

# A neonatal short-term home nasogastric tube feeding programme

Every neonatal unit will be familiar with a cohort of mid to late preterm babies who are otherwise well but spend the last few weeks of their admission establishing sucking feeds. These babies can spend several days to weeks weaning off nasogastric tube (NGT) feeds after they have been deemed medically ready for discharge. A solution to help speed up discharge for these babies is a short-term home NGT feeding programme. This article looks at the experiences and outcomes over the first five years of setting up a short-term home NGT programme on the neonatal unit at John Radcliffe Hospital.

## Katherine Wood<sup>1</sup>

BMedSci, BMBS, MRCPCH  
Neonatal Registrar

## Frances O'Brien<sup>1</sup>

BSc, MBBS, MRCP, DRCOG  
Consultant Neonatologist

## Karen Liddle<sup>1</sup>

RGN, Neonatal intensive care course (405)  
Neonatal Outreach Lead

## Rhys Dore<sup>2</sup>

BABMBCh  
Foundation Year 2 Doctor

<sup>1</sup>Neonatal Unit, John Radcliffe Hospital, Oxford

<sup>2</sup>Brighton and Sussex University Hospitals NHS Trust

The basis for home NGT feeding programmes has been in existence since the 1980s<sup>1</sup> and has been described as not only having cost and resource benefits for neonatal units but also psychological, developmental and practical benefits for the infants and their families.<sup>2,3</sup> Additionally, it has been shown that babies who are discharged with NGT feeds at home have a reduction in clinical infections with no significant increase in re-admission rates or difference in weight gain, compared to those establishing feeds in hospital.<sup>4</sup>

## Origins of the programme

John Radcliffe is a level 3 neonatal unit in the Thames Valley Neonatal Network. It consists of 14 intensive care beds, 11 high

dependency beds and 22 low dependency beds with four 'homeward bound' rooms (allowing parents to room in with their baby prior to discharge).

In 2012 a commissioning quality and innovation (CQUIN) goal was set up in the neonatal unit to identify babies with a gestational age of less than 36 weeks who may be suitable for short term NGT feeding at home while establishing breast or bottle feeding, and to provide a community outreach service to allow this to happen.

A programme was therefore set up to target babies born at 28-35<sup>+6</sup> weeks' gestation. The criteria for babies and families to be discharged on the home NGT programme were set out (TABLE 1).

## Keywords

nasogastric (NG); tube; home; feeding; discharge; outreach

## Key points

Wood K., O'Brien F., Liddle K., Dore R.

A neonatal short-term home nasogastric tube feeding programme. *Infant* 2020;16(2): 67-71.

1. We share our experiences of setting up a short-term home NGT feeding programme for well preterm babies establishing sucking feeds.
2. The programme has several benefits: reducing hospital stays, enhancing weight gain, increasing breastfeeding rates, significant financial savings, and enhancing family bonding.

Infant criteria	Family criteria
Medically well and stable	Safe home environment
Maintaining temperature in a cot for 48 hours	Telephone availability in case of emergency
Tolerating feeds by NGT and breast/bottle	Own transport in case there's a need to return to the unit for tube replacement
Feeding at least three hourly	Understand and speak English
Able to complete two sucking feeds given by the parents in 24 hours	Family willing to undertake tube feeding
Clear feeding plan in place	Family have completed NGT feeding teaching package and demonstrated competences
Gaining weight	Attended an infant basic life support class
No monitoring for at least 48 hours	Can provide care over 24 hours
No anti-reflux medication required (as this affects pH testing of NGT)	No social concerns
	Family able to interpret colours on pH testing strips

TABLE 1 Infant and family criteria for discharge with an NGT.

These criteria evolved as the programme was established and different obstacles were encountered. For example, one mother assessed for the programme was colour-blind due to retinopathy, so she was unable to interpret the colours on the pH testing strips. Therefore, extra family criteria were added to address this potential safety issue.

A detailed training package and competency list was developed to ensure that the parents had the full set of necessary skills to manage their baby with an NGT at home. A flow diagram was developed to help guide hospital staff in the event of parents telephoning the neonatal unit for advice out of hours (when the outreach team was unavailable) if a baby was not sucking well or appeared unwell (FIGURE 1).

