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I

**THE REASONS WHY WOMEN WITH
SMALL FOR GESTATIONAL AGE BABIES STOP BREASTFEEDING:**

A thesis presented in partial fulfilment of the requirements for the
Master of Arts Degree (Midwifery)
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“The child you have nourished from within for so many months is ready for nourishment from without. After the birth, your body continues to be your baby’s best source of warmth comfort, and food”.

Presser, Storza, Brewer and Freehand, 1983, p.24.

Abstract

There has been a multitude of research literature on breastfeeding benefits, incidence and duration of breastfeeding, characteristics of women who breastfeed and formula feed, and variables associated with breastfeeding initiation and success in the 'general' breastfeeding population. Unfortunately there has been very little written about breastfeeding in women who deliver small for gestational age (SGA) babies.

The literature has demonstrated that women with SGA babies have different characteristics to women in the general breastfeeding population as illustrated in the adjacent literature review. The literature review, which accompanies this thesis, has highlighted the multiple advantages associated with breastfeeding, which may be particularly beneficial for SGA babies. Whether women delivering SGA babies have different breastfeeding experiences, or reasons for discontinuing breastfeeding, however has never been investigated.

The research presented in this thesis is part of a randomised-controlled trial entitled "The effect of educational information on the duration of breastfeeding in small for gestational age babies". Only one arm of this larger study has been analysed due to the restraints of a 75-point thesis. The full program of study is in progress. The primary aim of this arm was to determine why women with small for gestation age babies stop breastfeeding. Other influences on breastfeeding success were also investigated to determine if these external influences were statistically significant.

The findings from this research project have demonstrated that women with SGA babies have the same breastfeeding concerns as women in the general breastfeeding population. The most commonly cited reason for stopping breastfeeding were concerns about 'not enough milk'. Forty four percent of the women cited the midwife as being the most 'valuable' support with their breastfeeding experience. Overall the women with SGA babies had very good breastfeeding rates at 3 and 6 months postnatally compared with the general breastfeeding population statistics. This is a credit to the midwives caring for

these women and babies and may also be related to the fact that term SGA babies have been undernourished in utero and can often be hungry babies with 'catching up' to do.

These research findings also support the idea that the introduction of supplementary bottles administered on the postnatal wards can have a detrimental effect on future breastfeeding success. However, small for gestational age infants are at increased risk of hypoglycaemia and supplemental feeding may be necessary if the infant is feeding poorly or shows evidence of hypoglycaemia. Any strategies that can improve the breastfeeding duration for SGA infants can result in a wide range of health benefits. The adjacent literature review demonstrates that breastfeeding is the best form of infant feeding and may be even more so for small term babies.

Preface

As an adjunct to this research project a large review of the literature on the benefits of breastfeeding and the literature on SGA babies and breastfeeding was reviewed. Literature on the 'characteristics' of the women who deliver SGA babies was also summarised. This revealed that women with SGA babies are more likely to come from a lower socio economic group, smoke, possibly use recreational drugs and have other medical conditions eg. high blood pressure.

Within the following research project is a smaller literature review specifically relating to women with SGA babies and breastfeeding. This literature reveals that no other studies previously carried out have specifically investigated the breastfeeding experiences of women with SGA babies, and more specifically 'the reasons why women with SGA babies stop breastfeeding'. There is only one previous study that investigates the breastfeeding rates or the variables associated with breastfeeding success in women breastfeeding term SGA babies.

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GLOSSARY OF TERMS

The research articles reviewed have statistical abbreviations and medical abbreviations. The following definitions will be used:

Appropriate for Gestational Age (AGA) usually defined as the birth weight between the 10th percentile and the 90th percentile for gestational age.

Confidence Interval (CI) indicates the precision of an estimate. It conveys more information because it indicates a range of values for the true effect.

Gestational Hypertension (GH) is a diastolic ≥ 90 with an increase of 15 mmHg.

Gestational Proteinuric Hypertension was defined as gestational hypertension and proteinuria of $> 300\text{mg}/24$ hours and/or at least '++' [proteinuria on repeated testing with urine dip sticks, in the absence of urinary tract infections.

Intra-Uterine Growth Restriction (IUGR) is a birth weight below the population 10th percentile, corrected for gestational age. Replaced by SGA in recent times.

Low Birth Weight (LBW) refers to all infants whose birth weight is 2500 grams or below, irrespective of the cause and without regard to the duration of gestation.

Milk bank refers to the place where breast milk (donated by other mothers) is stored

Odds Ratio (OR)= odds of event in treatment group/odds of event in comparison group

Otitis media is an inflammation of the middle ear

Relative Risk (RR)= risk of event in treatment group/ risk of event in comparison group

Risk Difference = risk of event in treatment group minus the risk of event in the comparison group, also known as "attributable risk" or absolute risk reduction

SD = standard deviation was defined as a statistic used to measure the variation in a set of scores.

SIDS (sudden infant death syndrome) was defined clinically as the sudden, unexpected death of an apparently healthy infant for which a routine autopsy fails to identify the cause (Schulte, Price, James, 1997, p.184).

Small for Gestational Age (SGA) is a birth weight below the population 10th percentile (corrected for gestational age) of an accepted reference.

ABBREVIATIONS USED IN THIS LITERATURE REVIEW

/ Indicates separation of numerator and denominator

AGA	appropriate for gestational age
GP	general practitioner
GPH	gestational proteinuric hypertension
HIV	human immunodeficiency virus
IUGR	intrauterine growth restriction
LBW	low birth weight
LSCS	lower segment caesarean section
OR	odds ratio
PHC	Public Health Commission
RR	relative risk
SD	standard deviation
SIDS	sudden infant death syndrome
SGA	small for gestational age
UK	United Kingdom
UNICEF	United Nations Children Fund
WHO	World Health Organisation

CHAPTER 1:

Introduction:

It is widely acknowledged that breastfeeding is the best form of infant nutrition and has long term benefits for the infant, mother and society. Benefits established through research are: the transfer of immune factors through breast milk (Hennart, Brasseur, Delogne-Desnoeck, 1991; Ebrahim, 1995; Orlando, 1995), improved infant mortality (Victora et al. 1987; Mitra & Rabbani, 1995), protection from otitis media (Duncan et al. 1993), reduction in sudden infant death syndrome (SIDS) (Mitchell et al. 1991), and a reduction in the development of gastrointestinal diseases (Howie, Forsyth, Ogston, Clark, Florey, 1990). There are also considerable cost savings associated with breastfeeding (Drane, 1997; Riordan, 1997).

In this chapter the importance of research on breastfeeding in women with SGA (small for gestational age) babies will be discussed and an overview of all the chapters given.

This thesis is one component of a larger program of research entitled "the effect of educational information on the duration of breastfeeding small for gestational age babies". The full outline of this research will be described (chapter 5) in order to locate the arm under investigation. The full program of research is too extensive to uncover in this 75-point thesis. Therefore a smaller research investigation has been carried out uncovering the reasons why women with SGA babies stop breastfeeding.

Background

In New Zealand initial breastfeeding rates have reached an acceptable level with 80-90 per cent of women choosing to breastfeed (Ford; Wild; Mitchell, 1995). However the partial and exclusive breastfeeding rates assessed by the Royal New Zealand Plunket Society in 1992 were 72% at three months and in 1997 were 69% at 3 months (Griffiths, 1997). International recommendations advocate that women should breastfeed for at least 4 to 6 months (World Health Organisation [WHO] & United Nations Children's Fund [UNICEF], 1989).

A preliminary New Zealand study of women delivering SGA babies concluded that these women were less likely to breastfeed their babies at three months of age than women from the general population ($p=0.0001$) (Barker [Hutchings], M^cCowan, Harding, 1996). The drop in breastfeeding rates is a public health concern as these infants have a higher infant mortality rate and breastfeeding may be particularly beneficial.

An important study carried out in Brazil concerning SGA babies (Barros, Huttley, Victora, Kirkwood, Vaughan, 1992) revealed that these babies needed special attention from health care workers, as their infant mortality rate was 4.4% higher than that of children with adequate birth weight at term. A well-known New Zealand cot death research study by Mitchell et al. (1991) demonstrated that SGA babies are at increased risk of SIDS. Another study by Lucas, Morley, Cole, Lister, Leeson-Payne (1992) also demonstrated that they are at a greater risk of lowered intelligence, and Pryor (1992) reported significantly lower scores on Stanford Binet scales at ages 3 to 5 years in a group of SGA children when compared with controls matched for sex, birth order and socio-economic status. Lucas et al. (1997) suggested that breastfeeding promotes better development of the eye, brain and central nervous system. Thus breastfeeding has particular benefits for this group of high-risk babies.

My interest in SGA babies was generated (whilst working on a large clinically based research trial) recruiting women to the SGA Doppler study at a large metropolitan hospital (M^cCowan, Harding, Roberts, Barker [Hutchings], Ford, Stewart, 1999). This was a randomised-controlled trial that investigated the use of low dose aspirin in women with SGA pregnancies. The aim of the study was to determine whether 100mg of aspirin taken daily by the women with abnormal umbilical artery Doppler would improve their baby's birth weight. An additional study was commenced to follow up the growth of these SGA babies every 3 months until 2 years of age. It was during this period I noticed a large number of women with SGA babies were bottle feeding their babies and was concerned enough to initiate the following research. I was also aware that these women were from lower socioeconomic groups and many were smokers with the

associated risk of SIDS. Indeed one of the women in the SGA Doppler study had an infant that died in the postnatal period from SIDS. I concluded that research was needed to investigate whether the breastfeeding rate is lower for SGA babies than the general population of babies. The pilot study had a small sample size. If the breastfeeding rate is confirmed to be lower, then it would be important to uncover why women with SGA babies were less likely to breastfeed as there is no previous research in this area.

The most important research questions were: What is the percentage of women with SGA babies breastfeeding at 3 months and 9 months? What is the most important reason for women with SGA babies to stop breastfeeding? Is this reason different than the general population of breastfeeding women? Does formula feeding have an effect on future breastfeeding success in women with SGA babies? What do women with SGA babies perceive as being helpful and valuable with their breastfeeding experience? Does early discharge from hospital have any effect on the future ability to breastfeed?

The research pertaining specifically to breastfeeding and SGA babies has been undertaken predominantly by the medical profession, particularly pediatricians and also a particularly relevant study by a nutritionist. These will be explored in the following review of the literature. Small for gestational age is a medical classification. Lawrence (1994, p.369) states that the "small for gestational age infant will be identified where gestational age and birth weight are scrutinised". This infant is small at birth despite full gestational time *in utero*. Common medical causes identified by Lawrence are placental insufficiency, maternal disease, toxemia [Gestational Proteinuric Hypertension], heavy smoking, or more rarely intrauterine infection such as toxoplasmosis. Lawrence (1994, p.369) suggests "tube feeding for the first few days as they may be difficult to feed" and he suggests "the SGA infant should be placed on frequent feeding, every two to three hours by day and every four hours by night". Many hospital protocol feeding regimes for SGA babies are three hourly by day and night. These strict feeding regimes suggested by many pediatricians can be difficult to maintain and may also be detrimental as many women resort to formula due to

the stress of meeting the frequent feeding demands. The woman's confidence may also be impaired if she becomes increasingly anxious about the need to provide adequate amounts of milk to nourish the SGA baby. The importance of maintaining normal blood glucose levels cannot be underestimated and this balance needs to be carefully considered. Breastfeeding should be resumed as soon as possible if formula or tube feeding is necessary.

Aim

The primary aim of the current research (described in chapter 6) was to determine why women with SGA babies stop breastfeeding. In order to meet this aim the following objectives were formulated:

- To determine the percentage of women with SGA babies exclusively and partially breastfeeding at 3 months post delivery.
- To determine the percentage of women with SGA babies exclusively and partially breastfeeding at 6 months post delivery.
- To determine the effect of early discharge from hospital on the duration of breastfeeding.
- To determine the effect of formula feeding (during hospital stay) on future breastfeeding success in women with SGA babies.
- To ascertain what women perceive as being helpful and valuable with their breastfeeding experience.

Justification

There are numerous positive benefits associated with breastfeeding that will be reviewed in detail as an adjunct to this study. The lack of research pertaining specifically to SGA babies and breastfeeding will be evident in the review of the literature (chapter 3). The problems and risk factors associated with SGA babies makes breastfeeding even more important for this group of at risk babies.

Research needs to be carried out that investigates the reasons why women with SGA babies discontinue breastfeeding, as these reasons may be different from

those in the general population. The results from this research will be useful in helping midwives and doctors care for these women and babies in the antenatal and postnatal period. If any specific causative factors are identified, measures may be taken to assist these women and babies in the future. Subsequently the future well being of these babies may be improved.

Outline of the following chapters

I carried out an extensive literature search in an attempt to uncover research specifically on SGA babies and breastfeeding. The larger research study on “the effect of educational information on the duration of breastfeeding SGA babies” will not be presented, as it is too extensive for a 75-point thesis. Only the small subset of the breastfeeding research and literature most pertinent to women with SGA babies and breastfeeding has therefore been included in this thesis. The literature on breastfeeding and SGA babies, which is not directly, but indirectly related, has been written up as an adjunct to this study. Another smaller sub-set of literature directly relating to breastfeeding and SGA babies will be reviewed in chapter 3 and the interventions aimed at improving breastfeeding rates will be reviewed in chapter 4.

In chapter 5 the initial full study will be described and the research design of the selected arm explored in this thesis will be outlined.

The reasons why women with SGA babies stop breastfeeding will be analysed in chapter 6 and chapter 7 will focus on interpreting the results of this research. Discussion of these results will be carried out in chapter 8 and overall conclusions will be made in chapter 9. Recommendations will be offered to assist midwives, nurses and doctors who care for these women and babies.

In the following chapter the physiology and pathophysiology related to breastfeeding term, SGA babies will be reviewed.

CHAPTER 2:

**Physiology and Pathophysiology related to breastfeeding term,
small for gestational age babies:**

To understand breastfeeding midwives must have knowledge of the mechanics of how the baby breastfeeds, the duration and frequency of the feeds, the correct positioning of the baby on the breast, and care of the breasts, to name a few. Fortunately in many circumstances breastfeeding is a natural physiological process and advice is usually only required when there are breastfeeding difficulties. Midwives, other health professionals, friends and relatives also advise women on how to prevent difficulties and what the 'norm' is. The pathophysiology of breastfeeding the SGA baby is the same in many circumstances as the AGA baby and the same principles, knowledge and advice would apply. There are however special considerations that would apply with breastfeeding the term SGA baby. The following breastfeeding considerations for SGA babies will be reviewed in this chapter: whether the breast milk constituents are different for women delivering SGA babies; whether women with SGA babies have added stress which may affect their let-down reflex; whether maternal malnutrition affects breast milk production; and other special considerations such as, weight gain, hypoglycaemia, hypothermia, small mouth and congenital abnormalities. Other important considerations are; when the woman decides not to breastfeed, drug usage, and the human immunodeficiency virus. All of these factors are pertinent for women delivering SGA babies and warrant further investigation.

Breast milk constituents in women with small for gestational age babies

Rodriguez-Palmero, Koletzko, Kunz and Jensen (1999) examined in detail the composition of human milk. It is already well documented that breast milk has a balanced nutrient composition and a number of conditionally essential nutrients (Jelliffe, Jelliffe, 1979; Hennart, Brasseur, Delogne-Desnoeck, 1991; Cuthbertson, 1999). Lipids have an important role as precursors for the formation of prostaglandins, prostacyclins, and other lipid mediators. They are also essential components in membrane-rich tissue, particularly the brain and the retina, further supporting the theory that human milk may have an effect on

developmental outcomes and may be particularly beneficial for women delivering SGA babies. Rodriguez-Palmero et al. (1999) postulate that breast milk has different types and classes of bioactive factors, such as hormones, enzymes, and growth factors. It is already well known that these bioactive factors have a supporting role in infant growth and development. This is particularly significant for women delivering SGA babies as these bioactive factors may help the infant grow at a faster rate. Bioactive agents that have been isolated and quantified in breast milk, include antimicrobial factors; secretory IgA, oligosaccharides, fatty acids, anti-inflammatory agents; digestive enzymes, transporters (lactoferrin). There are also several nonpeptide hormones (cortisol, thyroid hormones, pregnanediol, estrogens, progesterone, and artificial contraceptive) and peptide hormones and growth factors (hHG, erythropoietin, epidermal growth factor insulin, gonadotropin-releasing hormone, insulin-like growth factor-I, nerve growth factor, thyroid-parathyroid, gastrointestinal regulatory peptides and hormones transforming growth factor-alpha). Some of these components have vital roles in the maturation of the gastrointestinal tract of the infant. It is clear from the research by Rodriguez-Palmero et al. (1999) that it is highly unlikely breast milk could be artificially replicated. Many of the bioactive agents in breast milk and the subsequent effect on humans have not been researched yet. Many of these factors may have important effects on the growth and development of the newborn and may be particularly beneficial in SGA babies.

Research has been carried out exploring the effect of breast milk on specific infant groups. Unfortunately most of the studies on breast milk compositions in these infants only investigate outcomes in the first year of life. They also fail to examine the breastfeeding experiences of women delivering SGA babies. The most prevalent research on breast milk composition has been carried out with premature and LBW babies (Luukkainen, Salo, Nikkari, 1995; Genzel-Boroviczeny, Wahle, Koletzko, 1997; Faldella et al. 1996; Beijers, Schaafsma, 1996). There have been several research trials investigating breast milk compositions in women delivering term SGA babies (Pamblanco, Portoles, Paredes, Ten, Comin, 1989; Awasthi, Misra, Malik, Agarwal, Saksena, 1989; Boehm et al. 1991; Grumach, Jeronimo, Hage, Carneiro-Sampaio, 1993; Cosgrove, Losty, Jenkins, Davies, 1997). There are also several trials with SGA,

preterm infants (Pamblanco, Ten, Comin, 1986; Boehm, Melichar, Lorenz, Muller, Beyreiss, 1985; Boehm, Springer, Muller, Senger, 1989; Boehm, Jakobsson, Mansson, Raiha, 1992). The data specifically on preterm, SGA infants however will not be analysed as the findings may be complicated by prematurity. Further discussions will be confined to studies on term SGA infants.

Comparison of human breast milk with common supplements

It is well known that human breast milk is a very complex and highly unique secretion that is unable to be replicated from the milk of other species (Jelliffe & Jelliffe, 1979). The following species have been used in different cultures to rear human children: cow, goat, camel, horse, buffalo, reindeer, yak. In the Western world, cow's milk has been the basis of bottle-feeding.

The very success of commercial preparations has lured us into believing that we need to know very little about nutrition, as all infants thrive on any number of formulas readily available at the pharmacy and, in some instances, the supermarket. Is our sense of confidence well founded? I am not certain.

(Lowe, 1971, p.245)

For this reason much research has been carried out comparing the differences between human milk and cow's milk. Pan and Izumi (2000) researched the variation of the ganglioside (glycolipids of the basic composition ceramide-glucose-galactose-*N*-acetyl neuraminic acid) compositions of human milk, cow's milk and infant formulas. The results demonstrate a drastic change in the ganglioside composition from colostrum to later breast milk. They also identified that the patterns and contents of gangliosides in cow's milk, human milk and infant formulas differed markedly. To be more specific, in human milk, the total lipid-bound sialic acid level was twice the levels of those in infant formulas and cow's milk. Pan and Izumi (2000) hypothesise that gangliosides in breast milk, infant formulas and cow's milk may have a biological significance regarding infant

growth, neonatal brain development and allergies. As demonstrated, there are major differences in the gross composition of breast milk and cow's milk.

Other research has demonstrated considerable variations in the composition of breast milk, particularly in women from diverse cultural groups with different diets. This variance in breast milk composition suggests that it may ultimately be possible to design infant formulas better able to meet the needs of individual infants than the milk available from the mother's breast. This may be what has instigated the many studies examining the effects of certain supplements in specific infant groups such as SGA babies. Research carried out by Lucas, Fewtrell, Davies, Bishop, Clough and Cole (1997) on L-carnitine supplementation in SGA babies is examined in further detail in chapter 4. Zinc supplementation (Castillo-Duran, Rodriguez, Venegas, Alvarez, Icaza, 1995) and nucleotide supplementation have been researched in SGA infants (Cosgrove, Davies & Jenkins, 1996). According to Cosgrove (1998) "nucleotides are ubiquitous intracellular compounds of crucial importance to cellular function and metabolism"(p.748). The first trial that Cosgrove, Davies and Jenkins (1996) carried out was a double blind randomised controlled trial investigating nucleotide supplementation (n=39) vs standard formula (n=35). The trial formula was provided over a six-month period. The findings suggested that the nucleotide supplemented infants had significantly higher mean rates of gain of weight (91 compared with 71.8 g/kg baseline weight/week), length (16.2 mm/m compared with 15.0 mm/m baseline length/week), and head circumference (11.8 mm/m compared with 10.8 mm/m baseline head circumference/week). The investigators concluded that catch-up growth in SGA infants was improved by nucleotide supplementation of infant formula.

