Progression from gastric tube feeds to full suckle feeds and discharge home of preterm infants

AUTHORS

Anndrea Flint
RN, RM, NICC, MHSc
Nurse Manager, Grantley Stable Neonatal Unit, Royal Women's and Brisbane Hospital, Centre for Clinical Nursing, Royal Women's and Brisbane Hospital, Brisbane, Australia
Anndrea_Flint@health.qld.gov.au

Mark William Davies
MBBS, FRACP, DCH
Staff Neonatologist, Grantley Stable Neonatal Unit, Royal Women's and Brisbane Hospital, Department of Paediatrics and Child Health, The University Of Queensland, Royal Children's Hospital, Brisbane, Queensland, Australia

Li-An Collie
RN, RM
Clinical Nurse, Grantley Stable Neonatal Unit, Royal Women's and Brisbane Hospital, Brisbane, Australia

Kristina Palmer-Field
RN, RM
Clinical Nurse/Lactation Consultant, Grantley Stable Neonatal Unit, Royal Women's and Brisbane Hospital, Brisbane, Australia

KEY WORDS

bottle feeding, breast feeding, discharge planning, infant, newborn, rooming-in care, tube feeding

ABSTRACT

Objective
To estimate the time taken for preterm infants to progress from 50% suckle feeds to full suckle feeds and then to discharge.

Design
An observational, retrospective cohort study.

Setting
A level 2 and 3 neonatal nursery in a tertiary teaching and referral hospital in Queensland, Australia.

Subjects
61 consecutive infants born between July 2002 and December 2002 who were born <35 weeks gestational age; admitted for ≥14 days; and discharged directly home from hospital.

Main outcome measures
Time taken to progress from 50% suckle feeds to full suckle feeds and then to discharge.

Results
Infants spent an average of eight days in hospital after they attained four out of eight suckle feeds, six days in hospital after they attained five out of eight suckle feeds, and four days in hospital after reaching full suckle feeds.

Conclusions
Most infants will be able to be discharged home within two or three days of achieving five out of eight suckle feeds if discharge planning is started at this stage. This may decrease overall length of stay for these infants.

INTRODUCTION

Preterm infants face many hurdles during their stay in the neonatal nursery. Once they are stable and progressing well, the focus shifts from treatment to discharge and feeding becomes an integral part of an infant's progress. There is clear agreement in the literature about when preterm infants are ready for discharge (Medhurst 2005; McGrath and Bodea Braescu 2004; Merrit et al 2003; Raddish and Merritt 1998). Maintaining temperature, fully suckle feeding either by breast or bottle, and gaining weight are the accepted criteria for preterm infants leaving the neonatal nursery. There is wide acceptance of these criteria derived from textbooks such as Nelson's Textbook of Paediatrics (1983). This textbook is often quoted in journal articles reflecting a standard which has led to consistent practice in neonatal nurseries for the last 50 years (Gardener et al 2002; Kliethermes et al 1999; Anderson 1945). Historically, feeding in special care nurseries has been regimented in such a way that baby's feeds are progressed from one suckle feed a day, increasing each day until the infant is taking full suckle feeds. The number of suckle feeds each day are increased according to the baby's performance during feeds as determined by the nursing staff observing good attachment to the breast; a strong suckling cycle by the infant; and lactation let-down by the mother. Once the baby has successfully attained full suckle feeds and is gaining weight the decision is made to discharge the baby home.

Many factors impact on a preterm infant's ability to suckle and progress with feeds, however the parameters and factors which lead to the achievement of full suckle feeding remain largely unexamined (Pickler and Reyna 2003). To date there are only two randomised control trials examining feed progression or transition (Simpson et al 2002; McCain et al 2001). A systematic review which included these two studies determined that feeding protocols may indeed assist in the progression of feeding, but the quality of the study results need to be viewed with caution (Medhurst 2005). Thus it is not clear which is the most successful process to progress suckle feeding, especially in terms of enhancing the mother infant dyad and impacting on length of stay in hospital. Some of the advantages of earlier discharge of infants from neonatal nurseries are increased weight gain, enhanced mother-infant bonding, decreased incidence of iatrogenic illness and lower cost associated with shorter length of stay and fewer readmissions (Touch et al 2001). The criteria for discharge in most neonatal nurseries in Australia remains achievement of full suckle feeds either by breast or bottle (Medhurst 2005).

It was observed in the Royal Brisbane and Women's Hospital Special Care Nursery that despite infants achieving many of the recognised criteria for discharge, some babies remained in hospital for long periods after they had attained full suckle feeds. This was due to the difficulty in predicting at what point a baby would be ready for discharge. Furthermore, some babies were waking for feeds long before formally progressing to full suckle feeds, indicating that progression to full suckle feeds may be attained earlier for these infants.