Initially the team involved in setting up the programme included:

- two existing neonatal outreach nurses (band 7 at 1.9 whole time equivalent)
- an existing discharge co-ordinator (band 6 at 36 hours/week)
- two existing band 6 neonatal nurses (2.0 whole time equivalent) on a six-month secondment.

The neonatal nurses worked with the outreach team as well as taking telephone consultations on the unit. Additionally, a neonatal consultant was allocated 1 PA with existing administrative support (band 3 at 0.3 whole time equivalent).

As the programme became established and grew, the supporting outreach team expanded and now consists of two band 7 nurses and an additional band 6 nurse (totalling 2.8 whole time equivalent). The consultant support is now provided by the existing attending low dependency consultant.

The payment schedule for setting up the CQUIN in the first year stipulated that in each quarter 25% of value would be given providing the following targets were met:

- quarter 1: confirmation of set up for collection of data
- quarter 2: 20% of the eligible patient group receiving tube feeding at home
- quarter 3: increasing to 25% of eligible patient group
- quarter 4: 30% of eligible patient group.

After these targets were reached the same data were provided for two more years before funding was secured for the long term.

A summary of what went well during the programme set up, along with the

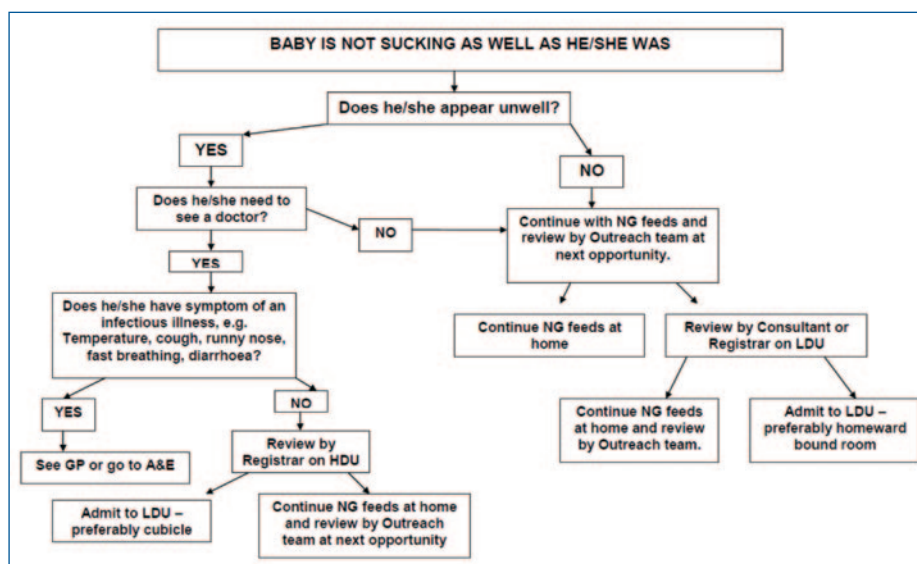


FIGURE 1 Flowchart for the baby who is not sucking as well as he/she previously was.

#### What went well:

- Multidisciplinary team approach to implementing the programme including input from speech and language therapists.
- The programme kickstarted a change in culture around family involvement and parents' roles in looking after their babies.
- Positive feedback from parents involved in the programme, especially relating to earlier discharge.

#### The challenges:

- Initial resistance to change from staff, as a completely new concept was being introduced.
- At the outset there was a focus on volumes of milk taken when reviewing a baby for discharge on the home NGT programme. We were not considering responsive feeding, so feeling confident that babies were taking enough milk was a challenge for both medical and nursing staff.
- There was initial uncertainty about whether babies would be able to gain adequate weight while establishing sucking feeds at home.

#### Tips for setting up and running a home NGT programme:

- When enrolling the first few babies on the programme ensure there are no potential additional problems in order to maximise chances of success while the programme is being established.
- Start NGT training with parents from admission and introduce the home NGT feeding programme early, so they feel confident with their skills and have time to get used to the concept before discharge is considered.
- Trusting that as long as babies are well they will be able to feed, grow and mature at home on the NGT programme.
- Having robust guidelines and criteria will help with a smooth set up while staff get used to the programme.
- The home NGT programme can be set up and run in conjunction with Unicef's Baby Friendly Initiative accreditation programme.

FIGURE 2 A summary of what went well and the challenges encountered during set up, and some tips for running a home NGT programme.

challenges and some tips for running a similar programme can be seen in FIGURE 2.