Cosgrove, Losty, Jenkins and Davies, (1997) continued their research on the effects of nucleotide supplementation with SGA infants. This following randomised-controlled trial was similar to the previous trial, the only major difference being the inclusion of a third group of breast fed infants. The investigators were particularly interested in the pancreatic exocrine function in SGA infants. The results suggested that nucleotide supplementation did not effect pancreatic exocrine function and further research was necessary in this area.

Cuthbertson (1999) warns that without well-designed, large controlled trials investigating the effect of infant formula and supplementations on human health and development from infancy through to adulthood, serious health and safety concerns may be overlooked. There are several studies that investigate breastfeeding and subsequent neurodevelopmental status (Bauer, Ewald, Hoffman, Dubanoski, 1991; Rogan, 1993; Niemela, 1996; Morrow-Tlucak, Hawde, Ernhart, 1998; Richards, 1998). As mentioned previously in the adjacent literature, the results are conflicting and further research needs to be carried out investigating whether there is indeed a trend emerging.

A Brazilian study carried out by Grumach, Jeronimo, Hage, Carneiro-Sampaio (1993) researched the immunological factors in breast milk from Brazilian mothers delivering SGA babies. This was unfortunately not a randomised-controlled trial. Demographic data was analysed to determine any statistically significant differences between the SGA and AGA groups. There were also no differences in relation to the parity, mother's age or type of delivery. Breast milk samples were collected from three groups of women. The first were mothers delivering term, LBW babies (SGA) (n=16), the second were preterm AGA babies (n=20), and the third were mothers delivering term, AGA babies (n=30). The investigators collected breast milk samples at 48 hrs and on the 7th, 15th, 30th and 60th days after delivery. The samples were analysed for immunological factors; lysozyme, total IgA levels, rotavirus, herpes simplex virus, antibodies against polioviruses I, II, III, varicella zoster and cytomegalovirus. The findings suggest that there are no differences in immunological factors between the mothers delivering term SGA babies, preterm AGA babies and AGA babies.

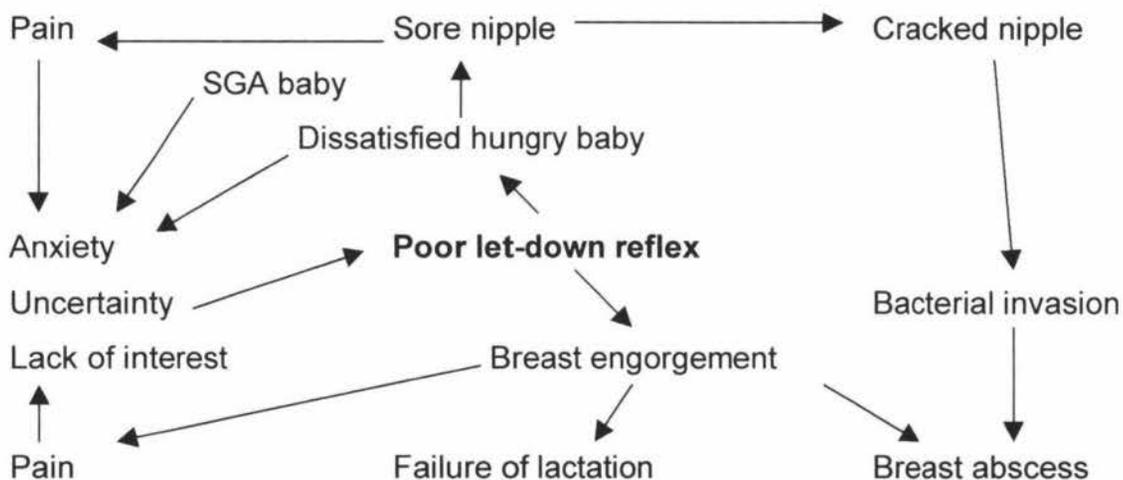
Grumach, Jeronimo, Hage, Carneiro-Sampaio, (1993) went on to further analyse the nutritional aspects of the breast milk from the same group of women. In this study the nutritional factors were the focus of the investigation. A total of 209 milk samples from 66 women were analysed for the following factors: total proteins and protein fractions, osmolarity, creatinocrit, calcium, magnesium, sodium and potassium. The findings demonstrated that the groups did not differ

significantly in terms of total proteins and protein fractions, osmolarity, creatinocrit, calcium, magnesium and potassium throughout the study period. There were however higher sodium levels in all samples from mothers of term SGA infants and in samples from mothers of preterm AGA infants (on the 7th, 15th and 30th days) than in milk from the term AGA group. These findings may suggest that high sodium levels may be necessary for growth of low birth weight infants. It is interesting to note that women with term SGA babies produced similar nutritional contents to the preterm AGA infants. Further research needs to be carried out on why this physiological process may occur. It may be that the human body naturally compensates for what is lacking for infants in breast milk.

Emotional stress and the effect on breastfeeding

As already discussed in the adjunct larger literature review, women delivering SGA babies often have stressful events occurring in their lives. It is also common knowledge that stress has the ability to interfere with the let-down reflex, which is necessary for successful breastfeeding. As stated by Jelliffe and Jelliffe (1978), "environmental psychosocial stress can have an effect on poor lactational performance. Such stress is occasioned by poverty and unemployment, poor housing and crime, by illegitimacy and family instability, and by cultural confusion and uncertainty, and is probably manifested through the effect of anxiety on the let-down reflex" (p.62). The let-down reflex (draught or milk-ejection reflex) is quite different to the other breastfeeding reflexes (prolactin reflex, nipple-erection reflex) in that it is psychosomatic (Newton & Newton, 1967). As Jelliffe and Jelliffe (1978) support, it is the difference between the ability to produce milk in the alveoli and then making sure the milk available in the terminal lacteals- i.e. between making milk and giving milk. In further detail, the somatic component is produced by the suckling infant (stimulation of the mechanoreceptors in the nipple and areola leading to the nerve impulses to the hypothalamus). This in turn stimulates the posterior pituitary, which secretes oxytocin. The hormone oxytocin has other important functions of contracting and assisting with the involution of the uterus, and increased blood flow and raised temperature in the breast. The most important function is on the basket (myoepithelial) cells surrounding the alveoli. The contraction of these cells

squeezes the milk out of the alveoli and allows the 'let-down' to occur into the terminal lacteals. This let-down is crucial to the baby easily and successfully obtaining milk while breastfeeding. As Jelliffe and Jelliffe (1978) support, the human let-down reflex can be facilitated or inhibited by the mother's emotional state, "stress due to anxiety or uncertainty can inhibit or block the let-down reflex" (p. 22). This is believed to be due to adrenaline (epinephrine) being released and causing constriction of the blood vessels around the alveoli, this in turn decreases the ability for the circulating oxytocin to reach the target tissue, the basket cells surrounding the alveoli. Problems created by stress and inhibition of the let-down reflex can create a difficult negative cycle. The following diagram demonstrates an example of factors that may be responsible for poor let-down reflex.



Adapted from: Jelliffe and Jelliffe (1979)

Figure 1: Factors that may be responsible for the inhibition of the let-down reflex

Mothers can often interpret this failure of let-down as 'not enough milk or as 'milk that didn't suit the baby'. Complementary feeding with formula will interfere with the let-down reflex as it diminishes the baby's appetite and diminishes the suckling at the breast by the infant. This will be even more pertinent for an SGA baby as already mentioned, it is common practice to order additional supplementary feeds for an SGA infant to prevent hypoglycaemia.

Malnutrition and the effect on breastfeeding

Another aspect that needs to be considered in women delivering SGA babies is whether the mothers of these infants are well nourished. As previously mentioned in the adjunct literature review women may have an SGA baby as a result of severe malnutrition, for example, in third world countries, or medical disorders, such as Crohn's disease. Luckily in New Zealand maternal malnutrition is very rare. Vitamin deficiencies are more common in New Zealand and are often caused by a poor diet or strict diets such as those of vegetarians. Malnutrition is known to also interfere with the prolactin reflex, which as already discussed, is a vital component of breastfeeding (Jelliffe & Jelliffe, 1978).

A wide range of diseases can occur in early childhood, predominantly in resource poor communities and third world countries. Some of the problems relating to deficiencies can occur in communities eating a diet lacking in a particular vitamin. This in turn can lead to deficiencies in the breast-fed child.

Research by Smit, Oelen, Seerat, Muskiet, Boersma (2000) on 8 malnourished breast-fed Pakistani infants suggests that maternal diets low in omega3 fatty acid may be responsible. They recommend the augmentation of the infants' omega3 long chain polyunsaturated fatty acid status, by supplementation. This is particularly beneficial in deprived circumstances where mothers' access to fresh fish is difficult. Smit et al (2000) suggest the prevention of malnutrition in infants through maternal supplements of these long chain polyunsaturated fatty acids, preferably from early pregnancy onwards. Further research is required to determine whether women with an SGA baby resulting from malnutrition may benefit from omega3 long chain polyunsaturated fatty acid supplementation in the antenatal period, to prevent postnatal malnutrition of their infants.

There are a number of studies that investigate the association between vitamin and mineral deficiencies and breastfeeding outcomes. "The level of vitamins in human milk is affected by inadequate maternal nutritional status, especially the water-soluble vitamins (such as ascorbic acid and vitamin A)" state Jelliffe &

Jelliffe (1978,p.41). There has been recent research to suggest that maternal vitamin B-12 deficiency, possibly related to a vegan diet or with pernicious anaemia, can cause B-12 deficiency in the infant (Michaud, Lemieux, Lambert, 1992). Mothers who are susceptible to vitamin B-12 deficiency should be aware of this risk when breastfeeding as this deficiency can lead to neurological damage if not treated. Infants may need to be screened as a preventative measure.

Miranda et al. (1983) carried out a study on the effect of maternal nutritional status on immunological substances in human colostrum and milk. This was a small study of 23 Colombian women during the first 2 months of lactation. Maternal malnutrition was characterised by significantly lower weight/height ratio, total serum proteins, creatinine/height index, serum albumin, and serum IgA and IgG. The findings suggest that the colostrum of malnourished mothers contained less than half the normal level of albumin and only a third the normal concentration of immunoglobulin G. Significant reductions in the colostrum levels of IgA and the fourth component of complement (C4) were also observed in the malnourished group. This research suggests that maternal nutrition can have a significant effect on the protective qualities of colostrum and milk.

Marin-Spring et al. (1985) researched the fat and energy content of breast milk of malnourished and well nourished women in Brazil. This investigation was carried out with 71 Brazilian women from a poor socio-economic background and in 10 from a high social class. All were breastfeeding their infants without supplements. The milk of the malnourished mothers, was slightly richer in fat than that of well-nourished women, however this finding was not statistically significant.

The research literature suggests that maternal nutrition can have a significant effect on the quality of the breast milk and the immunological, fatty acid, vitamin, mineral and fat requirements of the newborn. Women should therefore be educated about the importance of a well-balanced nutritional diet while lactating and be cautioned about dieting in the postnatal period (Renfrew, Fisher & Arms,

1990). This may be particularly important for women with SGA babies, as the babies may need to catch-up on growth in the postnatal period.

Smoking and the effect on breastfeeding

Smoking has been researched by a number of investigators with regards to lactation. This will not be reviewed in great depth as it has been covered in detail in the adjunct literature review. It is important however to realise that smoking can reduce breast milk production (Hopkinson, Schanler, Fraley, Garza, 1992) and smoking around an infant is also linked to SIDS (Mitchell et al., 1991). Women should be educated about the risks involved, not only to themselves, of course, but to their baby and their possible breastfeeding success.

Special considerations when breastfeeding small for gestational age babies

Weight gain

The monitoring of weight and weight gain is far more crucial in an SGA baby than an AGA baby. If an SGA baby loses more than 10% of his/her total body weight (measured from birth) by the tenth day of life, this is often considered to be abnormal or concerning (Lang, 1997). The mother of the SGA baby may be far more anxious if this occurs and this added stress may further affect the let-down reflex. If excessive weight loss occurs the midwife or pediatrician may suggest top-up formula feeding to ensure added calories. Lang (1997) on the other hand suggests that "babies who have low birth weight for gestational age are another group who may lose little weight at birth. These babies are often hungry and may want to feed more frequently than babies whose birth weight is appropriate for their gestational age" (p.103). This may create added stress on the mother, damage her nipples, or result in engorgement, if the SGA baby feeds too frequently.

It is important to realise that growth patterns of breast and formula fed babies are different (Lang, 1997). In the first 2 or 3 months after birth breastfed babies put on more weight than formula fed babies. What is not allowed for on growth

charts (used by the NZ Plunket Nurses) is that from the third or fourth month breastfed babies tend to grow more slowly. This may be a time when women with SGA babies introduce formula feeds if they are concerned by the decreasing growth on the growth charts. Supplemental feeding can have a detrimental effect on future breastfeeding success as it can interfere with the prolactin reflex (milk-secretion reflex). This reflex is controlled by prolactin, the key lactogenic hormone in initiating and maintaining milk secretion. Its production by the anterior pituitary is mainly the result of the prolactin reflex, resulting from the baby suckling at the breast. As stated by Jelliffe and Jelliffe (1978), the prolactin reflex is a "quantitative phenomenon in that the prolactin secreted, and hence the milk produced, is related to the amount of sucking stimulus, that is the frequency, intensity, and duration with which the baby nurses"(p.15). Consequently if bottles are introduced (or a pacifier) the suckling vigor of the baby will be reduced, and less milk will be produced (Jelliffe & Jelliffe, 1978).

Hypoglycaemia

SGA babies have long been recognised to be at high risk for neonatal hypoglycaemia as they do not have extra fat stores to compensate for the low blood sugar levels (Cornblath, Odell, Levin, 1959). World Health Organisation (1997) further postulates that "factors which may account for this include a high brain: body mass ratio (with corresponding increase in glucose consumption), reduced fat stores, failure of counter regulation (including delayed maturation of gluconeogenesis) and hyperinsulinism" (p. 15). Research suggests that there were elevated concentrations of gluconeogenic pathways (alanine and lactate levels) in SGA infants, however, this was even more apparent in the preterm SGA infants (Haymond, Karl, Pagliara, 1974; Mestyan, Soltesz, Schultz, Horvath, 1975; Hawdon & Platt-Ward, 1993; WHO, 1997). There is debate in the literature regarding the normal lower limit blood glucose level, either for term or pre term babies. According to Sweet (1999), hypoglycemia occurs when the blood glucose is less than 1.7 mmol/ litre in the term AGA baby. In a more recent study by Hawdon, Ward-Platt, and Ansley-Green (1992), neonatal hypoglycaemia is defined as a blood glucose level below 2.6 mmol/ l. It often presents within the first 72 hours post delivery and if not treated may lead to serious brain damage.

According to WHO (1997), newborns at risk who do not show abnormal clinical signs (asymptomatic), the blood glucose concentration should preferably be maintained at or above 2.6 mmol/l. The World Health Organisation (1997) also recommend that if the blood sugar concentration is below 2.6 mmol/l the following should be carried out:

- 1.) The infant should be fed. This can be a breastfeed if the infant can suckle adequately. If not, EBM or an appropriate milk substitute can be given by cup or gavage.
- 2.) The blood glucose measurement should be repeated preferably 1 hour and certainly before the next feed 3 hours later. They recommend that if the blood sugar concentration is still below 2.6 mmol/l, treatment with intravenous glucose should be considered.
- 3.) Breastfeeding should continue.

World Health Organisation (1997) also go on to advise that if a newborn is unwell or shows signs of hypoglycemia, blood glucose should be measured urgently, and if below 2.6 mmol/l, intravenous glucose should be administered as soon as possible.

The monitoring and prevention of hypoglycaemia are crucial. Lang (1997) describes the symptoms of hypoglycaemia: jitteriness, poor feeding, tremors and abnormal crying. World Health Organisation (1997) does not recommend excessive blood sampling in SGA infants. "Reliable laboratory measurements of cord blood glucose and blood glucose at 4-6 hours of age (before the second feed) are preferable" (WHO, 1997, p.33).

The baby of the diabetic mother is at higher risk of hypoglycaemia because he/she continues to over-produce insulin for some hours after the birth. Other babies who are at risk of hypoglycaemia are babies with asphyxia at birth, respiratory distress, haemolytic disease, cerebral damage and rare metabolic disorders.

Babies who are SGA at birth are also at risk of asphyxia as they may not cope with the added stress of contractions in labour. This would make these babies even more vulnerable to hypoglycaemia. Due to the known risk of hypoglycaemia and the very serious consequences, pediatricians may order an

early feed (Wright, Stanley, Anday, Baker, 1983) and subsequent 3 hourly blood glucose monitoring and 3 hourly breastfeeds with an added formula top up to prevent this complication occurring. Lang (1997) also suggests that the baby's colour, breathing pattern, temperature and muscle tone should be assessed at each feed. If the blood sugar level has remained above 2.6 mmol/ l (or whatever is considered appropriate according to the local policies), then further testing is usually discontinued. Lang (1997) advised that the baby be fed regularly and that feeding should be gradually reduced from 3 hourly to 4 hourly and then to demand feeding. World Health Organisation (1997) recommends enteral feeding in healthy SGA infants at "90 ml kg⁻¹ d⁻¹ as 3 hourly feeds on the first day and increase in 30 ml kg⁻¹ steps daily"(p. 37). World Health Organisation (1997) highlights an absence of well designed randomised-controlled trials to investigate the incidence of hypoglycaemia among SGA babies exclusively breastfed on demand or breastfed with supplements. There is also conflicting advice in the literature about the standardised care for the prevention and treatment of hypoglycaemia in SGA babies. Lang (1997) recommends the most standard advice that if the blood glucose falls below 2.6 mmol/ l the baby should be assessed by a pediatrician. If the blood glucose level is below 1.1 mmol/ l the baby should be assessed immediately by a pediatrician and the administration of an intravenous solution of dextrose quickly given to raise the blood glucose level. Once again, this advice may vary between pediatricians depending on their method of practice.

A potential negative cycle associated with the feeding requirements of SGA babies at risk of hypoglycemia may be like that presented in figure 2.



Figure 2: The possible adverse effects of hypoglycaemia on breastfeeding

This diagram illustrates the potential consequences of hypoglycaemia if the staff members involved do not care for the woman and baby sensitively and appropriately. If the lethargy and poor feeding are reversed quickly through the administration of glucose the negative cycle may be prevented. Making sure the woman's confidence in her ability to breastfeed is maintained can be crucial. If the woman is aware of the lethargy and poor feeding associated with hypoglycaemia she may not feel the same level of failure from her breastfeeding experience. As soon as the baby is well enough and not as lethargic,

breastfeeding can be initiated once again. Always offering the breast before administering a bottle is necessary. Lang (1997) advises the use of cup or spoon-feeding as a successful replacement to bottle-feeding. Cup feeding does not have the same risk of interfering with the natural suckling mechanism according to Neifert, Lawrence and Seacat (1995) and Thornley (1997). Care does need to be taken when cup feeding as it is possible for the infant to aspirate milk if carried out incorrectly (Kuehl, 1997).

A research trial by Howard et al. (1999) investigated the physiologic stability of infants during, cup, breast and bottle-feeding. A total of 98 term, healthy newborns were randomised to receive either cup feeding (n=51) or bottle-feeding (n=47). There were a further 25 (not randomised) breastfed infants who were also assessed. Measurements were carried out while the mother/ midwife was feeding the infants. These were: heart rate, respiratory, and oxygen saturation rates. Analysis of variances and t-tests were carried out to determine if there were any differences in the administration times and the physiological data. The results demonstrated no significant differences in the administration times, amount ingested, heart rates and oxygen levels between the cup and bottle groups. It was interesting to note that there was less physiological variability in the breastfed infants. The findings support that breastfeeding is definitely the best method of infant feeding. Cup feeding may be a good alternative to bottle feeding as results support no significant differences in the physiological data and other findings suggest a greater prevalence of nipple confusion with bottle fed infants (Neifart et al. 1995). Ideally expressed breast milk should be given. Research needs to be carried out investigating the effects of cup feeding in SGA infants.

The risk of hypoglycaemia in SGA babies and the subsequent monitoring and regular feeding has a profound effect on the breastfeeding practices, however there has been no research carried out to determine whether the routine administration of formula feeds has a subsequent effect on breastfeeding in SGA babies. This warrants further investigation as there may be other methods of administering formula eg. cup-feeds, nasogastric tube feeds, nursing supplementer, syringes and droppers, if bottles are found to have a negative

effect on long term breastfeeding success. The most important consideration is the baby's health and well being as the prevention of hypoglycaemia is very important. The complications arising from being born SGA do not stop in the newborn period. Breastfeeding has been demonstrated in the adjunct literature review to prevent newborn, childhood and adult complications. Breastfeeding has also been demonstrated to prevent many of these complications and so the method of feeding and the later consequences warrant further investigation. If routine 3 hourly formula feeding or top-up formula feeding is found to have a negative effect on the subsequent breastfeeding success, other methods of feeding may be offered which does not compromise the safety of the infant. The guidelines developed by WHO (1997) offer the most comprehensive guidance for the prevention and treatment of hypoglycemia in SGA babies.

