of parenteral and enteral nutrition*. 2020. March; 44(3): 491–9.
- [5] Williams SL, Popowics NM, Tadesse DG, Poindexter BB, Merhar SL. Tube feeding outcomes of infants in a Level IV NICU. *Journal of perinatology: official journal of the California Perinatal Association*. 2019. October; 39(10): 1406–10.
- [6] Matharu P, Cristea AI, Slaven JE, Becker S, Niehaus JZ. Feeding Outcomes for Infants with Bronchopulmonary Dysplasia Discharged on Nasogastric Feeds. *American journal of perinatology*. 2019. December 30.
- [7] Devin CL, Linden AF, Sagalow E, Reichard KW, Vinocur CD, Miller JM, et al. Standardized pathway for feeding tube placement reduces unnecessary surgery and improves value of care. *Journal of pediatric surgery*. 2020. June; 55(6): 1013–22.
- [8] Chapman A, George K, Selassie A, Leshner AP, Ryan RM. NICU infants who require a feeding gastrostomy for discharge. *Journal of pediatric surgery*. 2020. July 29.
- [9] Irving SY, Lyman B, Northington L, Bartlett JA, Kemper C. Nasogastric tube placement and verification in children: review of the current literature. *Critical care nurse*. 2014. June; 34(3): 67–78. Epub 2014/04/17. eng.
- [10] McAndrew S, Acharya K, Westerdahl J, Brousseau DC, Panepinto JA, et al. A Prospective Study of Parent Health-Related Quality of Life before and after Discharge from the Neonatal Intensive Care Unit. *The Journal of Pediatrics*. 2019; Oct; 213: 38–45.
- [11] White BR, Zhang C, Presson AP, Friddle K, DiGeronimo R. Prevalence and outcomes for assisted home feeding in medically complex neonates. *Journal of pediatric surgery*. 2019. March; 54(3): 465–70.
- [12] Ermarth A, Thomas D, Ling CY, Cardullo A, White BR. Effective Tube Weaning and Predictive Clinical Characteristics of NICU Patients With Feeding Dysfunction. *JPEN Journal of parenteral and enteral nutrition*. 2020. July; 44(5): 920–7.
- [13] Tubbs-Cooley HL, Pickler RH, Meinen-Derr JK. Missed oral feeding opportunities and preterm infants' time to achieve full oral feedings and neonatal intensive care unit discharge. *American Journal of Perinatology*. 2015; 32(1): 1–8.