### Summary of the reviewed data

In the first five years after the home NGT feeding programme was established (from 1 April 2013 to 31 December 2017) there were a total of 798 babies born between the

gestations 28<sup>+0</sup> to 35<sup>+6</sup> weeks. This amounted to a total of 20,174 bed days, with gradual increase in bed days each year (TABLE 2). A total of 234 babies have been discharged on the home NGT feeding programme, which is, on average, 32% of babies born at 28<sup>+0</sup> to 35<sup>+6</sup> weeks' gestation.

The median corrected gestational age

(cGA) at discharge for all babies born between 28<sup>+0</sup> and 35<sup>+6</sup> weeks' gestation over the five-year review period was 36<sup>+5</sup> weeks. For the babies discharged on the home NGT feeding programme, on average this was five days earlier at 36<sup>+0</sup> weeks. **FIGURE 3** gives a breakdown for each year.

## Finances

The costs of the home NGT feeding programme were analysed. During the first year of start-up, consultant time at 1 PA was required (cost to the trust estimated at £9,000/year). After the first year this was incorporated into the everyday role of the attending consultant, resulting in no extra costs for the consultant cover. An extra community neonatal nurse was employed after the programme was established (cost to the trust estimated at £45,000/year). Travel reimbursement for the community nurses can be estimated at around £3,000/year. There was no extra cost of consumables (NG tubes, syringes etc) as the babies would have used the same consumables if they remained on the unit.

When the saving of each low dependency bed day is balanced by the cost involved in providing the home NGT programme (including initial start-up and resulting running costs), there has been an estimated net saving of around £994,000 over the first five years (a total of 2,728 bed days saved by discharging babies home earlier on the programme, with a low dependency bed cost estimated at £433 per day<sup>5</sup>) (**TABLE 3**).

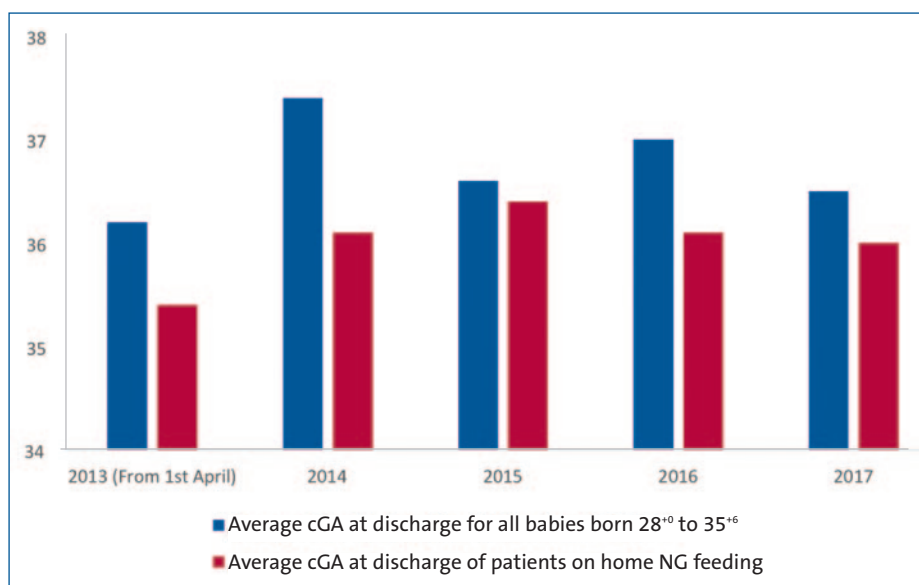
## Weight gain

Not only has the home NGT programme provided financial benefits but we have also measured objective advantages for the patients. An analysis of a random selection of patients between January 2014 and February 2016 was carried out to look at differences in weight gain between the babies that were discharged on the home NGT programme and equivalent babies eligible (ie no significant ongoing medical problems, no problems with growth and no social concerns) for home tube feeding but who, due to parental choice, stayed on the neonatal unit to establish sucking feeds.