Hypothermia

Small for gestational age infants are predisposed to hypothermia as they have a relatively large surface area. This increases evaporation and radiant heat loss. Limited subcutaneous tissue and brown fat stores contribute to a decreased ability to produce heat (Merenstein & Gardner, 1993). Another aspect that may contribute to hypothermia in SGA infants is their high metabolic rate. This is possibly caused by their larger brain size compared to body weight according to Sinclair (1970). The behavioural changes with hypothermia are: hypotonia, weak crying, and weak suckling. Late signs of hypothermia may be as drastic as acrocyanosis and respiratory distress. Chronic hypothermia may result in poor weight gain and must be considered with SGA babies who do not thrive (Merenstein & Gardner, 1993). Another important aspect to consider with an SGA infant is that glucose is consumed during the non-shivering production of heat. Therefore the infant who already has low glucose levels may become even more hypoglycaemic with added thermal stress (Merenstein & Gardner, 1993). As already mentioned, hypothermia can cause major difficulties with feeding. Therefore the prevention of hypothermia is important as it can help prevent hypoglycaemia in these infants and potentially improve their ability to feed. If temperature is unable to be regulated an incubator may be warranted. Premature SGA infants will definitely require care in an incubator. With the term

SGA infant incubators are rarely necessary if care is taken to keep the infant warm and well fed. It is important that the other extreme of 'over heating' the infant does not occur. The hyperthermic infant may be lethargic, irritable, hypotonic, have a weak cry and be a poor feeder (Merenstein & Gardner, 1993). Once again this can have major consequences on the infants ability to feed successfully as it can interfere with the prolactin reflex (Jelliffe & Jelliffe, 1978). Hypothermia or hyperthermia may occur with infections and must always be considered with an SGA infant who is having difficulty maintaining a normal temperature. Regular temperature monitoring in the SGA infant is advisable, as the consequences of hypo or hyperthermia can result in a vicious cycle of symptoms. These symptoms can certainly interfere with breastfeeding success in these infants. While breastfeeding, the SGA baby should be warmly wrapped and the simple method of woollen hat and booties can help to prevent hypothermia.

Small mouth

The aspect of breastfeeding an infant with a small mouth is very neglected in the literature. From my own personal experience there have been times when a woman with large nipples is unable to feed her baby as the baby has a very small mouth or jaw. This can make breastfeeding impossible as the infant is physically unable to open his/ her mouth wide enough to milk the ducts behind the areola with his/ her tongue (Royal College of Midwives, 1989). Luckily the nipples and breasts tissues are composed of flexible tissue and can be moulded to fit the baby's mouth. Fortunately in most circumstances the baby is able to correctly suckle on the nipple. The prevalence of difficulties occurring from infants with small mouth or jaw will however be greater in women with SGA infants. Making sure the baby's mouth is opened as wide as possible when initially placing the baby on the breast is essential if the woman has large nipples. Kitzinger (1989) also agrees that it is much more difficult for the baby to get a firm latch on the breast. Nipple shields may be recommended as an alternative method of breastfeeding in circumstances when the baby is unable to latch on the breast or the woman has sore nipples. There are disadvantages associated with the use of nipple shields and women should be warned about these problems. The

Royal College of Midwives (1989) believes that their use in the “early days of lactation may lead to a conditioned rejection of the breast by the baby” (p. 54). They also warn that prolonged use can reduce the mothers milk supply as there is a less efficient milking action of the baby’s tongue and jaw through the layer of rubber. There are certain instances when the mother can benefit from the use of nipple shields, particularly if their nipples are severely traumatised.

Congenital abnormalities and syndromes

Babies who are born SGA are at greater risk of congenital abnormalities and syndromes as previously discussed in the adjacent literature review. It is not possible to cover the syndromes in detail, as there are so many varied disorders. There are however special considerations for feeding and these will need to be reviewed on an individual basis. If the baby has a cleft lip this should not cause any feeding problems (Royal College of Midwives, 1989), however an initial period of spoon-feeding may be necessary. The cleft palate, unless very small, will cause major breastfeeding problems. The baby will be unable to create an effective seal around the nipple, which is a pre-requisite for effective breastfeeding. Breast milk may be expressed and given to the baby using a special teat or spoon. In some instances breastfeeding may be possible if a woman has large elastic breasts that can be moulded to create a seal. Another syndrome which may also be associated with breastfeeding difficulties is the cri du chat syndrome (deletion of a portion of chromosome number 5). Again there is a small jaw and associated mental retardation which may have consequences on breastfeeding. As with many syndromes, they may not always be picked up in the early postnatal period unless the children have distinctive features. Small for gestational age babies with feeding difficulties may have underlying syndromes associated with uncoordinated suckling mechanisms and small, poorly developed jaws. Chromosomal abnormalities are rare, but, should be considered in women with SGA babies and any characteristics and features associated with these syndromes. Diagnosis would be required through genetic testing from specialist pediatricians and genetic counsellors.

Drug usage and breastfeeding

Research literature supports the theory that alcohol, caffeine, nicotine and marijuana do enter the breast milk and can have a detrimental effect on the composition, volume, production and ejection of breast milk (Liston, 1998). This will subsequently have a direct adverse effect on the infant. The large literature review adjunct to this thesis clearly identifies that there is an increased incidence of women using recreational drugs delivering SGA babies.

Atkinson, Begg and Darlow (1988) examined the clinical pharmacokinetic considerations of drug use and breastfeeding. Atkinson et al. (1988) stated that "recommendations regarding 'social' drugs such as nicotine, alcohol, caffeine and theobromine are particularly difficult, as doses are uncontrolled and variable" (p. 217). Calculations can be made of the daily amount of drug ingested in milk, and from this the dose in milk relative to the maternal dose on a weight-adjusted basis. Atkinson et al. (1988) suggests that this is the most relevant indicator of the infant's exposure to drugs. Another important aspect to consider is the rate of clearance of the drug from the infant. This may be compromised if the infant is sick, and particularly so if the infant is premature (Atkinson et al., 1988). Small for gestational age infants may be particularly vulnerable as the concentrations would be higher per body weight.

Liston (1998) examines the use of recreational drugs-alcohol, caffeine, nicotine and marijuana on breastfeeding. This article examines both the current literature and explores information reported by Nursing Mothers' Breastfeeding Counsellors relating to breastfeeding and recreational drug use. Liston (1998) advises breastfeeding mothers in the general population to restrict their intake of recreational drugs. This would also apply to women delivering SGA babies. Liston (1998) also acknowledges that women who use recreational drugs may be going through a particularly stressful period with the birth of the baby, therefore additional support may be necessary and possibly expert help warranted if the women is finding this difficult. Liston (1998) further advises that if a woman is

unable to reduce the baby's exposure to recreational drugs, formula milk may be a safer option.

Human and animal studies have demonstrated that opioid use during pregnancy directly affects fetal growth and is associated with a higher incidence of SGA babies (Finnegan, 1988). Mothers born to heroin or methadone dependant mothers have a particularly high incidence of neonatal abstinence syndrome (NAS). This syndrome is characterised by the following infant behaviour: high pitched crying, inability to sleep, frantic suckling of the fist, yawning and sneezing, poor feeding, vomiting, loose stools, hyperactivity, hypertonicity, tremors and convulsions (Merenstein & Gardner, 1993). Feeding difficulties are associated with NAS, particularly with the uncoordinated suckle/ swallow/ breathe mechanism. Merenstein and Gardner (1993) do not mention breastfeeding for NAS and advise alternative-feeding methods, eg. gavage. They advise small feeds at close intervals. Pharmacological substances are frequently used to control the treatment of withdrawal. Commonly used substances are oral morphine and phenobarbitol (Merenstein & Gardner, 1993). Unfortunately there is very little data available on breastfeeding use in opioid addicted babies. Kandall (1991) does however suggest that breastfeeding in the methadone maintained mother does not need to be discouraged, as evidence demonstrates that it does not appear to shorten or worsen the course of withdrawal. Merenstein and Gardner (1993) warned against the use of stimulants and other drugs in breast milk as these are known to be harmful to the health of the newborn.

The literature available on breastfeeding and recreational drug and medicinal drug usage strongly supports that 'breast is best' in most circumstances (Howard & Lawrence, 1999). As already identified in the adjunct literature review, women with SGA babies are more likely to have medical problems eg. heart conditions, elevated blood pressure, Crohn's disease. In the majority of instances these women will be on long term medication. Howard & Lawrence (1999) advise that the midwife/ clinician assess the impact of maternal medication on an individual basis. The hospital pharmacists are particularly helpful in assisting with this

decision making. Howard and Lawrence (1998) conclude that with many medications, continuous breastfeeding is advantageous to both the mother and infant. However, they warned that if a woman had an ongoing illicit drug abuse problem, the risks were substantial and outweighed the benefits of breastfeeding. It is up to the midwife and clinicians caring for the woman to determine how great the drug usage is and weigh up the risk-benefits associated with breastfeeding in consultation with the woman.

Other important breastfeeding considerations

The woman that chooses not to breastfeed

It is important to be aware that a woman may not always wish to breastfeed. The adjunct literature review has a strong focus on the benefits of breastfeeding. The Royal College of Midwives suggests that (1989) "at no time should the mother be given the impression that bottle feeding is equivalent to breastfeeding, or without risk"(p.47). The adjunct literature review supports the College's view however, it is important to be aware that a woman may not always wish to breastfeed, even when given information about the benefits of breastfeeding and the risks of bottle feeding. There may be underlying reasons for the woman for not wishing to breastfeed. These may be: breast implants, reductions, inverted or large nipples, cultural beliefs, difficulties breastfeeding, cracked/ sore nipples, previous sexual abuse, pressures from the husband, societal pressures that breastfeeding is not sexy, postnatal depression, does not like the sensation, going back to work. Sensitively finding out why the woman has made her choice may be warranted as issues such as sexual abuse may only surface at this point and the woman may need counselling. The woman may also believe she is unable to breastfeed for the wrong reasons or a lack of understanding. A sensitive approach is necessary which gives the correct information. A woman with a strong family history of allergy should be informed that their decision to feed the infant formula might be associated with an increased risk of allergies for the baby in later life. There may be times when a woman does not have valid reasons for not breastfeeding and may be unable to articulate her feelings. The midwife should

respect the woman's wishes and not pressure the woman with her own views or opinions as this is only going to add to the woman's guilt. There is now a book published called *Bottle babies; The guide to guilt-free bottle-feeding* (Ferguson, 1998) which has been designed to assist women in coming to terms with the guilt associated with 'not' breastfeeding. This is obviously a very real issue for women who are unable or choose not to breastfeed and midwives and health professionals need to be aware that pressuring a woman to breastfeed may lead to a loss of confidence and self esteem.

Human Immunodeficiency Virus and breastfeeding

According to Coovadia and Coutsoodis (2000), human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) are now the leading cause of mortality in Africa. The disease process may also be a contributing factor for women developing an SGA fetus and this was found to be evident in a research study by Bulterys et al. (1994). Therefore the implications for women breastfeeding SGA babies need to be addressed further. Trehan et al. (1997) do not recommend breastfeeding in HIV infected mothers in the western world. Lang (1997) further supports, "a mother who is known to be HIV-antibody positive, or who is at a high risk of contracting the disease is advised to avoid breastfeeding" (p.132). Coutsoodis (2000) carried out a large trial of 549 HIV-infected women in Durban, South Africa. This prospective trial compared the mother-to-child transmission rates of HIV-1 at 3 months in three different feeding groups (never breastfed, exclusive breastfeeding, and mixed breastfeeding). The results at 3 months demonstrated that 18.8% of 156 never-breastfed children were infected compared to 21.3% of 393 breastfed children ($p=0.50$). The infants that were exclusively breastfed to at least 3 months were less likely to be infected (14.3%) than those receiving mixed feeding (24.1%) ($p=0.03$). This recent research suggests that the breastfeeding policies for HIV-infected women require urgent review as exclusive breastfeeding in developing countries may be a more affordable and culturally acceptable. In summary, Coutsoodis (2000) supports that there may also be a reduction in mother to infant transmission of HIV-1 while maintaining the numerous benefits of breastfeeding.

Another option suggested by Lang (1997) is the heating of breast milk. It may be possible to kill the HIV virus if the expressed breast milk is heated to 62.5°C for 30 minutes. The staff would have to be certain that this pasteurisation process was safe and the equipment was not faulty. Milk banks will be inclined to err on the side of caution and sterilise the milk (120 degrees C for 30 minutes). Fidler, Sauerwald, Koletzko, Demmelmair (1998) researched the effect of human milk pasteurisation and sterilisation in relation to the fat content and fatty acid composition. They further support that pasteurisation and sterilisation may induce oxidative losses of unsaturated lipids and vitamins and may inactivate enzymes and immunologic factors. The investigators conclude that the pasteurisation of human milk does not influence fat content and composition. They do however caution that sterilisation may reduce available fat content by more than 10%, whereas there were only slight changes in fatty acid composition. This aspect needs to be considered in a woman delivering an SGA baby, as fat content is important for weight gain.

Orlando (1995) also found that the heating process of microwaving damaged the immunological properties of breast milk. The benefits associated with pasteurising breast milk is therefore questionable and would be only be warranted if the woman felt strongly that she would like to give her own breast milk and is aware of the risks. It is advisable that a woman who is known HIV antigen positive never supplies milk to milk banks or supplies milk for another woman. In undeveloped or third world countries, the policy on breastfeeding and HIV antigen positive mothers may be different to the developed world. Because the risk of death from malnutrition and gastrointestinal disease may be greater than the risks associated with breastfeeding in an HIV infected mother, breastfeeding may be encouraged in these women (Merenstein & Gardner, 1993; Spangler, 1995; Sharma & Willingham, 1997).

Nduati et al. (2000) carried out a recent trial investigating the effect of breastfeeding and formula feeding on the transmission of HIV-1. This randomised clinical trial was carried out in Kenya (November 1992-July 1998) where the rates of women with the HIV virus are very high. Four hundred and twenty five HIV-1-seropositive, antiretroviral-naive pregnant women enrolled, 401

mother-infant pairs were included in the analysis of trial end points. Mother-infant pairs were either randomised to breastfeeding (n = 212) or formula feeding (n = 213). The compliance with the assigned feeding modality was very good (96% in the breastfeeding arm and 70% in the formula arm). The investigators concluded that the frequency of breast milk transmission of HIV-1 was 16.2%, and the majority of infections occurred early during breastfeeding. The use of formula milk prevented 44% of infant infections and was associated with significantly improved HIV-1-free survival. This study demonstrates that every effort should be made in undeveloped countries to allow these women to provide formula if they are HIV positive as the results show a definite reduction in the rates of transmission to the infant. These results are in direct contrast to the research carried out by Coutsooudis (2000) described earlier, this demonstrated a lower mother to infant transmission rates at 3 months in mothers who exclusively breastfed compared to those receiving mixed feeding. The research by Nduati et al. (2000) has a larger sample size and a powerful methodology. These conflicting studies suggest that further research needs to be carried out to fully understand the complexity of issues surrounding breastfeeding, particularly in third world countries where the risk of other dangers from not breastfeeding are more prevalent.

If a woman is HIV antigen positive it is appropriate that she is not approached to participate in breastfeeding research studies. This should be an exclusion criterion for not participating. There are many times when women are not aware that they are HIV antigen positive. Counselling by the primary care giver in the antenatal period may elicit at risk behaviour for women who may be at risk for HIV. These women should be screened antenatally for HIV, as there are measures that can be taken to prevent transferring the virus to the baby. This should only be carried out with thorough counselling and informed consent.

Conclusion

There are many aspects of breastfeeding that are significantly different for women with SGA babies compared to women with AGA babies. Not all of the issues discussed are relevant for every woman with an SGA baby. There may however be aspects, particularly hypoglycaemia and weight gain issues that are usually of concern for many women with SGA babies. The literature and research has demonstrated that the constituents in breast milk may be different in women delivering SGA babies, e.g. higher concentrations of sodium in the breast milk. Many researchers have investigated the effect of various supplements to determine whether these would improve catch up growth. More research needs to be carried out determining the long-term benefits of breastfeeding versus additional supplements. Excess stress has been demonstrated to have a negative affect on the let-down reflex and subsequently effect the amount of breast milk the baby receives. The prolactin reflex is also an important reflex and the introduction of bottles can interfere with the amount of suckling the baby carries out and subsequently reduce the amount of milk produced. Maternal malnutrition has a negative affect on breast milk production as the prolactin reflex can also be affected. Research has demonstrated that the maternal malnutrition or nutritional deficiencies may cause immunological, fatty acid, vitamin, mineral and fat deficiencies for the infant. Maternal malnutrition can not only cause an SGA baby, but also have long lasting affect on the babies weight gain if the malnutrition is severe enough to effect the woman's milk production. Weight gain in the baby is an issue for most women with SGA babies and a slow weight gain can create an added stress for women. The literature has demonstrated that bottle and breast fed babies have different patterns of growth. This needs to be considered by health care workers before switching from the breast to the bottle.

Hypoglycaemia is a particular area of concern with SGA babies as it can have severe consequences if left untreated. The literature supports careful monitoring and skilled treatment by care-givers. It is possible to feed babies successfully with methods other than bottle-feeding to raise blood glucose levels. The

literature supports that 'nipple confusion' may occur in infants that are breast and bottle-fed. Small for gestational age babies are also at risk of hypothermia and care must be taken to ensure they do not become cold as the symptoms can also create difficulties with breastfeeding. The 'small mouth' is not really mentioned in the breastfeeding literature, however, in SGA infants this may be a real phenomenon if the woman has large nipples and the baby a small mouth or jaw. Congenital abnormalities are more prevalent in SGA infants and there may be breastfeeding problems created by the associated mental retardation and small jaw of these babies. These syndromes may be diagnosed early in the neonatal period, however, if only subtle characteristics are present they can sometimes be missed.

The woman may feel guilty in response to some midwives' attitudes if she decides not to breastfeed. As long as the woman has made an informed decision the midwives and staff must respect the woman's right to choose not to breastfeed. Further guilt placed on the woman can be damaging for her self-confidence and self-esteem. Drug usage is more prevalent in women with SGA babies, not just from medicinal purposes but recreational use as well. With recreational drug usage a detailed history is necessary to determine if the risk of the drug out-weighs the benefits of breastfeeding to the baby.

Human immunodeficiency virus is of particular concern for mothers wishing to breastfeed. The research demonstrates that the HIV virus can be transmitted to the infant through breast milk so the woman is advised not to breastfeed. If the woman feels strongly that she would like to provide her own milk, it may be possible to pasteurise the milk to kill the virus and give this *only* to her own baby. The pasteurisation process may damage the immunological properties of the milk and therefore the benefits gained from this process may not be advantageous.

There are certainly many issues raised in this chapter that are of particular relevance for staff assisting women with SGA babies to breastfeed. There is no specific advice in the literature on feeding considerations for women delivering SGA babies.

CHAPTER 3:

**Literature specific to small for gestational age babies and
breastfeeding**

Literature relating specifically to SGA babies and breastfeeding will be reviewed in this chapter. The review will be focused on two topics and will review the literature available from the midwifery, pediatric and nutritionists' domain. Finally the literature around possible interventions aimed at improving breastfeeding rates will be discussed. For a general overview of research relating to SGA babies and breastfeeding, refer to the larger adjunct literature review (Barker, 2000).

Literature from the midwifery domain

Barker (Hutchings) (a midwife), M^cCowan and Harding (1996) presented "a longitudinal study on breastfeeding rates in women with SGA babies" at the Australasian Perinatal Society meeting held in Adelaide in 1995. As already discussed in the adjunct literature review SGA babies have increased risks of infection, cot death, and long term neurodevelopmental problems. Barker (Hutchings) et al. (1996) commented that breastfeeding SGA babies may reduce these risks.

The aim of this pilot study was to identify whether mothers of SGA babies had a reduced breastfeeding rate at three months compared with the general population and if so to explore the associated variables.

A questionnaire was sent to 66 women at 6 and 9 months after the birth of an SGA baby. The definition of 'breastfeeding' referred to complete or partial breastfeeding. Sixty-one of the 66 (92%) women initiated breastfeeding in hospital but by the time of hospital discharge 79% were breastfeeding. At 3 months, 42% of SGA babies were breastfed compared with 71.3% in a cohort of the New Zealand population ($p=0.0001$). There was no difference in gestational age at delivery between those who were breastfeeding at three months and those who were not (35.8 weeks vs 36.1 weeks). The statistical test used was the t-test. Similarly there were no differences in maternal age, parity, education, and delivery method between breast feeders and non-breast feeders at three

months. At 6 months, 25% of these women were still breastfeeding compared to 56% in a cohort of the New Zealand population ($p=0.0001$).

The median time at which women stopped breastfeeding was 10 weeks (range 1-72 weeks). The reasons identified by the women for stopping were: not enough milk (28%); difficulty latching on (26%); baby likes the bottle better (9%); infant illness (7%); other (11%). Twenty (30%) of babies were readmitted to hospital (for example chest infection, poor feeding). The rate of readmission did not differ between those who were breastfed at three months and those who were not, however this lack of difference may be due to small numbers.