Another factor that prompted this investigation of feeding practices was the under utilisation of our rooming-in facilities. Families benefit from rooming-in as they gain greater confidence and autonomy in decision making around their baby's care (Raddish and Merritt 1998). Rooming-in gives the family the opportunity to stay with their babies in a self-contained room prior to discharge home. Policy generally requires however that babies attain full suck feeds prior to being roomed-in. Nursing staff in the neonatal unit in which this study was based questioned whether this was necessary and whether more women would use the facility if rooming-in became accepted as part of the normal progression toward discharge and if the requirement to achieve full feeds prior to rooming-in was abolished.

There is difficulty predicting when a preterm infant might be ready to leave the nursery, that is, when they will achieve full suckle feeding. If this were known it would provide a point of reference to begin planning

for rooming-in or discharge. More over, if rooming-in was used as part of the normal progression through the neonatal nursery, it would not be necessary to have a baby on full suckle feeds before rooming-in. This would decrease the length of time in the nursery and shorten the time of separation of the mother and her infant.

In order to improve the nursing staff's ability to predict when an infant would be ready for full feeds and discharge, the unit required more detailed information about current practices. Consequently, the aim of the study was to estimate how long it took a preterm infant to progress from 50% suckle feeds (ie. 4 suckle feeds out of a possible 8) to 100% or 'full' suckle feeds (ie. 8 out of 8), and then from 'full' suckle feeds to discharge. It was also important to determine if babies rooming-in progressed more quickly to discharge.

METHODS

A retrospective cohort of infants born preterm was examined. The cohort consisted of inpatients in a neonatal unit at a tertiary teaching and referral hospital who met the following criteria: 23-24 weeks to <35 weeks gestational age (GA); admitted to the neonatal unit for at least 14 days; and discharged directly home from hospital. The infants could be either bottle or breastfed. Exclusions from the study were infants who: had major congenital abnormalities; infants with or at risk of Neonatal Abstinence Syndrome (NAS); withdrawing infants from opiate dependent women; infants who remained in hospital only because they were awaiting ophthalmology review, surgery, or improvement in maternal well-being; and those planned for transfer to another hospital before going home.

Collected data included: weight and GA at birth; major diagnoses; duration of hospital stay (table 1); the dates the infant reached four suckle feeds out of eight feeds a day (50%), 5 suckle feeds out of 8 feeds per day (63%), and eight suckle feeds (100%); date of discharge; date of rooming-in prior to discharge (if roomed-in); the time taken to progress from 50% suckle feeds to discharge, from 63% suckle feeds to discharge, and from 100% suckle feeds to discharge; and weight (recorded second daily from the time the baby achieved 50% suckle feeds). A comparison of breast feeding to bottle feeding infants was also undertaken. No maternal factors were considered as part of the data collection. Gastric aspirates are not continued in the nursery once full feeds are achieved so this was not a focus of this study. Suck feeds and progression were assessed using a feeding scale, which guides the clinician to a volume requirement should the infant need a top up of milk.

RESULTS

The charts belonging to 66 consecutive infants born between July and December 2002 who met the inclusion criteria were reviewed. Five infants who remained in hospital despite being ready for discharge were excluded. Reasons for exclusion were maternal illness (n = 1); awaiting ophthalmology review (n = 2); and inguinal hernia repair (n = 2). The cohort therefore consisted of 61 infants. Of these infants, five were of gestational diabetic mothers; 12 were diagnosed with hyaline membrane disease; 26 had non-specific respiratory distress; 39 had jaundice

Table 1: Infant characteristics and length of stay of the cohort

	Mean (SD)	Min	1st Q	Median	3rd Q	Max
BW (grams)	1,773 (453)	720	1,450	1,842	2,090	2,750
GA at birth (weeks)	32.1 (2.4)	24.9	31.1	32.9	34.1	34.9
GA at 100% suckle feeds	36.5 (1.3)	32.1	35.7	36.4	37.0	41.7
GA at discharge (weeks)	37.1 (1.2)	32.9	36.4	37.0	37.6	42.3
Duration of hospital stay (days)	34.5 (19.7)	15.0	21.0	26.0	45.0	112.0

of prematurity; five had anemia of prematurity; 19 had apnoea of prematurity; eight had birth weights less than the 10th percentile; three had a patent ductus arteriosus; and two were diagnosed as having chronic lung disease. All babies in this cohort were clinically stable and maintaining their own temperature in an open cot when they achieved 50% suckle feeds. Six infants were one of triplets and 13 were one of twins.