The two groups had no significant difference in gestation, birth weight or feeding method. The analysis showed there was a significantly higher increase in weight gain for babies discharged on the home NGT feeding programme (**TABLE 4**).<sup>6</sup> This suggests the home environment is

Calendar year	2013 (from 1 April)	2014	2015	2016	2017	Total
Number of babies born at 28 <sup>+0</sup> to 35 <sup>+6</sup> weeks' gestation	102	141	194	163	198	798
Number of bed days for babies born at 28 <sup>+0</sup> to 35 <sup>+6</sup> weeks' gestation	2,185	4,235	4,291	4,380	5,083	20,174
Number of babies discharged on home NGT feeding	28	53	64	55	34	234
Percentage of babies born at 28 <sup>+0</sup> to 35 <sup>+6</sup> weeks' gestation and discharged on home NGT feeding	27%	38%	33%	34%	17%	-

**TABLE 2** Number of babies born and number of bed days at 28<sup>+0</sup> to 35<sup>+6</sup> weeks' gestation, with number and percentage of babies discharged on the home NGT feeding programme (1 April 2013 to 31 December 2017).



**FIGURE 3** Comparison of cGA at discharge of all babies born at 28<sup>+0</sup> to 35<sup>+6</sup> weeks' gestation vs those discharged on the home NGT feeding programme (1 April 2013 to 31 December 2017).

Year	2013 (from 1 April)	2014	2015	2016	2017	Total
Number of bed days saved	252	498	812	742	424	2,728
Estimate of net saving (£)*	101,716	180,034	303,596	273,286	135,592	994,224

**TABLE 3** Number of bed days saved and estimate of net savings of providing the home NGT programme per year from period of 1 April 2013 to 31 December 2017. \*Savings from reduction in bed days minus cost of home NGT programme/year.

more conducive to higher weight gains and possible reasons for this include:

- an increase in responsive feeding when parents are by their baby's side 24 hours a day
- less disturbance for the babies when they're not in hospital
- maternal stress is likely to be decreased in the home environment, which is associated with an increase in milk production as well as availability.<sup>7</sup>

## Breastfeeding rates at discharge

We compared the percentage of babies born between 28<sup>+0</sup> to 35<sup>+6</sup> weeks' gestation

discharged breastfeeding on the home NGT programme with those discharged breastfeeding but not on the home NGT programme. We saw consistently higher breastfeeding rates at discharge for babies on the programme compared to those not on it (**FIGURE 4**). This might suggest that a higher level of involvement of parents in their babies' care, together with earlier discharge, may result in higher breastfeeding rates. However, we need to be aware that those babies not on the home NGT feeding programme may have additional problems that not only excluded them from being enrolled on the

programme but may also have impacted their ability to breastfeed (for example, a more unstable neonatal course with resultant complications of prematurity).

### Impact on families

Some benefits related to early discharge resulting from the home NGT feeding programme are harder to quantify. We can get a sense of the impact on families from the feedback we received, for example, being more comfortable at home and not having to juggle time between coming to hospital and being with older siblings.

**FIGURE 5** illustrates some of the quotes from parents on the programme.

### Readmissions

We found that over the five years of

analysis some babies on the home NGT feeding programme have had to be re-admitted, as might be expected. However, there have been no re-admissions due to faltering growth or problems related to the NGT. Reasons for re-admission include bronchiolitis, requirement for blood transfusion, hernia repair, pyloric stenosis and gastro-oesophageal reflux.

### Changes to the home NGT feeding programme over the last five years

As the home NGT feeding programme has developed there have been some changes. The programme has started to accept babies from a lower gestation (ie from 24 weeks' gestation, providing all the other infant and family criteria are met). In 2017 two babies born at less than 28 weeks (at

24<sup>+6</sup> and 26<sup>+3</sup> weeks' gestation) were discharged on the home NGT feeding programme. Both babies saved six days, where they were at home instead of in hospital establishing sucking feeds. Since then, there has been a gradual increase in the number of extremely preterm infants discharged home with NGTs; this inclusion of babies of lower gestation has helped the families that have some of the longest stays on the unit to get home sooner.