Barker (Hutchings) et al. (1996) concluded that breastfeeding rates at 3 months and 6 months of age in SGA babies at National Women's Hospital were approximately half that of the general population of babies. Increased breastfeeding in SGA infants is associated with potential short term and long term health advantages. Strategies should therefore be explored which might increase breastfeeding rates in this group of high-risk babies.

Unfortunately this study had a small sample size and was not representative of a larger group of the term SGA babies as the mean gestational age of delivery ranged between 35.8 and 36.1 weeks gestation. Breastfeeding difficulties encountered by the women in the study may have been related to prematurity and not specifically due to the baby being SGA. Therefore it was concluded that there is a need for a larger study investigating the difficulties women with term SGA babies encounter which could be compared to women in the general breastfeeding population.

Midwifery textbooks often have a section on the SGA baby and the management of these babies. The management recommended by Sweet (1999) stipulates that early feeding is essential and breast milk should be given where possible. She also recommends that frequent feeding is essential and if hypoglycaemia develops infusions of 10% dextrose may be required. Blood glucose should be carried out every 3-6 hours for 48-72 hours. This is all the advice given. It clearly stipulates that breast milk should be given when possible but does not

further recommend how frequently. There is a lack of research and advice in the literature about how to best manage the feeding requirements of an SGA baby. Further research is needed by midwives, as breastfeeding is an area in which midwives have special expertise.

Literature from the paediatric domain

Within the following section 3 major studies are reviewed. The first is a study carried out in 1987 by Mullen, Garcia-Coll, Vohr, Muriel and Oh (1998) who researched mother-infant feeding interactions in full-term SGA infants. The behaviour during feeding was assessed in 30 mother-infant dyads. As all the infants in the study were bottle-fed, the study does not provide enlightenment on information relating to breastfeeding and SGA babies. Only 3 women in the study refused to participate and this was because they wanted to continue breastfeeding. This research study is typical of the infant feeding practices carried out in 1987. There was no mention of ethical approval or considerations by the researchers and there are obvious concerns as the women in the study *had* to bottle feed. The sample size was small with only 15 SGA infants (birth weights below the 10th percentile) and 15 AGA infants (birth weights between the 25th and 90th percentile) participating. The groups were balanced for gestational age, sex, neonatal risk factors, socioeconomic status, maternal age, parity and race. On the second or third day of life, behaviours of infant feeding difficulties were coded for both the mother and infant. The researcher carrying out the behavioural studies was not aware of which group the babies were in (SGA or AGA), however it is more than likely the experimenter was aware of the classification of some of the infants because of their obvious size. During the observation the examiner recorded specific infant and maternal feeding behaviours for the first 10 minutes of the feeding. The maternal ratings assessed were: delight in the baby, appropriateness of initiations, physical contact, determination of feeding, attentiveness and whether the mother was nervous or confident. There were also maternal codes for the following: stimulates the infants mouth with the nipple, jiggles or rotates the bottle, pulls nipple, interrupts feeding, shifts infants position, burps infant, rearranges infant wrap, wipes infants mouth, and expresses concern about feeding the infant. It was easy to mistake

the feeding as being breastfeeding with the nipple mentioned as a measure of behavior. It may have been better to call the nipple a teat to prevent any confusion. Factors that were not mentioned by the researchers that may effect the research findings was the possibility that the women may be feeling uncomfortable on the 2nd and 3rd day post partum with full breasts. This would be significantly worse with a study protocol of exclusive bottle-feeding. Mullen et al. (1987) do not mention whether the women were allowed to give expressed breast milk by bottle, or even if they were allowed to express to possibly relieve breast engorgement. The method of delivery was an important factor that was not mentioned by the researchers. Other factors that might effect the women's behaviour include pain from an episiotomy, perineal tear or Caesarean section delivery.

The researchers also investigated the behaviour of the infants and coded this according to the criteria developed. The infant ratings were for appropriateness of state, ease of feeding, withdrawing or responsive and tense or relaxed. The other criteria were: refuses or rejects the nipple, dribbles milk out of the mouth, coughs or chokes, spits up, grimaces, cries, whimpers and trembles, and tense body. The researchers admit that many of these behaviours are not necessarily problematic. They do however consider a high score indicative of greater difficulties in feeding. Interobserver reliability testing was carried out on seven observations made by two trained observers. Having an observer marking and assessing the women bottle feeding their baby may have made the women nervous, or behave in a manner that was unnatural.

Other factors that may have effected the reliability of the scoring were: hypoglycaemia, hypothermia or hyperthermia (causing trembling or drowsiness), a colicky, windy baby, and method of delivery; for example a baby delivered by forceps can be very irritable for the first couple of days. These factors were not taken into consideration by the researchers, which is unfortunate as SGA babies are at risk for hypoglycaemia and hypothermia and have a greater incidence of interventional births which may lead to differences in infant behaviour post delivery.

The researchers found the following ratings of interactive behaviour for mother and infant: using the non-parametric Mann-Whitney U test, SGA infants had ratings that indicated less optimal interactions than AGA babies. In particular, SGA babies grimaced more often than AGA babies did ($p=0.05$). The total of all the frequencies for mother and infant behaviour were analysed using the unpaired t test. The mothers of SGA infants had a higher total frequency of the non-optimal bottle-feeding behaviours ($p=0.001$). The difference in scores between the SGA and AGA infants did not differ significantly.

Infant caloric intake was recorded by the researchers to ascertain whether the previous behaviours were associated with lower nutritional intake. Infant caloric intake was recorded before feeding and immediately after feeding by weighing the infants (while wearing a diaper only) and then converting the measurement to calories. There was no difference in caloric intake between the 2 groups, however the infant behaviours and ratings were associated with caloric intake.

Unfortunately there was a small sample size and considerable ethical concerns with all the women having to bottle feed. The ethical issues were not clarified, justified or mentioned in detail by the researchers.

The second study carried out by a paediatrician, were on early feeding and plasma glucose levels in SGA infants (Wright, Stanley, Anday & Baker, 1983). These investigators recognised that no previous research had been carried out on early oral feeding and the prevention of hypoglycaemia in SGA infants.

This was an uncontrolled small study with only 24 healthy SGA (<10th percentile) infants enrolled to participate. The researchers obtained consent for the infants to participate in the study and ethical approval was obtained. The exclusion criteria were: sick or stressed infants, cardiac disease, respiratory distress, dwarfing syndromes or congenital abnormalities. Plasma glucose levels were measured during the first day of life. At birth and before each feeding a capillary blood specimen was obtained by heel prick and measured immediately with a glucose analyser. Before 2 hours of age all infants were given sips of sterile water and then an initial maximum feed of 30 ml of 20-calorie/ ounce formula by teat. Subsequent feeds were offered every 3 hours.

The results demonstrated that the mean plasma glucose for the entire group of 24 early-fed SGA newborns over the first 26 hours after birth was 67 mg/dl. There were no plasma glucose levels below 30 mg/dl. Mean plasma glucose levels were lower in infants born to mothers with preeclampsia (57.2 ± 2 vs 69.7 ± 2.3 mg/dl, $p < 0.005$). These differences did not appear to be related to feeding since the amount taken was similar between the 2 groups (114 ± 9 vs 117 ± 11 ml/kg). There also appeared to be no difference in mean birth weights between the two groups (2119 vs 2119 grams). Two infants that were dropped from the study, one because of a transient period of delayed gastric emptying, and a second infant who began breastfeeding at 11 hours of age.

This study does have limitations, the small sample size and the design of the study (uncontrolled). This research could have been conducted as a randomised-controlled trial with half the infants receiving routine care (the care they would normally receive if they had not participated in the research). It would also be interesting but is probably not ethical to randomise the women to breast versus bottle feeding to determine if breastfeeding provides enough nutrients to prevent hypoglycaemia in SGA babies. No other research studies have examined the rate of hypoglycaemia in SGA babies who are fully breastfed.

There are some practical implications suggested by these researchers, that healthy SGA babies can be managed effectively with oral feeds before two hours of life and that the glucose concentrations should remain above 40 mg/dl. The glucose level should be monitored 2 hours post delivery and before subsequent feeds until it remains consistently above 40 mg/dl. These implications should however be considered with caution, as no sample size calculations were documented.

Lucas, Fewtrell, Davies, Bishop, Clough and Cole (1997) carried out the third study of SGA babies and breastfeeding. This research is particularly relevant as it investigates breastfeeding and catch-up growth in infants born SGA. Unfortunately the review does not describe any breastfeeding difficulties. It focused predominantly on the growth patterns of these infants, the use of L-

carnitine supplementation and the timing and type of feeding. The cohort was recruited as part of a randomised-controlled trial to assess the effectiveness of L-carnitine supplementation versus placebo to improve catch up growth in term SGA infants. Another hypothesis was that early diet (unrandomised comparison between breast and formula feeding) would influence catch-up growth.

Over a 14-month period 54 infants were recruited from a Cambridge (England) hospital, postnatal ward. Twelve women decided not to enrol in the study. Unfortunately the reasons for refusing to participate were not mentioned. All of the infants were born between 37 and 42 weeks gestation and had birth weights below the 10th percentile for gestational age. The infants were also recruited within the first 4 days post delivery. They were then randomly assigned to receive L-carnitine or placebo, and within each arm stratified by breast or formula milk feeding. The sample size was calculated using historical data, to detect a 10% difference in growth rate (weight gain) between breast fed and formula fed infants in their first three months, with 80% power at a 5% significance level. The researchers also mention that there was no change prior to recruitment from breastfeeding to formula feeding or vice versa. No attempt was made by the researchers to influence the mother's choice of diet for her baby. A trained nurse carried out anthropometric measurements at 2, 5 and 12 weeks and 6, 9 and 12 months. Details of infant feeding, weaning and any episodes of illness were also recorded. There were a number of infants withdrawn for the following reasons. One infant was withdrawn at 4 days when a major congenital heart defect was diagnosed. The parents of 4 other infants withdrew during the first 5 weeks and one at 12 weeks after repeat hospital admissions with respiratory illnesses.

The statistical tests used were the student's *t*-test and the χ^2 test. The postnatal growth in the breastfed versus the formula fed infants was compared using the mean standard deviation score (SDS) and the student's *t*-test. Multiple regression analysis and analysis of variance were used to explore whether any relationship between catch-up growth and diet was confounded by social, demographic or obstetric factors.

The results demonstrated that there were no significant differences in any parameters of growth in the first year of life between infants who received carnitine or placebo. There was a 0.36 and 0.64 standard deviation (SD) increase in weight at 2 weeks and 3 months of age, respectively, which persisted beyond the breastfeeding period (0.64 SD at 1 year). Breastfed infants also demonstrated greater catch up growth in head circumference [SDS 0.53 higher at three months] and greater body length gain (SDS 0.68 higher at 6 months). There were also no significant differences in birth weight, gestation, gender and infant or parental measurements between groups at enrolment. There were expected differences in socio economic variables, the higher social class and level of maternal education was higher in the breast fed group. There were also higher levels of parental smoking in the formula fed group. This would also support the findings of the large literature review adjunct to this thesis, that women who deliver SGA babies are more likely to come from a lower socio economic group and be smokers. The researchers carried out detailed analysis to determine if any of these previous factors may have influenced the growth in the breastfed group. Adjusting for them did not affect the influence of diet.

Ohlsson (1998) was invited to comment on the above research study by Lucas et al. (1997). He made many criticisms particularly about the way in which it was presented, as many aspects were not made clear. He was critical of the hypothesis "Does feeding breast milk versus formula decrease or increase catch up growth during the first three months of life in term SGA infants?" As mentioned previously the cohort was part of a randomised-controlled study assessing the effectiveness of L-carnitine supplementation versus placebo to improve growth in SGA infants (primary question). It seemed that many of the findings presented by Lucas et al. (1997) were found retrospectively once the research was analysed. The researchers do clearly admit to the differences in the baseline characteristics between breastfed and formula fed infants (mothers of formula fed infants were more likely to be from a lower socio economic group, lower education, smoke through out the pregnancy). As Ohlsson (1998) states "numerous statistical tests were used to test the differences between the two groups and the results were presented in a confusing manner. No adjustment in the *p* value for statistical significance was made in view of numerous

comparisons”(p.354). There were also other criticisms, a major one being the sample size, which was inadequate for the number of variables included in the step-wise multiple regression analyses. The number of eligible infants is not reported and the starting and stopping dates for the research are not stated.

Karlberg (1998) is currently recruiting for a research trial investigating the same research question as Lucas et al. (1997), and agrees with the criticisms made by Ohlsson (1998). He believes that it is easy to be convinced when reading the research that the results have clinical significance. Karlberg also agrees with Ohlsson that the research findings need to be verified in a study with a larger sample size. Karlberg (1998) also states “promoting breastfeeding specifically in SGA infants may place unnecessary additional pressure on the mothers”(p.355). This statement is controversial as the literature supports the long-term benefits that may be particularly beneficial in SGA babies from breastfeeding. Research already demonstrates that the benefits outweigh any additional pressure to breastfeed. If women with SGA babies are unable to breastfeed or have difficulties, this would be the time that women should be supported in their decision to continue or discontinue. Giving women information on the benefits of breastfeeding is not necessarily pressuring as it enables them to make an informed choice. Women with SGA babies should not however be treated differently to women in the general breastfeeding population. They may have different concerns with their baby being smaller or being at risk of hypoglycaemia that a woman with an AGA baby does not have. Additional support and encouragement is therefore necessary.

All of the above research trials carried out by pediatricians specifically with SGA babies and breastfeeding are of a small sample size and the statistical significance of all the studies is questionable. Further trials are needed on breastfeeding in women with SGA babies.

Research from the nutritionists domain

The most specific research carried out on the two topics breastfeeding and SGA babies were by Dewey, Cohen, Brown and Rivera (1999). The primary investigator, Kathryn Dewey, was based at the Department of Nutrition at the University of California. Unfortunately an attempt to correspond with her was unsuccessful, however, one would assume that her background is in nutrition. Dewey et al. (1999) investigates the age of the introduction of complementary feeds and the subsequent growth of term, low-birth-weight, and breast-fed infants. This study was a randomised-controlled trial set in Honduras and was designed specifically to investigate the optimal age at which an SGA infant was introduced to complementary foods. Honduras was chosen because of the high incidence of SGA infants and because it is a nutritionally vulnerable population. The Human Subjects Review Committee approved the study protocol in California. It did not appear to have local ethical approval, however they did have assistance from the ministry of Health in Honduras.

The investigators classify the infants recruited as low-birth-weight, term infants. This is the same criterion as SGA babies as these babies were below the 10th percentile on standard growth charts. These infants were recruited from the two main maternity hospitals in San Pedro Sula, Honduras. Gestational age was assessed by two physicians using the score developed by Capurro, Konichezky, Fonseca, Caldeyro-Barcia (1978) and cited in the work, for diagnosing the gestational age in new born infants. Unfortunately women were not recruited if they had not received an antenatal ultrasound < 18 weeks gestation as this is a more accurate means of determining an SGA baby. Lactation guidance was provided to all the subjects in both hospitals and at home visits at three days post partum and every week there after. Continued exclusive breastfeeding was encouraged by lactation counsellors using a flip chart of pre-tested motivating messages. The researchers did not describe what these motivational messages were or how they were pre-tested. Of the 575 low birth weight, term infants, only 222 qualified for the research. The reasons given by the women for not qualifying were: maternal employment that would prevent exclusive

breastfeeding (39%), residence outside the recruitment zone (28%), prematurity (16%), maternal or infant illness, congenital defect or death (7%), inability of the field workers to find the subjects home (4%), refusal by spouse or family to participate (3%), refusal to exclusively breastfeed (1%), refusal to participate (1%), mother aged <15 years (1%) and twin birth (1%). The infants had anthropometric and morbidity data collected at 2, 4, and 6 months of age. Infants with low haemoglobin (<100 g/L) at any age were given iron supplements for 2 months.

Of the 222 subjects enrolled at birth, 128 were ineligible to enter the intervention phase at 16 weeks postpartum, predominantly due to the requirement of exclusive breastfeeding. The infants were randomly assigned to 1 of 2 groups: 1) continued, exclusive breastfeeding to 6 months (EBF), or 2) complementary feeding plus breastfeeding from 4 to 6 months with mothers encouraged to maintain baseline 16-week breastfeeding frequency (SF). Unfortunately the randomisation procedure was not blinded. The infants were randomised according to which week they were born. Subjects were not informed of their assignment until they had completed the first 16 weeks of the study. The target sample size was 56 in each arm of the study, which was based on detecting a difference between groups of $\geq 15\%$ in weight or length gain between 4 and 6 months by using standard deviations from a previous study carried out by the researchers. Assuming a two-sided test with $\alpha = 0.05$ and $\beta \geq 0.9$. Unfortunately the previous study only had 28 low birth weight infants, which is not a large sample size to base the power calculations on. Growth and morbidity from 16 to 26 weeks were assessed for all infants in the intervention phase. There were also measurements of breast milk intake and composition and total energy intake at 16 and 26 weeks. The mothers had to go to a central facility at each of these time points to have 24-hour measurement of milk volume and collection of milk sample for determination of energy density. It was interesting to note that in this non-random sub-sample, only half the participants were willing to participate in this component, it was obviously very inconvenient for the women to stay overnight. At 26 weeks, intake of solid foods of the infants in the SF group were determined by weighing the baby food jars before and after feeding (same baby food used with all infants). There was no consideration made for whether the

child preferred the type of baby food given. This could make a significant difference with some infants. After the intervention phase, infant growth was measured monthly until the infant reached 12 months of age.

The results suggest that the breast milk intake at 4 months was not significantly different between groups. At 4 to 6 months breast milk intake increased by 28 grams per day in the EBF group but decreased by 39 grams per day in the SF group ($p < 0.005$). There appeared to be no effect of feeding hygienically prepared nutritious complementary foods from 4 to 6 months of age on the growth of SGA infants in this population. The results were the same as research previously carried out by Cohen, Brown, Canahuati, Rivera, and Dewey (1994) on AGA babies and a small number of SGA babies. These researchers were also aware they might have had insufficient power to detect a difference in sample size. According to Dewey et al. (1999), if an effect size of 0.6 (ratio of the difference to the SD) were biologically meaningful, the power to detect a difference of a magnitude of 95% would mean there is only a 5% probability that the difference would not have been detected.

Probably the most interesting aspect of this study, which was not elaborated by the researchers, was the large number of women who were ineligible for the study. Of the 222 subjects who were enrolled at birth, 128 were eligible to enter the intervention phase at 16 weeks postpartum. The remaining 94 women were ineligible for the following reasons: 31% moved or were unable to be located, 23% did not maintain exclusive breastfeeding by 16 weeks, either because of employment issues, or a further 28% because of other reasons (not elaborated by the researchers), 9% had a spouse or family member pressure not to participate, 3% had an infant or a mother who died or was very ill. A further breakdown of reasons why 28 women did not continue with exclusive breastfeeding for the first 16 weeks (excluding women who discontinued for reasons other than employment), were the following (noting that these are all women who were committed to exclusive breastfeeding at the beginning of the study): 1) insufficient milk (25%), 2) baby cried too much and disturbed husband (18%), 3) mother never intended breastfeeding that long (despite saying they would at recruitment) (14%), 4) mother was too busy, family pressures, or had to

leave the house often (14%), 5) infant sucking problems (11%), and 6) Mother intended to go back to work (7%). Unfortunately the data available on breastfeeding rates cannot be compared to the breastfeeding rates in the general population due to the large numbers of women not qualifying for the study initially (n= 94). Reasons for not qualifying were: maternal employment, residence outside the recruitment zone, maternal or infant death, illness, inability to find subjects home, refusal to participate and refusal to exclusively breastfeed. These women would have to be included in the overall analysis to give a true picture of the constraints some of these women face, a common one being the need to return to work and the inability to continue breastfeeding. The women who lived outside the recruitment zone may have successfully breastfed and would not have been included in the total group for analysis. Therefore it would be inappropriate to analyse the women who qualify for the study as it would give a misrepresentation of the total group of women with SGA babies.

From the total number of women eligible to qualify (222 women) in the beginning of the research, it is interesting to note that 23% were unable to maintain exclusive breastfeeding even though they had additional assistance with their breastfeeding. This additional assistance was motivational and educational messages and lactation guidance at 3 days post delivery and every week thereafter. It would be interesting to know what lactation guidance was provided and the qualifications of the person/s providing this for the women. Unfortunately the researchers have not elaborated on the breastfeeding success of these women in great detail or compared them with the general breastfeeding population in Honduras.

In summary, this study of SGA infants was designed predominantly to assess whether complementary feeding before 6 months of age influenced the growth of full-term SGA breastfed infants. The researchers concluded that there were no growth advantages associated with complementary feeding between 4 and 6 months of age. This is an important finding as women delivering AGA full term infants are educated that exclusive breastfeeding is best until 6 months of age (Brown, Dewey, Allen, 1998). Unfortunately no such conclusions can yet be

made with regard to the breastfeeding difficulties in women who deliver SGA babies.

The literature does not clearly identify the breastfeeding rates in women with term SGA babies, and the research is also lacking information on the women's breastfeeding experience and whether this is any different to women with AGA babies. This would be of particular interest as SGA babies may have benefits that can be gained from breastfeeding as already elaborated in detail (Barker, 2000). The benefits from breastfeeding may also have future consequences on the health and well being of these infants.