Infants spent an average of eight further days in hospital after they reach 50% suckle feeds; six more days in hospital after they reached five suckle feeds out of eight feeds a day (63%); and approximately four more days in hospital after reaching full suckle feeds (table 2). Twenty-one infants (34%) reached full suckle feeds at ≤2 days after reaching 50% suckle feeds. Fourty-seven infants (77%) reached full suck feeds at ≤2 days after reaching 63% suckle feeds. Fourty-three infants (91%) were gaining weight at the time they reached full suckle feeds (table 2). Twenty-eight infants roomed-in, with a median time from attaining 100% suckle feeds until discharge of 3 days (range 2-6), compared with 3 days (range 1.5-4) in the 33 infants that did not room-in. Using the Mann-Whitney confidence interval (CI) and test, the difference between medians was 0.0 (95% CI -1.0 to 2.0), W = 924.0; this difference was not statistically significant at p=0.42 (adjusted for ties).

Sub-group analysis were undertaken comparing singleton (n=42) with multiple birth infants (n=19) and breastfed compared with bottle-fed infants. Neither of these comparisons showed a difference in time taken from five suckle feeds out of eight feeds (63%) to eight suckle feeds out of eight feeds (100%).

DISCUSSION

The results showed that preterm infants remained in hospital a considerable time even after achieving full suckle feeds and adequate weight gain. One possible explanation for this is the difficulty in predicting when an infant will achieve full suckles feeds. Policies that require the establishment of full suckle feeding before considering discharge often causes delay. This is usually because discharge plans are not made until the infant achieves full suckle feeds with good weight gain. A large majority of the babies will reach full suckle feeds (with adequate weight gain) within two days of achieving five suckle feeds out of eight feeds and this may be the appropriate time to begin rooming-in.

A small randomised controlled trial conducted in the neonatal nursery at a Texas (USA) children's hospital compared progress within two groups of infants (Simpson et al 2002). Thirteen were randomly allocated to the experimental group and had suckle feeding progressed quickly once full tube feeds were established and sixteen were allocated to the control group. This group's initiation of oral feeding and progression of suckle feeding was at the discretion of their attending physicians. The experimental group had a mean of 2.8 days from 50% feeds to full suckle feeds and the control group had a mean of 4.3 days from 50% feeds to full suckle feeds. These results are consistent with our data which

Table 2: Time (days) to achieve various proportions of suckle feeds

	Mean (SD)	Min	1st Q	Median	3rd Q	Max
50% to 100% suckle feeds	4.1 (3.1)	0.0	2.0	3.0	5.0	15.0
63% to 100% suckle feeds	1.8 (2.0)	0.0	0.0	1.0	2.0	10.0

Table 3: Time (days) to achieve various proportions of suckle feeds and discharge home

	Mean (SD)	Min	1st Q	Median	3rd Q	Max
50% suckle feeds to discharge	7.9 (4.1)	2.0	5.0	7.0	10.0	22.0
63% suckle feeds to discharge	5.6 (3.8)	1.0	3.0	5.0	7.0	19.0
100% suckle feeds to discharge	3.8 (3.3)	0.0	2.0	3.0	5.0	18.0

showed a mean time from 50% to full suckle feeds of 4.1 days. The experimental group in the Simpson et al study demonstrates that this duration can be decreased with more rapid progression from tube to suckle feeds.

Our data shows that rooming-in does not enhance earlier discharge because our current practice is to wait until the baby has achieved full suckle feeds before considering rooming-in. Findings from the current study have encouraged us to trial an new approach:

1. Organise for mothers to room-in for two nights once their baby has progressed to five suckle feeds out of eight feeds with a view to discharge when 100% suckle feeds are attained (if gaining weight); or
2. Mother's not wishing to room-in could have their day of discharge planned for 2-3 days after progressing to five suckle feeds out of eight feeds.

These changes will provide the opportunity for women to exclusively breast feed before their infants discharge. If women do not room-in their infants are bottle-fed overnight, to ensure they are capable of taking eight feeds.

In today's environment of cost-effective health care, tertiary hospital beds are a valuable commodity and examination of any possible efficiency can be beneficial to cost saving. It is important that clinicians continue to examine ways to achieve earlier or timely discharge in the neonatal nursery (McGrath and Bodea Braescu 2004). The average daily cost of a shared public bed for a neonate is approximately AUD $250-$300 (Queensland Health 2005). Potential bed cost savings of AUD $1000-$1200 is possible if the length of stay is reduced by four days. This is without the inclusion of medical and nursing hours and clinical supplies.

CONCLUSIONS

We have determined that the overwhelming majority of well preterm infants in our nursery achieve full suckle feeding within two days of achieving five suckle feeds out of eight feeds. We speculate that if discharge is planned for two days after achieving five suckle feeds out of eight feeds that most babies will be able to be discharged home as planned, decreasing overall duration of hospital stay.

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