Another change is the continuation of breast milk fortifier (BMF) at home. Traditionally BMF has been stopped when babies have been discharged or have been established onto full breastfeeds. BMF 'boosts' have been introduced, which involves mixing a 2.2g sachet of BMF in 5mL of warmed breast milk and administering it via a teat four times a day before feeds. This continuation of BMF at home should allow for further enhancement of weight gain.<sup>8</sup>

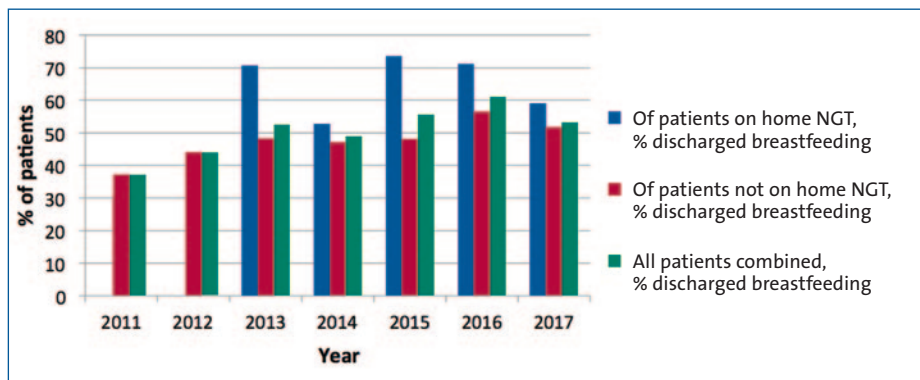
### Summary and future direction

Over the five-year period reported, we have discharged a total of 234 babies on the home NGT feeding programme, which is equivalent to 32% of all babies born at gestations of 28<sup>+0</sup> to 35<sup>+6</sup>. There have been several objective gains from the programme, from financial (with estimates of savings of £994,000 over the first five years), to enhancement of growth of babies. We have also seen higher breastfeeding rates and other gains that are harder to quantify arising from earlier discharge (eg enhanced family bonding, increased family involvement and confidence in their baby's care).

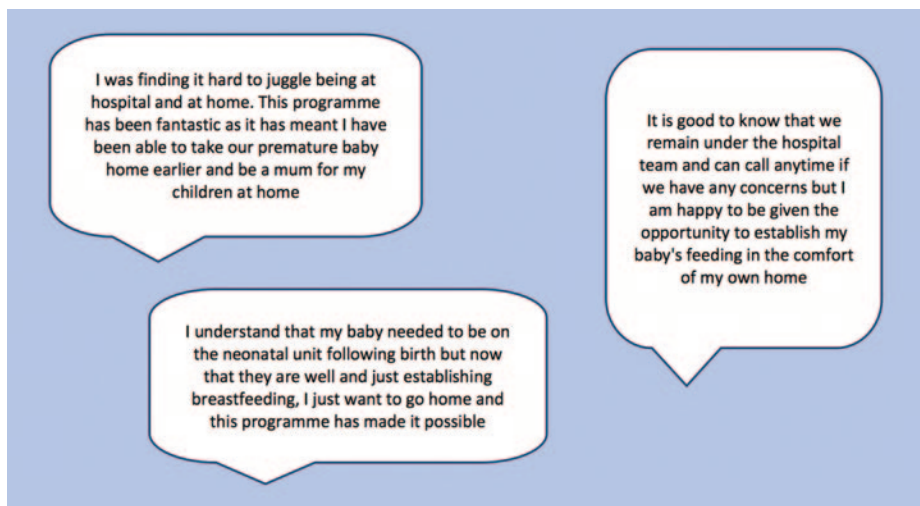
As the programme grows and progresses we aim to develop it further. Future plans include altering infant criteria to allow consideration of those infants being discharged on home oxygen or on anti-reflux medication, which will allow more of our babies to benefit from the programme.

	Babies on home NGT feeding programme (n=62)	Babies establishing sucking feed on neonatal unit (n=81)	
Mean weight gain (g/kg/day)	15.6	10.4	P<0.003

**TABLE 4** Mean weight gain (g/kg/day) in 62 babies on the home NGT feeding programme vs 81 babies establishing sucking feeding on the neonatal unit (January 2014 to February 2016). P value calculated with Mann-Whitney U test.



**FIGURE 4** Comparison of babies (28<sup>+0</sup> to 35<sup>+6</sup> weeks' gestation) discharged breastfeeding in 2011-2012 (prior to establishment of the home NGT feeding programme) and 2013-2017, after the home NGT feeding programme was established.