CHAPTER 4:

**Possible interventions aimed at improving breastfeeding rates in
small for gestational age babies**

As already discussed in the literature review, SGA babies are at an increased risk of infection, cot death, and long-term neurodevelopmental problems compared to normal size babies. This is why the importance of breastfeeding SGA babies is so imperative and the need for further research necessary. The literature, as well as my own personal experiences, suggest that women with SGA babies tend to be from a lower socio economic group. There is no one single cause in most cases, SGA babies are heterogeneous and individual factors may produce synergistic (multiplier) effects, even when the relative contribution of each in isolation is small eg. smoking. The same could be said for artificial feeding which was also associated with many of the same social factors as women with SGA babies. The following figure illustrates how a woman with an SGA baby that was artificially fed could produce a compounding effect in a negative cycle (Figure 3).

Artificial feeding is sometimes associated with:**Example of a negative cycle**

↓

Lower socio-economic group
(Bekele & Berhane, 1999)

Smoking
(Woodward & Hand, 1988)

Higher anxiety and neuroticism scores. (Soo, 1988)

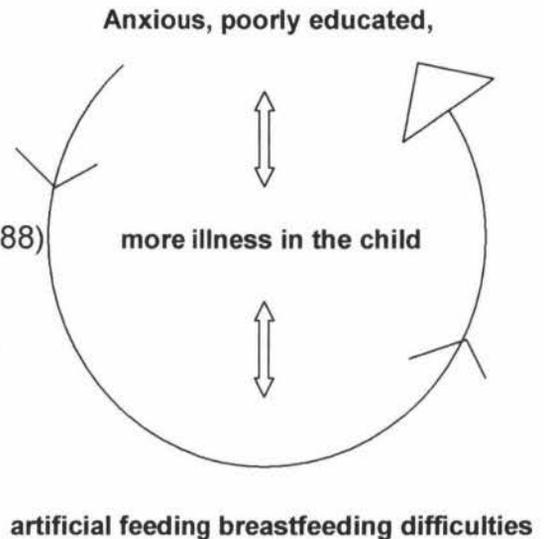
Premature, LBW, SGA or ill baby
(Williams & Carmichael, 1983) (Ryan et al 1991)
(Lucas et al, 1988)

Lower education and skill level
(Mahoney & James, 2000)

Teenage mother
(Yoos, 1986)

Caesarean section
(Samuels, Margen, Schoen 1985)

Premature, low birth weight or ill baby
(Lefebvre, 1990)



(The arrow indicates increased likelihood of outcomes)

Illness of Child and Mother**Figure 3: Negative Cycles**

Adapted from: Nursing Mothers Association of Australia (1992)

Women who have the factors outlined in Figure 3 may find breastfeeding more difficult. Nursing Mothers Association of Australia (1992) also suggested that it might be more difficult for the mother of a sick, low birth weight infant to establish or maintain breastfeeding unless she was given substantial information and support. Programs have been developed to assist mothers in overcoming breastfeeding problems when attempting to breastfeed in difficult circumstances.

Research on breastfeeding interventions

There are multitudes of interventions aimed at improving breastfeeding rates in the general population and in special circumstances. They are too numerous to summarise in this review. A variety of research will be reviewed, however, giving examples where breastfeeding assistance has been researched in difficult circumstances and with women from lower socio economic groups.

Breastfeeding interventions in women with preterm babies

Gunn (1991) examined the effect of a mothercraft program on breastfeeding preterm infants in Auckland, New Zealand. A total of 43 mothers with 49 preterm infants, <37 weeks gestation, were included in the study (5 mothers had twins or triplets). The research demonstrated that with extra care, support and teaching, mothers of preterm infants can successfully breastfeed in the majority of cases (88% were still breastfeeding 3 months later).

Breastfeeding interventions in women from lower socio-economic groups

Kistin, Abramson and Dublin (1994) investigated "the effect of peer counsellors on breastfeeding initiation, exclusivity, and duration among low income women"(p.11). This study was carried out at Cook County Public Hospital, in Chicago, where 90% of the families were at or below the poverty level. There were 59 women in the counsellor group and 43 women in the no-counsellor group. The counsellors were trained by a registered nurse certified in lactation, using education techniques aimed at providing information about breastfeeding and other health care issues. The women were allocated to peer counsellors immediately after delivery. The peer counsellors spoke to the women at least twice weekly by phone for the following two months and on an "as needed" basis after this time. Unfortunately the women were not randomly allocated to receive the intervention (peer counsellor) and many of the women recruited heard about the program antenatally through friends or the antenatal classes and were motivated to participate. This would certainly have affected the sample group, as it may have consisted of women who were motivated to breastfeed and more

likely to succeed. The investigators state that the other women in the non-intervention group were also motivated to receive peer counsellors, however, due to the small number of counsellors were unable to receive the support. This is an ethical concern as there was very little assistance within the hospital at the time of the research. Only 21.8% of women were breastfeeding at the time of hospital discharge and there were no breastfeeding protocols or promotional activities in place. Ninety three percent of the women initiated breastfeeding in the counsellor group versus 70% in the no-counsellor group ($P < 0.05$). The counsellor group also influenced the duration of breastfeeding with a mean of 15 weeks in the counsellor group versus 8 weeks in the no-counsellor group. The results suggested that peer counsellors might have a positive impact on the breastfeeding duration in women who intended to breastfeed. Unfortunately the research was not well designed and the results would surely be influenced by the manner in which the women were recruited.

Humphreys, Thompson and Miner (1998) also researched intention to breastfeed in socioeconomically disadvantaged pregnant women. This large study of 1001 women was carried out in a large public hospital in Atlanta, Georgia. A cross-sectional, convenience sampling strategy was employed for collecting data. Women who have HIV were excluded from participating as breastfeeding is contraindicated with HIV. Women who did not speak English or Spanish were also excluded. The women completed a six-page questionnaire with demographic information, social support and infant feeding plans. Maternal breastfeeding intention was compared with the hypothesised correlates using simple regression analysis. The results demonstrated that there were many variables that influenced a woman's intention to breastfeed. These were: older maternal age, higher education, Hispanic ethnicity, the baby's father, lactation consultants, hearing about the benefits of breastfeeding from other family members and more breastfeeding experience. In conclusion, the use of peer counsellors and lactation consultants may be of benefit to this group of women. Unfortunately there has been no specific research examining the effect of interventions on improving breastfeeding rates in women with SGA babies.

Nikodem, Hofmeyr, Kramer, Gulmezoglu and Anderson (1993) examined the effect of audiovisual education on the general breastfeeding population in a South African population, which serves mainly low-income urban women. This was a randomised controlled trial, 340 women were randomly allocated to view one of two breastfeeding audiovisual programs, one of which was specifically designed to educate women about the benefits of breastfeeding, correct positioning of the baby on the breast and motivational information. The second gave information on healthy eating habits for adults. A structured questionnaire was designed and was filled in at 6-weeks post delivery, when the women visited the hospital for a postnatal check-up. A major limitation of the study was the poor response rate. Unfortunately only 162 (47.6%) women filled in the questionnaire as many failed to attend the postnatal clinic at 6 weeks. This is a major concern as the women who failed to attend the postnatal clinic may have had different breastfeeding outcomes to the women who did attend. The results were still analysed and the baseline variables showed no differences in socio-demographic characteristics between the two groups. The statistical tests used were the Student t-test, Mann Whitney U test and the confidence intervals were measured. The mother-infant relationship was measured using rating scales. Nikodem et al. (1993) also examined depression scores using the Pitt's depression inventory. The results demonstrated no difference between mother-infant relationships or postnatal depression scores. If the women were depressed they may have been less motivated to attend the 6-week postnatal visit and the poor follow-up rate may have been reflected in the results. There was a weak correlation for mothers in the control group to supplement with the bottle and there were significantly more women in the control group who sought medical advice or treatment for their babies. The investigators conclude that the audiovisual education is a non-labour intensive tool for breastfeeding education, which has the advantage of being used on a large scale. The marginal trends demonstrated by this study may justify the routine use of audiovisual education. The most effective method of breastfeeding education needs to be investigated further as unfortunately less than half the women filled in the postnatal questionnaire at 6 week. Other educational techniques should also be integrated, particularly one on one support with peer counsellors and lactation

consultants as demonstrated previously by Kisten, Abramson and Dublin, (1994) and, Humphreys, Thompson and Miner (1998).

In summary, previous research has suggested that specially trained peer counsellors and lactation consultants improve breastfeeding rates in low-income women. There was also research by Nikodem et al. (1993) that suggests that audiovisual education may be of benefit. Unfortunately there was a very poor response rate with this trial and the results were not conclusive. The investigators recommend that further research be carried out investigating the use of audiovisual equipment on educating and motivating women to breastfeed.

The need for further research investigating the use of audiovisual equipment and subsequent breastfeeding success was the rationale that instigated the following research project "The effect of educational information on the duration of breastfeeding in SGA babies". I wanted to investigate whether watching an educational video and reading a pamphlet would make any difference to breastfeeding success in women with SGA babies who already received routine one on one support within the hospital environment. I was also interested in finding out what the women believed to be most helpful with her breastfeeding experience and the significant reasons for stopping breastfeeding as this may uncover reasons not previously identified from research. At the hospital where the research was carried out, women received breastfeeding support from a midwife or trained nurse post delivery. I was aware that many of the women with SGA babies were not aware of the advantages of breastfeeding and I decided to investigate the effect of providing additional information to women with SGA babies. The video was designed with the assistance of a qualified lactation consultant, to determine whether additional information would have any effect on breastfeeding duration. The choice of a video and pamphlet rather than a lactation consultant or peer counsellor was due to the very good assistance women already received through the hospital system. I decided that additional information on the advantages of breastfeeding might encourage women to persevere with their breastfeeding.

The following issues are outlined in the pamphlet and video: Breastfeeding is associated with:

- lower incidence of SIDS
- less infections and consequently less doctors visits,
- less expensive than formula, more convenient,
- enhanced development (possibly).

The pamphlet and video also discuss the correct positioning for baby on the breast and advise the women how to care for their breasts and nipples. There are also tips on how to determine if the baby is receiving enough milk. The pamphlet also outlines the contact numbers to phone if the woman is having breastfeeding difficulties.

CHAPTER 5:

Background to the major study:

**“The effect of educational information on the duration of
breastfeeding small for gestational age babies”**

In this chapter the design and proposal for the research study “the effect of educational information on the duration of breastfeeding small for gestational age babies” will be described in detail. Due to the inability to complete this research study in the specified time frame, the revised research design and methodology used for this thesis will then be reviewed. Please refer to appendix 1 for the ethical approval for the research trial and appendix 2 for the approval notification to carry out the trial.

Brief description of the proposal:

Breastfeeding is associated with multiple benefits to the newborn baby and mother as previously described in the literature review. A recent finding by Barker (Hutchings) et al. (1996) is that Auckland women who deliver babies that are small for their gestational age, are less likely to breastfeed their babies at three months of age than women who have babies of normal birth weight.

Women were randomised into two groups: One group of women received pamphlets on the advantages of breastfeeding and watched a 30-minute video on breastfeeding. The other group received usual postnatal care. The aim of this study was to assess the impact of further education on breastfeeding rates.

If the study demonstrated that an educational video and information pamphlet improved the number of women breast feeding, then this educational resource would be offered to all women with SGA babies at the hospital. Women were recruited to the study by myself or by another registered midwife. The women approached to participate had recently delivered an SGA baby (birth weight less than the tenth percentile).

Detailed project description

A pilot study revealed that women who delivered SGA babies were less likely to breast feed their babies at three months of age than women in the general population; 42% versus 71.3% ($p=0.0001$)(Barker [Hutchings] et al. 1996).

The proposed study aimed to identify whether increased knowledge about the advantages of breast feeding, given in the early postnatal period, increased the duration of breast feeding in this group of high risk babies.

Aims, objectives and plan of the research

The aim of the study was to investigate whether the provision of educational information (a pamphlet and video) would increase the frequency and duration of breastfeeding in women who had recently delivered SGA babies.

Women who delivered a baby after 37 weeks gestation whose birth weight was less than the tenth percentile were asked to participate. They were randomised using computer-generated numbers into one of two groups. The control group received routine postnatal care (as is current practice) and the intervention group received an educational pamphlet (appendix 3) and watched a video on breastfeeding prior to discharge from hospital. At 4 and 9 months post delivery a questionnaire was sent to the women's homes. This questionnaire aimed to identify information that may have an effect on breastfeeding rates (appendix 4). The subject information sheet was designed to inform the women about the research (appendix 5) and a consent form was completed (appendix 6) to gain informed consent.

Hypotheses

- 1) The use of the educational video and written information will result in a significant increase in the number of women with SGA babies breastfeeding at three months.

- 2) There will be a significant increase in the duration of breast feeding in women with SGA babies who watch a half hour educational video postnatally compared to those that have routine care postnatally.

Participants

Recently delivered women with SGA babies were recruited from the postnatal wards within two days after the birth.

Power Calculations: An increase in the breast feeding rate from 40% to 60% at three months of age required 100 women in each arm of the study (power = 80% $p < 0.05$). It was estimated that it would take between 24 and 30 months to recruit this number of women as 170 women were recruited to another SGA study in a 2-year period.

Initiation and Termination of the Project

The study began 1 March 1996 and recruitment was to be completed in December 1999. Unfortunately due to changes with discharge policies at the hospital where this study was being conducted, it was difficult to obtain consent prior to discharge as the women were often being discharged on day 2 post-delivery. The change in discharge policy did not lead to a change in study protocol as the researcher felt it was ethically not appropriate to approach the women earlier in the postnatal period. This was because they would still need to possibly watch the video prior to discharge creating time constraints. The recruitment was completed in February 2000. One hundred and eighty-two women were recruited in total to the study.

Risks and Benefits

There were no apparent risks to the women in the study. The women who receive the educational intervention may have benefited if increased rates of breastfeeding resulted.

Departure from standard patient management

Those randomly allocated to the intervention group watched the 30-minute educational video on breastfeeding SGA babies and were also given a specific information leaflet. Videos on several topics were already available on the hospital wards for women to watch at their leisure, as were information leaflets. Therefore the use of this study video did not cause any departure from standard patient management. The women were also asked to complete a short questionnaire 4 and 10 months postnatally. These took approximately 10 minutes each to complete. A prepaid addressed envelope was provided for the women's convenience.

Ethical approval

Ethical approval was sought through North Health (Northern Region Health Authority) as the research study was carried out in their region. All women recruited were given information relating to the study and read the patient information sheet. Consent forms (Appendix 6) were obtained from all participants entering the study. The midwives recruiting the women to the study explained that they were able to withdraw from the study at any time if they did not wish to continue taking part.

Confidentiality

Name and hospital number initially identified women in the study. Once consent was obtained the women were ascribed a study number by the order they were recruited into the study. The researcher carried out the allocation of randomised

numbers. These were opened in sequential order by the researcher in front of the woman who had consented to participate in the study. Research records were stored in a research office that was supervised or locked. Access to the computer files required a password and were accessible only to personnel involved in the study. The only form of identification on the postal questionnaire was the women's study number. This maintained the subject's anonymity if the questionnaire was mislaid in transit.

Retention of data

A register of all subjects included in the study will be retained as a confidential written document for 10 years. All data will be retained on a confidential computer file for 10 years.

Conclusion

For the purposes of this 75-point thesis the major project planned (The effect of educational information on the duration of breastfeeding small for gestational age babies) was too large. It was however necessary to give an overview of the design and methodology in order to locate the smaller project under investigation "Why women with small for gestational age babies stop breastfeeding." Many of the design and methodology issues for this smaller project have already been reviewed in this chapter and will not require any further expansion. A brief discussion of the methodology for the smaller project will be carried out under the headings: aims, study population, follow-up, data collection, control of the variables, variables collected and the statistical methods planned.

SECTION II: THE RESEARCH UNDER INVESTIGATION

CHAPTER 6:

Design and methodology:

**“The reasons why women with small for gestational age babies
stop breastfeeding”**

Aims, objectives and plan of the research

The main aim of this study was to determine why women with SGA babies stop breastfeeding.

The study is part of the previous study described in 5 entitled "The effect of educational material on the duration of breastfeeding". Therefore, the same entry and exit criteria apply for this study. The advantage of recruiting term SGA babies is to remove the confounding effect of difficulties associated with breast feeding premature babies. Women who deliver babies after 37 weeks gestation whose birth weight is less than or equal to the tenth percentile were asked to participate. The questionnaires were sent to the women at both 4 months and 10 months postnatally (appendix 4, 5) . This enabled the breastfeeding rates to be determined at 3, 6 and 9 months postnatally.

Women were asked what they perceived to be the *most* valuable assistance with their breastfeeding. This question was categorised into 11 options for the women to choose from. If none of these options were applicable the women could specify another choice. The women were also asked (from the same list of categories) what they found the *least* valuable for their breastfeeding. This may identify whether there are negative influences on the women's breastfeeding experience. An aspect that may be of particular significance is the length of time a woman stays in hospital after the birth of her baby. This information was also collected and analysed.

As an aspect of the main study of particular interest was what the women perceived as being their reasons for discontinuing breastfeeding, a qualitative analysis of the open-ended sections of the questionnaire pertaining to their reasons for stopping breastfeeding was undertaken using a 'thematic' approach. The women had to initially grade, in the order of importance, the reasons for stopping breastfeeding (1 being the most important). The women had the opportunity to list the three most significant reasons for discontinuing breastfeeding. This was the key analysis for this project. Never before has qualitative research been carried out with women with SGA babies and their

breastfeeding experiences. The reasons women with SGA babies discontinue breastfeeding may be different to women with AGA babies. As already illustrated in the larger review of the literature, women with SGA babies have risk factors for many potential health problems that breastfeeding may prevent.

Because the previous research questions are part of the first research design, the risks benefits, confidentiality, departure from standard patient management, retention of data, all remained the same.

The following objectives were developed through the review of the literature on women delivering SGA babies and breastfeeding.

Method

The effect of educational material on the duration of breastfeeding SGA babies research study is a prospective, longitudinal, randomised controlled trial. The study population was 100 women in each arm. The study population is currently 183 women who have recently delivered a SGA baby, of whom 132 have returned questionnaires (table 4) at 4 months and 122 at 10 months. The study is still ongoing.

Information identifying the breastfeeding rates and what the influences on breastfeeding are in this group of women is of considerable interest. There have only been two previous studies that researched these areas of interest. One by myself (Barker [Hutchings], M^cCowan and Harding, 1996) with a very small sample size (n= 66) and another by a nutritionist (Dewey, Cohen, Brown and Rivera, 1999).

Study Population

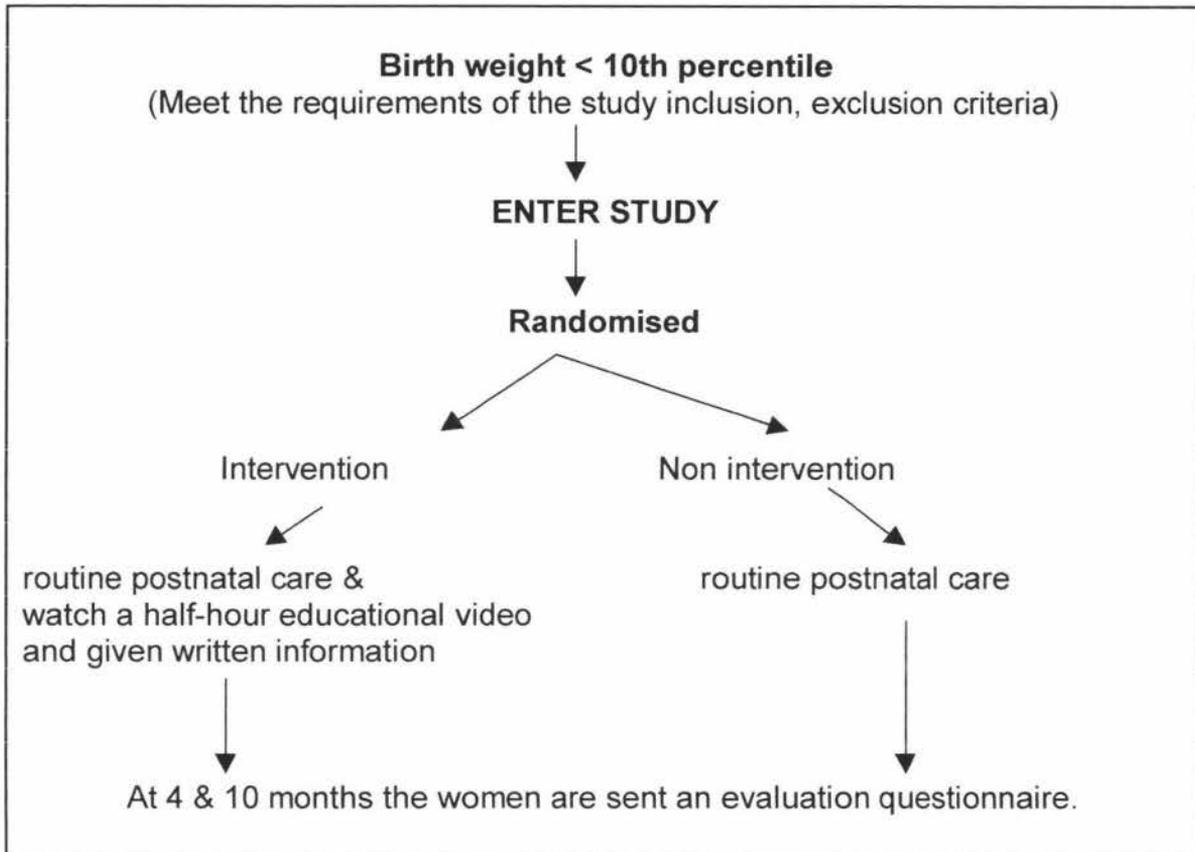


Figure 4: Summary plan of the research

Due to the inability to analyse the original hypotheses due to a reduced sample size, alternative research designs were employed to measure equally important information about women with SGA babies, as very little knowledge is available. The lack of control over the variables makes the design weak in determining cause and effect, however, it remains useful in generating knowledge.

A complementary approach to the quantitative data has also been employed, the use of a qualitative, non-experimental method using thematic analysis. As Morse (1991) describes "by reading and going back and forth among the various levels of questioning, there is a striving for a thoughtfulness" (p.65). The final coding system for emergent themes was developed through repetitive analysis of the emergent themes.

Methods of Recruitment

Women suitable for recruitment to the study were selected from the hospital computer database. The research midwife approached 203 women on 5 postnatal wards at National Women's Hospital. Eleven women did not meet the inclusion criteria (6 of these women did not wish to breastfeed) and a further 10 women refused to participate. The majority of the reasons for not participating were due to the women not having time to watch the video or were about to go home. Therefore a total of 182 women were recruited (90%). The research midwife always approached the midwife looking after the woman on that shift and checked that it was appropriate to discuss the research study before visiting. The midwife caring for the women introduced the research midwife in the majority of instances. The following inclusion and exclusion criteria were used to recruit the women.

Inclusion criteria:

Women delivering an SGA baby < 10th percentile
Singleton
Intention to breastfeed
≥37 weeks gestation

Exclusion Criteria:

Ventilated babies
Non-English speaking
Babies born to mothers with substance abuse
Major congenital abnormality
HIV antigen positive mothers

Follow-up

Questionnaires were sent to the participants at their home address specified at 4 and 10 months postpartum. With the questionnaire was a pre-paid envelope. If the questionnaire was not returned within a period of approximately 3 weeks, another questionnaire was sent. If still no reply, the questionnaires were sent to a second address (specified by the woman upon recruitment to the study). If still no reply from the study participant, no further follow-up action was taken.

Unfortunately 27% (n=50) women did not return the information at 4 months and a further 33% (n=60) of the women did not return the questionnaire at 10 months. Compared to other breastfeeding research studies where postal information is required the response rate 67% at 10 months is very good.

Data collection

The questionnaires were designed to include variables the researcher was interested in obtaining data on. Many of these variables were related to information the author had obtained in the literature review, which was identified as being of particular significance to this group of women. General demographic information was collected from the hospital patient notes using the study participant's hospital number. Confidentiality was maintained by adding the study number only to a data sheet with the demographic information. The computer databases were accessible only by a confidential password and the data sheets were locked away for safety.

Control of Variables

There are many variables associated with breastfeeding success. Janke (1993) has noted that these include:

- ethnic group
- socioeconomic status
- educational level
- whether in a supportive relationship
- age
- smoking
- breast fed as an infant
- healthy infant and mother
- prior success at breast feeding

There are many other variables that can have an effect on breastfeeding success. The design in the major research project (randomised controlled trial) was chosen as it would control for any confounding variables which would be evenly distributed in both groups, and therefore not introduce a bias. The independent variable that was given to one arm of the study was the extra breastfeeding video and pamphlet. The following variables have been collected by information obtained from the questionnaires and through the hospital database. These are important to measure as they may affect the independent variable, if not evenly distributed, ultimately eliminating the effect of extraneous variables. These variables will also provide important information on women delivering SGA babies and the influence on future breastfeeding success. Due to the inability to carry out the original research design using the independent variable (breastfeeding video and pamphlet) the other variables will be analysed to determine their effect on breastfeeding in women with SGA babies.

Information and variables collected

Maternal variables collected from the patient notes:

- Age
- Ethnicity
- Marital status
- Parity
- Education
- Employment status
- Estimated date of delivery
- Primary care giver
- Smoking status
- Method of delivery
- Total days in hospital

Maternal information collected from the questionnaires:

- Patients' mothers breastfed
- Seen friends or relatives breastfeed
- Breastfeeding/ bottle feeding pre-planned
- Influences on breastfeeding antenatally
- What factor was most helpful with their breastfeeding
- What factor was least helpful with their breastfeeding
- Continuity of care by midwife
- Watched breastfeeding video
- Nipple shields, breastshells, breastfeeding supplement used
- Time after delivery when baby held
- Time after delivery breastfeeding initiated
- Length of stay in hospital
- Percentage of breast milk or bottle milk given at 3, 6 and 9 months
- Smoking & alcohol intake

- Smoking amongst other household members
- Medication or alternative therapies taken

Infant variables collected from the patient notes:

- Date of birth
- Gender
- Gestation at delivery
- Birth weight
- Apgar scores
- Days in NICU
- Placental weight
- Baby given bottles (formula or EBM [expressed breast milk] in hospital)
- Baby received nasogastric tube feeding in hospital
- Dummy/pacifier usage
- Time of starting solids
- Illnesses of the infant
- Admissions to hospital from discharge from maternity hospital until 10 months
- Medications given to the infant from birth until 10 months

Study Definitions

1. Gestation: calculated from either an ultrasound scan before 12 weeks gestation, last menstrual period (LMP), or by a 16-20 week ultrasound scan if scan dates varied by ≥ 5 days from LMP dates
2. Fully / exclusively breastfed = breastfeeding for 100% of feeds

Statistical Methods

Statistical analysis was carried out using Statview (SAS Institute, 2nd edition 1998). Values are expressed as mean (SD), or median (10th, 90th percentiles) as appropriate. Multiple regression analysis was used to determine whether the

independent variables had any effect on the dependent variables: length of time breastfeeding at 3 and 6 months. The t-test was used to measure the differences in the averages of continuous variables between two groups.

Thematic analysis was employed to interpret the data.

CHAPTER 7:

Results

One hundred and eighty two women were recruited to the major study within the first 3 days post delivery. Ninety-one women watched the breastfeeding video "Why and How?" designed for the study and received the extra pamphlet (intervention group). The other ninety-one women received routine postnatal care (non-intervention group). There were no differences between groups in maternal age, ethnicity, marital status, parity, education, primary care giver, smoking and method of delivery (table 1). Women who received the video were more likely to be employed (this is difficult to interpret, as there were no differences in educational level, which is a good surrogate measure of socio economic status) and had a longer hospital postnatal stay (4.4 vs 3.8 days, $p=0.02$, table 1).

Table 1: Characteristics of the women

	Video n=91	No Video n=91	p value
Age (years)	30.3 [5.2]	29.0 [5.9]	0.10
Ethnicity			
European	56 (61%)	41 (45%)	0.18
Maori	8 (8%)	13 (14%)	
Pacific Island	5 (5%)	13 (14%)	
Asia	5 (5%)	5 (5%)	
Other	4 (4%)	3 (3%)	
Marital status			
Married	65 (71%)	58 (64%)	0.18
De facto	13 (14%)	13 (14%)	
Single	8 (8%)	17 (19%)	
Parity			
0	52 (57%)	46 (51%)	0.70
1	28 (31%)	36 (40%)	
>1	10 (11%)	9 (10%)	
Educational level (mother)			
Secondary < 3 yrs	9 (10%)	12 (13%)	0.65
Secondary 4-6 yrs	12 (13%)	16 (18%)	
Tertiary	37 (41%)	31 (34%)	
Employment (mother)			
Full time	44 (48%)	19 (21%)	0.0002*
Part time	6 (5%)	15 (16%)	
No paid work	29 (32%)	45 (49%)	
Primary care giver			
Midwife	14 (15%)	15 (16%)	0.23
General Practitioner	12 (13%)	22 (24%)	
Specialist	63 (69%)	52 (57%)	
Smoking status during pregnancy	1.54	1.88	0.66
Method of Delivery			
Normal	54 (59%)	62 (68%)	0.384
Operative vaginal	14 (15%)	10 (11%)	
LSCS	23 (25%)	18 (20%)	
Total Days in Hospital	4.4 [2.2]	3.8 [1.7]	0.02*

* Statistically significant results

Values are mean [SD], number (%) as appropriate

P values refer to the grouped data

No significant differences were found in the infant demographic details with regard to gender, birth weight, apgar score, bottles given in hospital, dummy usage or the time solid foods were commenced (table 2) between the two groups.

Table 2: Infant data

	Video n=91	No Video n=91	p value
Gender			0.34
Female	47 (52%)	44 (48%)	
Male	36 (40%)	45 (49%)	
Gestational age at delivery (weeks)	39.1 [1.46]	39.0 [1.19]	0.65
Birth weight (grams)	2658 (316)	2643 (280)	0.73
Apgar score			
1 minute	8.2 (1.4)	8.0 (1.9)	0.43
5 minutes	9.6 (0.7)	9.4 (1.0)	0.55
Bottles given in Hospital	42 (46%)	34 (37%)	0.71
Dummies used	38 (42%)	26 (29%)	0.16
Dummy usage (# times per day)	4.0 (4.3)	3.4 (2.3)	0.57
Time solid foods started (months)	4.8 (1.0)	5.1 (1.5)	0.18

There was no statistically significant difference in the breastfeeding rates at 3, 6 and 9 months post delivery in the women that received the additional information (video and pamphlet) compared with those that did not receive the additional information. Questionnaires are still being returned from the remaining participants in the study.

Table 3: Response Rate for data collected

Questionnaires returned at 4 months	132	73%
Questionnaires returned at 10 months	122	67%

Table 4: Breastfeeding rates in women with SGA babies (4 months)

	Video n=91	No Video n=91	P value
Returned questionnaires	n=71	n=61	Total=132
4 months			
Breastfeeding 3 months			
80-100% breast milk	53 (75%)	46 (75%)	0.21
50-80% breast milk	10 (14%)	5 (8%)	
Less 20% breast milk	7 (10%)	12 (20%)	

Table 5: Breastfeeding rates in women with SGA babies (10 months)

Returned questionnaires	n=68	n=54	Total=122
10 months			
Breastfeeding 6 months			
80-100% breast milk	33 (49%)	25 (46%)	0.80
20-80% breast milk	12 (18%)	13 (24%)	
Less 20% breast milk	23 (34%)	16 (30%)	
Breastfeeding 9 months			
80-100% breast milk	17 (25%)	12 (22%)	0.73
20-80% breast milk	10 (15%)	11 (20%)	
Less 20% breast milk	41 (60%)	31 (57%)	

The data was further analysed to determine the factors that influenced the breastfeeding rates in women with SGA babies at three months post delivery (table 6). There was no difference with regards to age, ethnic group, marital status and Caesarean section rates. Women not breast feeding at 3 months post delivery were more likely to smoke, had lower educational level and were less likely to work. All of these factors are associated with lower socio-economic status.

Table 6: Breastfeeding rates and maternal variables at 3 months

	Breastfeeding	Bottle feeding	p
Demographic variables-Mother	n=99 (74%)	n=34 (26%)	
Age	30.1 [4.9]	30.4 [6.2]	0.84
Ethnic group			
European	68	16	
Maori	9	4	
Indian	9	6	
Asian	6	2	0.25
Pacific Island	1	1	
Other	6	5	
Marital status			
Married	70	23	
De facto	15	5	0.57
Single	11	2	
Employment status while pregnant			
Full time	43 (43%)	7 (21%)	
Part time	7 (7%)	7 (21%)	0.02*
No paid work	38 (38%)	11 (32%)	
Educational level (mother)			
Sec 1-3 yrs	9 (9%)	7 (21%)	
Sec 4-6 yrs	17 (17%)	2 (6%)	0.02*
Tertiary	44 (44%)	12 (35%)	
Number of women smoking			
Yes	11 (11%)	10 (30%)	0.01*
No	88 (88%)	24 (70%)	
LSCS	18 (18%)	7 (21%)	0.78

* Statistically significant results

NB: Breastfeeding = >80% feeds breast milk

Small for gestational age babies who received bottles in hospital were less likely to breastfeed at 3 months post delivery ($p=0.02$) compared to babies who did not receive supplements (table 7). There was no difference in other variables between groups.

Table 7: Breastfeeding rates and infant variables at 3 months

Demographic variables-Baby	Breastfeeding	Bottle feeding	p
	n=99	n=34	
Birth weight	2643 (336)	2638 (227)	0.93
Gestation	39.16 [1.28]	38.89 [1.64]	0.33
Gender			
Male	45	14	0.61
Female	47	18	
Days in hospital	4 [+/- 1.7]	4.7 [+/- 3]	0.12
Bottles given in hospital	49 (49%)	26 (76%)	0.02*
Dummy usage	44 (44%)	20 (59%)	0.15

* Statistically significant results

NB: Breastfeeding = >80% feeds breast milk

Being discharged from hospital earlier had no significant effect on the breastfeeding rates. The results suggested that the mean hospital stay for the women successfully breastfeeding was 4 days compared to 4.7 days in women bottle feeding their baby ($p=0.12$). This is a far greater stay in hospital than the study definition of early discharge (< 48 hours). These results are not statistically significant so no conclusions can be derived.

The study intervention (video and pamphlet) did not alter breast feeding rates 6 months post delivery (Table 8).

Table 8: Results from the intervention (Video & pamphlet) at 6 months

Randomisation	Breastfeeding	Bottle feeding	p
	n=99 (74%)	n=34 (26%)	
Video	33 (56%)	35 (55%)	0.97
No video	26 (44%)	28 (44%)	

Women not breast feeding at 6 months post delivery were less likely to work part time in the antenatal period, however there was no statistically significant difference for women working full time or not working in the antenatal period. These results may be misleading as there is not enough clarity post delivery about the women's working status. For example women working part time prior to delivery may have returned back to work post delivery, whereas, the women working full time may have stopped working for 12 months.

Table 9: Breastfeeding rates and maternal variables at 6 months

Demographic variables-Mother	Breastfeeding n=59 (48%)	Bottle feeding n=63 (52%)	p
Age	31	30	0.7
Ethnic group			
European	40	38	
Maori	4	5	0.62
Indian	7	7	
Asian	4	3	
Pacific Island	0	2	
Other	4	8	
Marital status			
Married	41	46	
De facto	13	7	0.16
Single/ divorced	3	7	
Employment while pregnant (mother)			
Full time	26 (44%)	24 (38%)	
Part time	1 (0%)	12 (19%)	0.003*
No paid work	26 (44%)	16 (25%)	
Educational level (mother)			
Sec 1-3 yrs	4 (6%)	6 (9%)	
Sec 4-6 yrs	10 (17%)	6 (10%)	0.6
Tertiary	29 (49%)	27 (43%)	
Number of women smoking			
Yes	10 (17%)	10 (16%)	0.33
No	88 (104%)	24 (38%)	
LSCS	10 (17%)	14 (22%)	0.5

* Statistically significant results

NB: Breastfeeding = >80% feeds breast milk

Mothers of SGA babies were less likely to breastfeed at 6 months if their baby was given bottles in hospital. Babies that were not breastfed were also more likely to be given dummies at 6 months (Table 10).

Table 10: Breastfeeding rates and infant variables at 6 months

	Breastfeeding	Bottle feeding	p
Demographic variables-Baby			
	n=59	n=63	
Birth weight	2626	2688	0.26
Gestation	38.87 [1.17]	39.23 [1.52]	0.16
Gender			0.33
Male	23	30	
Female	32	29	
Days in hospital	4.2	4.3	0.8
Bottles given in hospital	25 (42%)	42 (66%)	0.01*
Dummy used	19 (32%)	35 (55%)	0.02*

* Statistically significant results

NB: Breastfeeding = >80% feeds breast milk

Table 11: Breastfeeding rates and infant variables at 9 months

	Breastfeeding	Bottle feeding	p
Demographic variables-Baby			
	n=29	n=93	
Birth weight (<i>gms</i>)	2551 [392]	2690 [261]	0.03
Gestation (<i>weeks</i>)	38.8 [1.26]	39.1 [1.40]	0.34
Gender			0.19
Male	15	38	
Female	11	50	
Days in hospital	4.5	4.2	0.43
Bottles given in hospital	17 (59%)	50 (54%)	0.86
Dummy used	9 (31%)	45 (48%)	0.06

NB: Breastfeeding = >80% feeds breast milk

The babies given more bottles at 9 months were bigger at birth. The small number of women giving > 80% breastfeeds at 9 months makes the interpretation of this result difficult.

Women were asked to rate the source of information they found the most and the least valuable about breastfeeding.

Table 12: Source of information rated as the most and least valuable

a) Information (most valuable)			b) Information (least valuable)		
	n=126	%		n=109	%
Midwife	55	44%	GP	28	26%
Video	13	10%	Antenatal classes	21	20%
Pamphlets, books	13	10%	Relatives	12	11%
Plunket	13	10%	Friends	9	8%
Relatives	13	10%	Teacher	8	7%
Friends	6	5%	Pamphlets, books	8	7%
Other	6	5%	Other	6	6%
Antenatal classes	3	2%	Community Group	5	5%
Community Group	2	2%	Video	5	5%
GP	1	1%	Midwife	4	3%
Teacher	1	1%	Plunket	3	2%

GP (general practitioner)

Midwives are clearly the source of the most valuable information. The GPs were identified as the least helpful, followed closely by the antenatal classes.

Summary of the Results Specific to the Research Aims

What is the percentage of women with SGA babies breastfeeding (>80% & 100%) at 3 months?

There was a 74 % breastfeeding rate (>80% breast milk) at 3 months in women with term SGA babies. The number of women fully breastfeeding (100% of feeds) at 3 months was 85/133 (64%) of those women who returned the questionnaires.

What is the percentage of women with term SGA babies breastfeeding (>80% & 100%) at 6 months?

There was a 48 % breastfeeding rate (>80% breast milk) at 6 months in women with term SGA babies. At 6 months the number of women fully breastfeeding (100% of feeds) was 40/122 (33%) of those women who returned the questionnaires.

The breastfeeding rate dropped to 23% (>80% breast milk) at 9 months in women with term SGA babies.

Is there any effect of early discharge from hospital on the future ability to breastfeed in term SGA babies?

There appeared to be no statistically significant effect of being discharged from hospital earlier on the future ability to breastfeed in SGA babies at 3 months ($p=0.1$), at 6 months ($p=0.8$), and at 9 months ($p=0.43$).

What is the preferential method of feeding (term, SGA babies) in hospital when breastfeeding is not successful or not enough?

Ninety-nine (%) babies received alternative methods of feeding in hospital. Eighteen percent of the babies received nasogastric tube feeds, seventy-six babies received bottle feeds (EBM or formula), 3% received cup feeds , one

received milk by an eye dropper (1%) and one was fed by a syringe (1%). There were no instances where a nursing supplementer was used. Over-all bottle-feeding was by far the preferential method of feeding.

What is the effect of formula feeding in hospital on breastfeeding rates at 3 and 6 months postnatally in women with term SGA babies?

There was a statistically significant increase in the number of women who discontinued breastfeeding at 3 months ($p=0.02$) and 6 months ($p=0.01$) postnatally whose SGA babies had received bottle feed/s in hospital.

Who or what do women with term SGA babies perceive as being the most valuable assistance with their breastfeeding?

The midwife is clearly the most valuable in assisting women breastfeed. The women were almost twice as likely to select a midwife over other types of assistance. Videos, pamphlets, Plunket nurses and relatives were equally selected as the next valuable source of information (4 x 10%).

Who or what do women with term SGA babies perceive as being the least valuable assistance with their breastfeeding?

The women selected the GP (26%) and the antenatal classes (20%) as being the least valuable source of help with their breastfeeding.

What were the reasons given 'why' women with term SGA babies stop breastfeeding at less than 4 months postnatally.

Of the 182 women enrolled to participate in the study, 132 women returned the questionnaires at 4 months and 122 questionnaires were returned at 10 months post delivery. Of the questionnaires returned at 4 months 37 women wrote down their own "reason for stopping breastfeeding". The women were able to write whatever she felt was the most significant reason for her. The data was coded independently and is therefore my own interpretation. Thematic moments arose

and these were interpreted “not as a collection of elements but as a way to further explore an aspect of their life as a mother” (Morse, 1991, p.63). The use of the word ‘thematic moment’ is describing the notion that the word ‘moment’ captures the experience for the women at that particular time (Morse, 1991). The responses to open-ended questions were read time and time again. The notes were placed on small pieces of paper so that they could be interpreted as a whole.