**FIGURE 5** Quotes from parents about the home NGT feeding programme.

### References

1. **Evans ID.** Tube feeding newborn babies at home. *J Royal Army Med Corp* 1988;134:149-50.
2. **Bissell G, Wood A, Peak S, et al.** Changing practice by the earlier introduction of tube feeding at home. *Infant* 2009;5:150-54.
3. **Khair J.** Managing home tube feeding for children. *Br J Commun Nurs* 2003;3:118-26.
4. **Ortenstrand A, Waldenstrom U, Winbladh B.** Early discharge of preterm infants needing limited special care, followed by domiciliary nursing care. *Acta Paediatr* 1999;88:1024-30.
5. **Shetty S, Kennea N, Desai P, et al.** Length of stay and cost analysis of neonates undergoing surgery at

a tertiary neonatal unit in England. *Ann R Coll Surg Engl* 2016;98:56-60.

6. **Dore R, O'Brien F.** Growth velocity in premature babies returning home with nasogastric tubes in situ versus those remaining in hospital. Poster presentation at the Second International

Neonatology Association Conference 2016 Vienna, Austria.

7. **Chatterton Jr. R, Hill P, Aldag J, et al.** Relation of plasma oxytocin and prolactin concentrations to milk production in mothers of preterm infants: influence of stress. *J Clin Endocrinol Metabol*

2000;85:3661-68.

8. **Arslanoglu S, Boquien C-Y, King C, et al.** Fortification of human milk for preterm infants: update and recommendations of the European Milk Bank Association (EMBA) Working Group on human milk fortification. *Front Pediatr* 2019;7:76.

## RESEARCH NEWS

### IVF twins: two hearts, quadruple the risk

Twins born through IVF have four times the chance of having a congenital heart problem, according to research published in *JAMA Pediatrics*.

A study analysing more than 500,000 births in Ontario, Canada, found that the observed association between assisted reproductive technology and congenital heart defects may be substantially mediated by twinning.

The findings build on research showing that having a baby as a result of using assisted procedures such as IVF nearly doubles the chance that a baby will have heart problems.

This increased risk could be important to clinical practice and policy making.



#### Reference

**Wen SW, Miao Q, Taljaard M, et al.** Associations of assisted reproductive technology and twin pregnancy with risk of congenital heart defects. *JAMA Pediatr* 2020; doi:10.1001/jamapediatrics.2019.6096.



### BAPM Gopi Menon Awards 2020 are now open for entries

The application process for the 2020 BAPM Gopi Menon Awards is now open. The awards celebrate excellence and those making a difference in perinatal care, particularly smaller scale or individually led projects or examples of local and regional excellence. They have been renamed as the BAPM Gopi Menon Awards after BAPM's former president. Gopi was a strong believer in both quality improvement and celebrating the achievements of the whole perinatal team. He was integral to the development of these awards before his death in 2019.

The categories for 2020 are:

1. Improving quality in perinatal care
2. Supporting the perinatal team
3. Excellence in research or innovation
4. Making a difference for families
5. Outstanding contribution to BAPM by a trainee
6. Outstanding contribution to BAPM by a nurse, ANNP or midwife.

The application deadline is 19 April 2020. For further information and to download an application form visit [www.bapm.org/pages/101-bapm-gopi-menon-awards](http://www.bapm.org/pages/101-bapm-gopi-menon-awards).

### Japan publishes its policy statement for enteral nutrition

The Japanese Pediatric Society has published its new policy statement on enteral nutrition for preterm and very low birthweight (VLBW) infants. The statement sets out how Japan will create a system to ensure that preterm and VLBW infants will receive a diet comprising of only human milk – no products derived from cows' milk will be supplied.

The statement recommends:

- for preterm and VLBW infants, mother's own milk should be encouraged and staff should assist mothers to pump or express whenever possible
  - where maternal milk supply is insufficient, donor human milk should be used
  - in the future, it will be necessary to create a system to supply an exclusive human milk-based diet, consisting of human milk with the addition of a human milk-derived human milk fortifier.
- This is a significant step as Japan's neonatal care is regarded as among the best in the world. New guidelines are expected from the European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) later in 2020 – it will be interesting to see if Japan's lead affects European recommendations on how to feed infants born preterm or at low birth weight.

#### Reference

**Mizuno K, et al.** Policy statement of enteral nutrition for preterm and very low birthweight infants. *Pediatr Int* 2020;62:124-27.