The responses to open-ended questions by the mothers at 4 months post delivery revealed concerns about ‘**not producing enough milk**’ for the baby, and this was cited as the major reason for stopping breastfeeding. Another emerging theme was ‘**not able to cope**’. Other less frequent reasons for stopping breastfeeding were physical difficulties with the baby and the mother (eg. mastitis, sick baby). There were also women concerned about the milk they produced (composition). Overall, these women seemed to have a ‘**lack of confidence in the ability of their body**’ to cope and produce milk.

The second reason the women cited as stopping breastfeeding was also analysed. The themes that emerged were a ‘**lack of time**’ and ‘**exhaustion**’. Examples of comments were;

“...moved house, I was *exhausted*”
 “...too *tired* to continue”
 “Baby had colic and I was *exhausted*...”
 “...*lack of time*”
 “*Baby took too long*...”
 “My other children were *demanding*...”

Once again the previous theme of ‘**not enough milk**’ also emerged. It was also interesting to note that many women felt that the **baby** had decided that he/she did not want breast milk.

“Baby wanted more”; “Baby not content”; “Baby hungry”

The third reason the women cited for giving up was centred on the woman's feelings. The theme that emerged was the '***need to get them selves back***'.

The following are quotes from responses to open ended questions:

"I was *frustrated*..."

"I was *happy* that baby was on formula..."

"...'*uncomfortable*' with baby hanging off my breast"

"...*bored* to sit with baby"

"I didn't feel *comfortable*..."

"I had more *freedom*..."

From the three reasons (the first reason the most significant) the women cited as being the reasons for stopping breastfeeding (at 4 months post delivery), the following 5 major themes emerged: Not producing enough milk; Inability to cope with the stress and exhaustion; Lack of confidence in the ability of their body; Need to get themselves back, and not enough time.

In the following chapter the findings will be discussed.

CHAPTER 8:

Discussion

The Public Health Commission (PHC) in New Zealand noted that in 1991 exclusive breastfeeding at 3 months was 60% and exclusive and partial breastfeeding at 6 months was 55%. The committee identified two targets:

1. To increase exclusive breastfeeding at three months from 60% (1991) to 70% by 1997 and 75% by the year 2000.
2. To increase breastfeeding (exclusive or partial) at 6 months from 55% (1991) to 70% percent by 1997, and 75% by the year 2000 (PHC, 1994).

The partial and exclusive breastfeeding rates assessed by the Royal New Zealand Plunket Society in 1992 were 72% at three months and in 1997 were 69% at 3 months (of partial and exclusive breastfeeding)(Griffiths, 1997). These data would suggest that the PHC did not reach their target of 70% exclusive breastfeeding at 3 months. The rate had also decreased in 1997 compared to 1992 suggesting that strategies implemented to improve breastfeeding rates in New Zealand were not working.

Data collected by the New Zealand Plunket Society in 1993 indicated that 93.8 percent of mothers initiated breastfeeding, however, 15 percent had stopped breastfeeding by eight weeks post partum. The researchers concluded that the major factors associated with breastfeeding failure were; low levels of maternal education, geographic region of domicile, maternal smoking, being primiparous and being European (PHC, 1995). It was interesting to note that many of these factors are also 'characteristics' which are more common in women having SGA babies. This would once again suggest that women with SGA babies need support and possibly the development of guidelines to improve their breastfeeding rates. Research is clearly required on ways to improve breastfeeding in women who were the most susceptible to breastfeeding failure.

The findings from this research have highlighted a number of important issues when assisting women to breastfeed term SGA babies. The research has

demonstrated that women delivering term, SGA babies at National Women's Hospital, have breastfeeding rates similar to the general population of breastfeeding babies. When comparing the number of women with SGA babies fully breastfeeding (100% of feeds) at 3 months, it was necessary to add 5 women to the sample size. This is because there were 5 women who declined participating in the study initially because they had decided to bottle-feed in hospital. This adjusts the number of women fully breastfeeding at 3 months to 62%. The New Zealand public health targets aimed at increasing the exclusive breastfeeding rate at 3 months, from 60% to 75% (Public Health Commission, 1995), by the year 2000. These data would suggest that women with SGA babies have similar breastfeeding rates to the general population and that both groups still have to increase this rate by approximately 13% to reach the public health targets. At 6 months the number of women fully breastfeeding (100% of feeds) was 31% when adjusting for the 5 women who did not join the research due to an early decision to bottle-feed. This figure is not as crucial as many babies started solids at this age, which would have reduced the number of women, exclusively breastfeeding considerably.

A large New Zealand survey carried out by the Plunket National Child Health Study (Essex, Smale, Geddis, 1995), reported exclusive breastfeeding rates of 47.6% at 3 months and 2.5% at 6 months. This is a much lower rate than our figures for term SGA babies (62% and 31%). A factor that may contribute to the much higher rates in the SGA study was the large number of unreturned questionnaires at 4 months (n=50, 27%) and at 10 months (n=60, 33%). It may be that many of the women that did not return the questionnaire had discontinued breastfeeding and the actual rate of breast feeding for the whole sample may be lower. This is always a difficulty with research involving questionnaires. The study by Essex et al. (1995), was also carried out a few years earlier than the SGA study and it may be that breastfeeding rates are increasing with increasing public knowledge on the benefits associated with breastfeeding.

Many people believe that the 'baby friendly hospital' initiative will improve these breastfeeding rates, however as already discussed there are concerns when

implementing this policy in SGA babies as there are times, particularly when the baby is hypoglycaemic, that additional feeds are necessary.

Overall, the percentages of women breastfeeding at 3 and 6 months postnatally were surprisingly high considering the number of potentially negative factors such as the influence of hypoglycaemia prevention and the associated routine bottle usage, hypothermia and the associated sleepiness, cigarette smoking and the associated negative influence on breastfeeding. The literature would suggest that women with SGA babies have lifestyle factors that could be potentially detrimental to breastfeeding success. There is thus room for improvement, as breastfeeding confers major advantages, particularly for the SGA baby.

It was interesting to note that there were no effects of being discharged from hospital earlier on the future ability to breastfeed in SGA babies. Most study participants stayed in hospital for at least 4 days, which is probably longer than women with AGA babies as the care-givers may have been more cautious about sending small babies home too soon.

Unfortunately many women with SGA babies were sent home earlier (in the final year of the research) which made recruitment very difficult as the women did not have time to discuss the research with their partner or watch the video. Women being discharged early were therefore more likely not to be recruited and early discharge reduced total study recruitment. There were more women in the intervention group (extra video and pamphlet) who stayed in hospital approximately an extra half day. This may be the result of needing to watch the video before being discharged from hospital.

It was interesting to note that there were more women who were in full time employment antenatally who were breastfeeding at 3 months. These findings suggest that even though these women may need to return to work, they still demonstrated a commitment to continue with their breastfeeding.

It was interesting to investigate the number of term SGA babies being given additional methods of feeding instead of breastfeeding. From the 133 women

who returned the questionnaire at 4 months, 18 babies were fed with nasogastric tubes, 3 by cup, 1 with an eye dropper and 1 with a syringe. There were however 76 babies (table 2) given bottles in hospital, which clearly demonstrates that health professionals were more inclined to give bottle-feeds in preference to other methods of feeding. It is also interesting to note the advice of Lang (1997) "it is better to avoid using bottles altogether, if a baby is to be breastfed" (p.157). Newman (1990) also suggests "bottles and pacifiers may cause many problems for the breastfeeding mother and her baby. Hospital routines are often set up for the convenience of the staff rather than to promote breastfeeding"(p.63). Newman also states "medicinally indicated supplementation can be provided without using bottles"(p.63). Lang (1997) suggests that when an alternative method of oral feeding is required, health professionals can use a cup, or a spoon and the mother may be able to use a nursing supplementer or syringe. This is interesting advice considering the large number of staff members/mothers that gave bottles compared to other methods of feeding. Women whose babies were given bottles in the hospital were more likely to have stopped breastfeeding at 3 and 6 months post delivery. This occurred in spite of the fact that all the women that participated in the study intended to breastfeed their babies (only 5 women did not participate because they had decided to bottle-feed).

Newman (1990) suggested that babies can suffer from 'nipple confusion' if introduced to the bottle early in the postnatal period. This phenomenon was thought to be due to the different suckling mechanisms the baby uses when bottle-feeding compared to breastfeeding. However the issue of nipple confusion is no longer accepted in terms of confusion but relates to the manner in which a baby suckles on a nipple when compared to a teat (Menahem, 1997). The 'prolactin reflex' is a very important aspect of breastfeeding and has been previously discussed in detail in chapter 2. The interference of the prolactin reflex process through the introduction of bottles is well recognised. The mother's/ health professional's that recommended bottles in hospital may have started a vicious cycle where the influence of bottle-feeding resulted in less suckling stimulus, which in turn compromised the amount of milk produced. Lang (1997) discussed alternative methods of feeding infants and recommended the use of these techniques before using bottles. Cup feeding had the advantage of

not interfering with the natural suckling mechanism of the new born. Staff would need to be educated on how to correctly administer cup feeding to the newborn if this policy was introduced to hospitals. If managers were to support this change in the way midwives and nurses care for SGA babies, they would need to look at the staffing ratios as cup-feeding is more time consuming if carried out correctly (Gupta, Khanna, Chattree, 1999). The literature on the benefits of breastfeeding (described in depth in the adjunct literature review) demonstrates the many advantages from breastfeeding. This is particularly so in SGA babies as the research and literature has demonstrated health problems that breastfeeding may prevent.

Most women were approached to participate in the study on the second to third day post delivery and the mean duration of hospital stay was 4 days overall. This would suggest that the majority of women with SGA babies had not decided to bottle feed at the time of recruitment to the study. The results suggest that SGA babies may be more unsettled and that may have been one reason the women resorted to formula feeding.

The results of what the women perceive as being the most valuable with their breastfeeding experience were not surprising. The midwives were rated as providing by far the most valuable assistance followed equally, but to a lesser degree by videos, pamphlets, Plunket nurses and relatives. This clearly illustrates the value of personal and professional knowledge and guidance. The women perceived the GP to be the least valuable source of advice for breastfeeding, followed closely by the antenatal classes. This was rather surprising, antenatal classes are expected to be helpful rather than unhelpful. Further research is warranted investigating why the antenatal classes are perceived in this way. Is it because they do not cover any breastfeeding education, is the timing unhelpful, or is it the content on breastfeeding? Further research may offer ways in which antenatal breastfeeding education can be improved.

Qualitative research was carried out investigating the reasons why women with SGA babies stopped breastfeeding. This was a key question as the literature

implied that women with SGA babies may be different to women in the general breastfeeding population and may have their own unique reasons for stopping breastfeeding. It was interesting to note that the reasons the women identified for discontinuing breastfeeding were similar to women in the general breastfeeding population. The 5 key reasons were: Concerns about not producing enough milk; Inability to cope with the stress and exhaustion; Lack of confidence in the ability of their body; Need to get themselves back and Not enough time. The theme 'not enough milk' was by far the most commonly cited reason for discontinuing breastfeeding. From the literature I have reviewed there may be physiological reasons for the inability to produce milk and this may be a very real phenomenon for these women. The reason may be related to stress, which has the ability to interfere with the let-down reflex, however these women were not saying they were stressed. They really believed they did 'not have enough milk'. It may be that SGA babies have a weaker suckle, creating less stimulus on the 'prolactin reflex' resulting in a decreased production of milk. It may be that there was enough milk and the women were lacking confidence in the ability of their bodies, as they were unable to see how much their baby was getting. It may be a lack of understanding on the mechanism of milk production. All of these are 'may be', it really does not matter what the physiological cause is, the real issue is what the woman *believes*, and they truly felt that 'they did not have enough milk'. This is cited in many other texts as 'insufficient milk syndrome' and is supported by many other researchers in many different countries as being the main cause for the discontinuation of breastfeeding (Avery, Duckett, Dodgson, Savik, Henly, 1998; Righard, 1998; Henly et al. 1995; Segura-Millan, Dewey, Perez-Escamilla, 1994; Hill, Aldag, 1991; Mathur, Chitranshi, Mathur, Singh, Bhalla, 1992; Hill, 1992; Hill, Aldag, 1993; Greaves, Hendrata, 1990; Haider, Kabir, Hamadani, Habte, 1997). This would suggest that women with SGA babies have similar difficulties to women in the general breastfeeding population and having a smaller baby or being from a lower socio economic group does not necessarily affect the woman's reason for stopping breastfeeding.

There was one woman who cited postnatal depression as being the reason for stopping breastfeeding. This is not well recognised in the literature as being

associated with difficulties with breastfeeding and further research needs to be carried out in this important, yet under researched area.

Due to the overwhelming evidence supporting the beneficial and protective properties of breast milk, guidelines have been developed to improve breastfeeding knowledge and ultimately improve the rates of breastfeeding. It was also well recognised that there needed to be appropriate marketing and distribution of breastfeeding information to the public. This resulted in the World Health Organisation (WHO) developing a code on the marketing of breast milk substitutes.

The most well recognised information on breastfeeding is from the WHO and United Nations Children's Fund (UNICEF). Based on research evidence and on mother's experiences of what made breastfeeding successful, they developed a recommendations known as the ten steps to successful breastfeeding (WHO, UNICEF, 1989). These steps were then expanded into the Global Criteria for the Baby-Friendly Hospital Initiative in 1991 (UNICEF, 1992). The Global Criteria took two years to reach a consensus, however, they have now become the basis for the accreditation of the Baby Friendly Hospital Initiatives health facilities.

These steps are:

1. Have a policy that is routinely communicated to all health care staff.
2. Train all health care staff in the skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mother's initiate breastfeeding within half an hour of a birth.
5. Show mothers how to breastfeed and how to sustain lactation, even if they should be separated from their infants.
6. Feed newborn infants nothing but breast milk, unless medically indicated, and under no circumstances provide breast milk substitutes, feeding bottles, or pacifiers free of charge or at a low cost.
7. Practice rooming in which allows mother and infants to remain together 24 hours a day.

8. Encourage breastfeeding on demand.
9. Give no artificial pacifiers to breastfeeding infants.
10. Help start breastfeeding support groups and refer mothers to them.

(UNICEF, 1992).

If women have a SGA baby these previous WHO and UNICEF guidelines would be difficult to adhere to as feeding protocols can be very strict with SGA babies due to the risk of hypoglycaemia. The SGA baby is usually fed 3 hourly which is a direct contradiction to step number 8 of the successful breastfeeding steps. Often an SGA baby is in the nursery for special care and attention, which is also in contradiction to step number 7. In summary, unfortunately women with SGA babies have routine protocols that go against the well-recognised 10 steps to successful breastfeeding. Research needs to be carried out investigating whether routine practices for SGA babies (3 hourly feeding, top ups) are necessary as breastfeeding is of particular benefit to SGA babies and should be encouraged and promoted at all times.

Ample evidence is available on the impact of health care practices and hospital routines and procedures on breastfeeding (Renfrew, Fisher, Arms, 1990). It is well known that good practices enhance successful initiation and establishment of breastfeeding and contribute to increased duration, just as inappropriate practices, and failure to support and encourage mothers, have the opposite effect. In 1991 the WHO and UNICEF jointly launched the Baby-Friendly Hospital Initiative, which aimed to give every baby the best start in life by ensuring a health care environment where breastfeeding was the 'norm'. The initiative was based on the principles summarised in a joint statement issued by the two organisations in 1989 on the role of maternity services in protecting, promoting, and supporting breastfeeding. To become truly baby-friendly, hospitals and maternity wards around the world were given practical effect to the principles described in the joint WHO/UNICEF statement that have been synthesised into Ten Steps To Successful Breastfeeding described previously. This summary of the rationale and scientific basis for the Ten Steps was presented in the light of cumulative experience demonstrating the crucial importance of these principles for the successful initiation and establishment of

breastfeeding (Saadeh & Akre, 1996). The World Health Organisation designed the 10 steps to successful breastfeeding to promote and protect breastfeeding. As already identified in chapter 2, SGA babies have special considerations that health professionals need to be aware of. Hospital policies for feeding SGA babies may need to be reviewed and new protocols designed that maintain the safety of the SGA baby, however, still promoting the 10 steps to breastfeeding where ever possible. These protocols should ensure that the safety of the SGA baby is considered at all times, particularly considering the dangers of hypoglycaemia. When assisting women feed their SGA baby, the advice should always be balanced, keeping in consideration the ways in which to promote successful breastfeeding and the safety of the baby. The 10-step strategy should not be taken too literally when caring for women with SGA babies as these babies may not have the same reserves to go without milk for a long period of time (WHO, 1997)

There is a vast quantity of literature available promoting the 10 steps of successful breastfeeding. A summary paper by Saadeh and Akre (1996) examines the rationale and scientific evidence for the 10 steps of successful breastfeeding guidelines. As the authors suggest, the adoption of the 10 steps enhances care for all women, whether or not they are breastfeeding. Saadeh and Akre (1996) notes that if the 10 steps are properly implemented, "they favour informed decision making about infant feeding, individualised advice about infant feeding, humanise care during labour and delivery, providing support for mothers after discharge, and independence from commercial influences" (Saadeh & Akre, 1996, p.157). Care should be taken that the steps are adopted appropriately without putting any babies at risk.

Conclusion

Guidelines have been developed by WHO to encourage breastfeeding and public health services are aware of these guidelines. Many maternity hospitals in New Zealand are implementing the ten steps to successful breastfeeding, as they are aware of the overwhelming evidence on the benefits of breastfeeding. It is interesting to note however that the breastfeeding rates had not altered

significantly in New Zealand since the PHC identified targets to achieve in 1997 and the year 2000. Unfortunately the targets identified by the PHC (1994) were not reached even though the majority of key maternity hospitals were implementing the 10 steps to successful breastfeeding policy where appropriate. Only recently was the Baby Friendly Hospital Initiative launched (August 2000), therefore it will take time for this initiative to make a significant change to breastfeeding rates in New Zealand. The findings from this research demonstrated that staff gave the babies other methods of feeding other than breastfeeding. It may be that this is appropriate in SGA babies, however, this goes against the 10 steps to successful breastfeeding guidelines. Further research needs to be carried out identifying the most appropriate feeding management of the term SGA baby that is at risk of hypoglycaemia and not feeding well on the breast. The findings from this research support that the administration of bottles in the early postnatally period is potentially detrimental to future breastfeeding success. There are alternative methods of feeding an SGA baby such as cup feeding, lactaids, nasogastric tube feeds. These alternative methods of feeding should be investigated further as they may not interfere with breastfeeding as much as bottles.

CHAPTER 9:

Conclusion and Future Directions

The larger literature review adjunct to this study on breastfeeding and SGA babies, concluded that breastfeeding had benefits to the gastrointestinal, auditory and respiratory systems, possible reductions in the incidence of SIDS and positive benefits on the emotional bonding between the mother and her infant. It was also clearly evident that there are significant cost saving benefits, not only to the family, but also to society as a whole. Other important impacts of breastfeeding were child spacing benefits and cancer protection. There was also a review of the literature relating to women who deliver SGA babies and the pathophysiology of the causes of restricted fetal growth. This review identified a variety of possible causes of SGA babies. These were: genetic reasons (ie. the mother or father is small), restrictions in maternal blood supply (particularly with GPH, elevated blood pressure), other medical conditions, genetic disorders (syndromes). There are, however, many cases where there are no obvious causes for the restricted growth and in many of these cases the women may have come from a lower socio economic group. The literature also demonstrated this finding and further postulated that women with SGA babies may have poor life style habits, a greater incidence of smoking, drug and alcohol abuse and a poor diet. Examples from a midwife's diary on stressful episodes that occur for women with SGA babies, revealed that many of these women might also have particularly stressful events occurring in their lives.

The literature reviewed specifically on SGA babies and breastfeeding uncovered a *complexity* of issues, all of which have the potential to affect the women's breastfeeding success. The issues discussed were: breast milk constituents, stress, malnutrition, hypoglycaemia, hypothermia, weight gain, small mouth, congenital abnormalities and drug usage. The aspects concerning, women who choose not to breastfeed, and HIV and breastfeeding were also reviewed. These complex issues all affect breastfeeding success in different ways, and need to be considered on an individual basis.

The results produced from the research described in this thesis suggest that the unemployed, smoking and less educated women have lower breastfeeding rates at 3 months. This is consistent with other research findings on breastfeeding.

The literature also supports that these women and babies would benefit far more from breastfeeding as the babies are at an increased risk of SIDS, and mother and family can benefit from the cost savings associated with breastfeeding. Many of these women find themselves in a negative cycle where one problem can lead to another.

The findings from the research concerning the reasons why women with SGA babies stop breastfeeding, has revealed that the main reason women stop breastfeeding is due to 'perceived insufficient milk supply'. This is well recognised in the literature as being the main reason women in the general breastfeeding population stop breastfeeding. This would suggest that even though their babies are smaller, and they have many complex issues that may affect their breastfeeding, they have the same concerns as women in the general breastfeeding population and the input from the midwives would therefore also be similar. There are however special considerations for these babies and the professionals caring for these women need to be aware of these. The results suggest that bottle-feeding in hospital can have a detrimental effect on future breastfeeding success. It is important to realise that complementary feeds may be crucial in the prevention of hypoglycaemia and other alternative methods (eg. cup feeding, nasogastric tubes) of feeding should be used if clinically indicated. Further research needs to be carried out on the success of cup feeding instead of bottle-feeding to determine whether this may be a good substitute in babies that require special assistance.

Overall the breastfeeding rates were very good in this group of women and babies. It may be that SGA babies are particularly hungry when they are born and feed well, however it may also be due to the superb care of the midwives looking after these women. Midwives are always striving to improve the number of women successfully breastfeeding, with the aim of improving the future well being of the mothers and babies. The literature reviewed has identified a lack of midwifery research on breastfeeding SGA babies and has highlighted that mothers of SGA babies and the babies themselves have special needs. This current research has only investigated the 'tip of the iceberg' in this area.

The literature has demonstrated that 'breast is best' and has illustrated that breastfeeding may be particularly beneficial in women with SGA babies. It is now necessary to implement the findings from this research into practice and to carry out further research in the many areas identified. Midwives and other health professionals need to be aware of the complex issues that may interact with breastfeeding success, particularly in women with SGA babies. Many of these factors have the potential to create negative cycles. It is up to the health care professionals to break these cycles and teach women healthy lifestyle habits.

The results from these initiatives can be long lasting and may impact on future generations.

APPENDICES:

APPENDIX: 1:

NORTH HEALTH ETHICS COMMITTEES

APPLICATION FOR ETHICAL APPROVAL OF RESEARCH

1. TITLE

THE EFFECT OF AN EDUCATIONAL INFORMATION ON THE DURATION OF BREAST FEEDING SMALL FOR GESTATIONAL AGE BABIES

2. INVESTIGATORS

Ms Sarah Barker (Hutchings), RCompN, RM, BHSc(Midwifery), Part 1 Ultrasound in Obstetrics(ASUM).

Ms. Barker will commence her MA studies in March 1996. Breastfeeding and small for gestational age babies will be part of the focus of her study.

At present she is the research midwife for the small for gestational age Doppler study and the follow up study on small for gestational age babies growth and development.

Dr Lesley McCowan (Obstetrician)

3. LOCATION OF RESEARCH

Women will be recruited to the study by Ms Barker at National Women's Hospital.

4. TYPE OF SUBJECTS

Recently delivered women with small for gestational age babies (birth weight less than the tenth percentile) will be invited to participate within the first few days after the birth.

5. PROJECT DESCRIPTION

5.1 Scientific Basis for the Project

Women who deliver small for gestational age babies at National Women's Hospital are less likely to breast feed their babies at three months of age than women in the general population. 42% versus 71.3% ($p=0.0001$). (Barker unpublished data).

A study by Barros, Huttly et al (1) revealed that small for gestational age babies needed special attention from health care workers as their infant mortality rate was 4.4% higher than that of children with adequate birth weight at term. New Zealand studies have shown that small for gestational age babies are at increased risk of cot death (2), and are also at greater risk of lower intelligence (3). Pryor (3) reported significantly lower scores on Stanford Binet scales at ages 3 to 5 in a group of SGA children when compared with controls matched for sex, birth order and socio economic status. Lucas (4) and Sinclair (5) have suggested that breastfeeding promotes better development of the eye, brain and central nervous system. Breastfeeding may be of particular benefit to this group of high-risk babies, therefore the proposed study will help us to identify whether increased knowledge about the advantages of breast feeding given in the early postnatal period increases the duration of breast feeding in this group of high risk babies.

SPECIFIC AIMS AND PLAN OF RESEARCH

The aim of this study is to investigate whether the provision of educational information (pamphlet and video) will increase the frequency and duration of breast feeding in women who deliver small for gestational age babies at National Women's Hospital. Women who deliver a baby after 37 weeks gestation whose birth weight is less than the tenth percentile will be asked to participate.

They will be randomised using a system of computer generated numbers into one of two groups. The control group will receive routine postnatal care (as is current practice) and the intervention group will receive an educational pamphlet (appendix 1) and watch a video on breastfeeding prior to discharge from hospital. Nine months after delivery a questionnaire to assess feeding methods will be completed. If the intervention group has an improved rate of breastfeeding the intervention will be made available to all women delivering small for gestational age babies at National Women's Hospital.

5.2 Subjects

Recently delivered women with small for gestational age babies will be recruited from the postnatal wards at National Women's Hospital within two days after the birth.

Power Calculations: An increase in the breast feeding rate from 40% to 60% at three months of age requires 100 women in each arm of the study (power = 80% $p < 0.05$). It is estimated that it will take between 24 and 30 months to recruit this number of women as 170 women have been recruited to another small for gestational age study in a two-year period.

5.3 Risks and Benefits

There is no risk to the women in the study. The women who receive the educational intervention may have increased rates of breast feeding as a result.

If the intervention is effective this may be of benefit to these women in the future as small for gestational age babies tend to be recurrent.

5.4 Initiation and Termination of Project

The study will begin 1 March 1996 and will be completed by 30 March 1998.

5.5 Confidentiality

Women will initially be identified for the study by name and hospital number. Once consent is obtained the women will be ascribed an anonymous number by the order they are recruited into the study. The allocation of randomised numbers will be performed by a clerical worker who will not have access to the patient files. The master copy of this list will be locked in a safe place and will only be accessible to the researchers. Research records will be stored in a research office that is supervised or locked if unsupervised. Access to the computer files will require a two way scrambled password and accessible only to personnel involved in the study. The only form of identification on the postal questionnaire will be the women's study number. This will maintain the subjects anonymity if the questionnaire is mislaid in transit.

5.6 Finance

The salary for Ms. Barker is provided by the Auckland Health Care until the 30.6.96 and then by the Health Research Council from the 1.7.96 until the 1.9.97. The cost of producing the video and information pamphlet is covered by a research grant.

5.7 Radiation

No radiation is used in this study.

5.8 Medicines

No medicines will be administered for the purpose of this study.

5.9 Departure from Standard Patient Management

Those randomly allocated to the intervention group will watch the thirty-minute educational video on breast feeding small for gestational age babies and will also be given a specific information leaflet. Videos on several topics are already available on the hospital wards for women to watch at their leisure, as are information leaflets. Therefore the use of this specific video does not cause any departure from standard patient management.

The women will be asked to complete a short questionnaire nine months postnatally. A prepaid addressed envelope is provided for the women's convenience.

5.10 Retention of Data

A register of all subjects included in the study will be retained as confidential written document for 10-years. All data will be retained as a confidential computer file for 10 years.

APPENDIX 2:

APPROVAL NOTIFICATION

91-95 Mt Eden Road

Mt Eden

Private Bag 92522

Wellesley St

Auckland

New Zealand

Ph: 64-9-357 4300

Fax: 64-9-357 4301

10 October 1996

Ms S Barker
Dept of Obstetrics & Gynaecology
National Women's Hospital
Private Bag 92 189
Auckland

Dear Ms Barker

96/030 THE EFFECT OF EDUCATIONAL INFORMATION ON THE DURATION OF BREASTFEEDING SMALL FOR GESTATIONAL AGE BABIES

Thank you for your letter of 23 September 1996 and the revised questionnaire and subject information sheet which were considered by Ethics Committee Y at the meeting on 9 October 1996.

The Committee gives approval for you to send the questionnaire in two separate parts (at 4 months and then at 10 months postnatally), and to the additional questions and clarification of technical terms.

Regards.

Yours sincerely



Ann Howard
Secretary
Ethics Committees

cc General Manager, National Women's Hospital

**Don't feel embarrassed
or nervous about calling for help. Lots of women
have breast feeding problems**

These services are more than happy to
help you with any breast feeding difficulties.

National Women's Lactation Consultant:

Provide specialised support for any breast feeding
difficulties. Leave a message on her answer phone
if she is not there.

Ph.630-9914

Your plunket nurse or family centre.

If you do not know your
plunket nurses number you could phone the
plunket help line

**Ph. 0800101067 24 hr service.
(this number is free).**

La Leche League.

This service provides telephone support
and group meetings with other mothers.

Ph. 846-0752

Parent centres.

This service is available for phone
support by other parents. Ph 837-2021

Please never hesitate to call.

Reference: Illustrations and photo
Renfrew, M. Fisher, C. Arms, S. 1990.
Bestfeeding: Getting Breast feeding Right for You.

BREAST FEEDING SMALL BABIES "WHY AND HOW"

**Extra information for the study
'The effect of educational information on the
duration of breast feeding
small for gestational age babies'**

Compiled by Sarah Barker





Diagram 1: Photo of breast feeding going well.

When breast feeding is going well , the mother's nipple is never damaged because it is so far back in the baby's mouth that there is no rubbing against it.

(It is rubbing that causes both soreness and damage to the nipple.)

This is why breast feeding should not hurt. In this photograph, and the accompanying drawing and diagram, you can see what is going on inside baby's mouth when breast feeding is going well.

Notice that she is well positioned on the breast her lower lip is pressed down flat against her chin and she has taken not only the nipple but also a large amount of breast tissue into her mouth, forming them into a teat with her tongue.

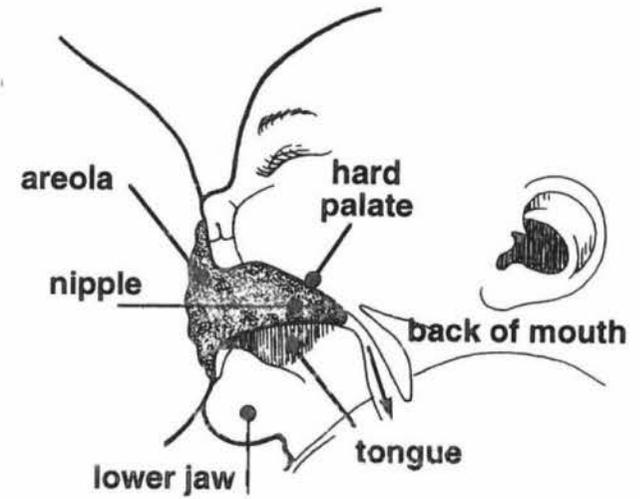


Diagram 2: The correct positioning of baby on the breast.

Baby's nose is against the breast but not pressing in. You can see how her nostrils in this drawing open to the side, which makes it possible for her nose to be right against your breast and for her still to be able to breathe. In diagram 2 you can see how baby's tongue completely cover the lower gum (or teeth) and protects the nipple, which lies safely in the back of the baby's mouth where it cannot be damaged.

You can see very little of this mother's large areola (the dark area of the nipple), because most of it is in the baby's mouth. Look at how the nipple plus breast tissue together are pulled into the shape of a teat.

Example of baby positioned incorrectly and correctly.

INCORRECT



This baby is not well positioned. Can you see how this positioning does not allow the baby to get enough milk and would be likely to result in sore nipples and decreased milk production.

Note how she seems to be pulling down and off the breast. There is also a gap between her chin and the breast and her nose is not resting against the breast.

CORRECT



Here the same baby is positioned just right on the opposite breast. She is now tucked in close to the breast, her mouth open wide, and her chin against the underside of the breast. She has taken in a good mouthful and is feeding well.

Positioning your baby on the breast correctly is vital.

This takes time and patience but you will feel the difference when the baby is positioned correctly.

The baby should not suck on the end of the nipple as this will be painful and also cuts off the milk supply.

The baby should have her mouth around and covering as much of the brown area around your breast (areola) as possible (as demonstrated in diagram 1). The baby's lips should be rolled back with the tongue underneath the nipple drawing the breast in.

There should be a sensation of suckling but this should not feel painful.

When the baby has finished feeding she usually stops suckling and will let go of the breast.

If you need to take the baby off the breast, break the suction by putting your finger in the baby's mouth, (you can be shown how to do this by your midwife) this helps to prevent nipple damage.

The benefits of breast feeding your baby are very well known these days.

I'll recap the main benefits which may be **even more important** when your baby is smaller than expected for his or her age.

- Your baby will have less infections and illnesses which may result in less Doctors visits. This is because of the unique properties in breast milk which helps protect from infections.
- Breast feeding is more convenient, it does not take time to prepare and warm bottles and you can also breast feed any time and anywhere if you wish.
- Formula is expensive so if you can breast feed your baby this can be a big saving.
- Babies that are small for gestational age are more at risk of cot death and breast feeding your baby may reduce this risk.
- Your baby will also be less likely to develop allergies.
- Recent research suggests that breast feeding may enhance baby's development

There are many very important health benefits for your baby

It is important to care for your breasts and nipples

- Check your breasts for any painful or red areas, this can be a sign of blocked ducts or a breast infection. Some women feel like they may be getting the flu when they have a breast infection. Get advice from your midwife or Doctor and continue feeding as this will help clear the blockage.
- After feeding allow your nipples to dry naturally before replacing your bra. Massage your milk gently onto your nipples if they are dry or sensitive, this will help them to heal.

Women are often concerned whether their baby is getting enough breast milk, this is particularly so if your baby is small. Hopefully these tips can reassure you;

A baby can lose up to 10% of his or her birth weight in the first few days, and should regain weight back to his or her birth weight by 10-14 days.

Allow baby to feed often and as long as baby chooses. This can vary greatly. It is normal for a term (37 weeks onwards) baby to have 8-10 feeds in 24 hours.

Your baby is likely to be getting enough milk if...

- **Baby feeds well and you note swallowing**
- **Baby has six to eight wet nappies a day.**

If you have any concerns contact your midwife or plunket nurse.

APPENDIX 4:**BREAST FEEDING QUESTIONNAIRE**
(To be completed 4 months after the birth)

Study number.....

Please complete and return in the envelope supplied.

Please circle one of the options below (1,2 or 3)

1. Have you had any previous babies? Y / N

If circled YES in the previous question,

2. Did you breastfeed your previous baby? Y / N

If circled YES in the previous question,

3. How long did you breastfeed your first infant?.....months orweeks

4. If you had more than one previous baby, how long did you breastfeed all your babies on average?.....months.....weeks

5. Did your mother breastfeed? Y / N

6. Have you seen friends or relatives breastfeed/ Y / N

The following questions relate to the recent breastfeeding experience of your four-month old.**7. Please circle one of the options below**

a.) Did you plan to breastfeed? Y / N

b.) Did you plan to partially breastfeed? Y / N

c.) Did you plan to bottle-feed? Y / N

Please answer the next section if you circled yes for the previous question c. otherwise continue to question 10.

8. Did you change your mind and breastfeed? Y / N

9. 9. If you answered yes to the previous question what persuaded you to breastfeed?

(please circle the most influential)

a. Antenatal classes

b. G.P.

c. Midwife

d. Plunket

e. Your teacher

f. Community group, i.e. La Leche

g. Friends

h. Relatives

i. Pamphlets, books

j. Video

k. Other, please specify.....

10. When did you start breastfeeding?.....days

11. When did you stop breastfeeding?.....months orweeks

12. If you started supplements/ bottles, when was this?

.....days.....weeks ormonths

13. Was baby given a bottle in hospital? Y / N

14. Was baby given a nasogastric tube feed in hospital? Y / N

15. Was baby given any other method of feeding?

Please specify.....

16. If you breastfed, please circle **one** source of information you found the **most** valuable with your breastfeeding.

- a. Antenatal classes
- b. G.P.
- c. Midwife
- d. Plunket
- e. Your teacher
- f. Community group, i.e. La Leche
- g. Friends
- h. Relatives
- i. Pamphlets, books
- j. Video
- k. Other, please specify.....

17. If you breastfed, please circle **one** source of information you found the **least** valuable with your breastfeeding.

- a. Antenatal classes
- b. G.P.
- c. Midwife
- d. Plunket
- e. Your teacher
- f. Community group, i.e. La Leche
- g. Friends
- h. Relatives
- i. Pamphlets, books
- j. Video
- k. Other, please specify.....

18. Did you have a midwife provide continuity of care in your pregnancy? Y / N

19. Have you ever seen a breastfeeding video? Y / N

20. If yes, where did you see the video?.....

21. When did you see the video? (Please circle one or more answers)

- a.) Pre pregnancy
- b.) Early pregnancy (1-14 wks)
- c.) Mid pregnancy (14-27 wks)
- d.) Late pregnancy (27-40 wks)
- e.) Postnatally (After baby was born)

22. Did you watch the breastfeeding video designed for this study? Y / N

23. Has your baby ever used a dummy or pacifier? Y / N

24. If yes, when was this first introduced?.....days.....weeks

25. How many times per day would your baby use the dummy?.....

26. If you have ever used any of the following, please enter for how long...

Nipple shields.....days orweeks

Breast shells for inverted nipples.....days or.....weeks

Breastfeeding supplementer (eg. Lactaid, supply line)..... days or weeks

27. How soon after the birth did you hold your baby?.....hours

28. If you did decide to breastfeed, how soon after the birth did you breastfeed?.....hours

29. The last 24 hrs before discharge from hospital was your baby

(Please circle **one** answer)

- a. Fully breast-fed (100% of feeds)
- b. 80-100% of milk feeds were breast milk
- c. 50-80% of milk feeds were breast milk
- d. 20-50% of milk feeds were breast milk
- e. <20% of milk feeds were breast milk
- f. No breast milk feeds

30. At three months was your baby

(Please circle **one** answer)

- a. Fully breast-fed (100% of feeds)
- b. 80-100% of milk feeds were breast milk
- c. 50-80% of milk feeds were breast milk
- d. 20-50% of milk feeds were breast milk
- e. <20% of milk feeds were breast milk
- f. No breast milk feeds

31. If you stopped breast feeding before four months, please grade in order of importance (**1 being the most important**) the reasons for stopping breastfeeding.

1.....
.....

2.....
.....

3.....
.....

32. How long after the birth of your baby were you in hospital
..... days or hours

33. Other comments:

.....
.....
.....
.....
.....
.....
.....

There is one final questionnaire that will be posted to you in another 6 months time (10 months after the birth), I would be grateful if you could also complete and send this to me as the information is valuable for the research.

Please can you fill in a further contact address if you are moving in the next 6 to 7 months.

New Contact address.....

Thank you very much for your time

Sarah Barker (Hutchings) (Research Midwife, National Women's Hospital) Contact number 6389919 ext. 3226 or locater 367-1653 (enter your phone number after the message).

This information is strictly private and confidential

We will let you know the outcome at the conclusion.

BREAST FEEDING QUESTIONNAIRE
(To be completed 10 months after birth)

Study number.....

Please complete and return in the envelope supplied.

The following questions relate to the recent breastfeeding experience of your ten-month-old.

1. When were solids started?.....months

2. At six months was your baby
(Please circle **one** answer)

- a. Fully breast-fed (100% of feeds)
- b. 80-100% of feeds were breast milk
- c. 50-80% of feeds were breast milk
- d. 20-50% of feeds were breast milk
- e. <20% of feeds were breast milk
- f. No breast milk feeds

3. At nine months was your baby
(Please circle **one** answer)

- a. Fully breast-fed (100% of feeds)
- b. 80-100% of milk feeds were breast milk
- c. 50-80% of milk feeds were breast milk
- d. 20-50% of milk feeds were breast milk
- e. <20% of milk feeds were breast milk
- f. No breast milk feeds

4. If you stopped breast feeding between four and nine months, Please grade in order of importance (1 being the most important) the reasons for stopping breastfeeding.

- 1.....
.....
- 2.....
.....
- 3.....
.....

5. Smoking

Do you smoke? Y / N

If yes, how many cigarettes do you smoke per day?.....

Do other people in your house smoke? Y / N

If yes, how many cigarettes do others smoke per day in total?

Please indicate on this scale the majority of cigarettes smoked inside/outside (please circle 1 number)

all inside 1---2---3---4---5---6---7---8---9---10 **all outside**

6 After your baby was born did you take any of the following..
Please circle your answer If circled, please indicate for how long

- 1. Maxallon.....(weeks)
- 2. Tigers milk.....(weeks)
- 3. Yeast.....(weeks)
- 4. Peanuts.....(weeks)
- 5. Calcium supplements.....(weeks)
- 6. Vitamin tablets.....(weeks)
- 7. Homeopathics.....(weeks)
- 8. Herbals.....(weeks)
- 9. Contraceptives.....(weeks)
- 10. Other.....(weeks)

7. Illnesses

Has your baby ever been admitted to Starship or any other hospital? Y / N

How old was your baby when first admitted?.....(weeks)

How many admissions in total?.....

Reason for admission?

- 1.....2.....3.....
- 4.....5.....
- 6.....

Does your baby have any chronic (on going) illnesses?

.....
If your baby has ever needed medications,
please specify what type?.....

How many glasses of alcohol would you have per week?.....

Please circle which type beer wine spirits

Other Comments:

.....

.....

.....

.....

.....

.....

Thank you very much for your time

APPENDIX 5:

SUBJECT INFORMATION SHEET

THE EFFECT OF EDUCATIONAL INFORMATION ON THE DURATION OF BREASTFEEDING IN WOMEN WITH SMALL FOR GESTATIONAL AGE BABIES.

PURPOSE

Women who deliver small for gestational age babies have a lower breast feeding rate at three months compared to women in the general population. This study is designed to determine whether watching a video and receiving additional pamphlets on breast feeding will have any effect on the breast feeding rate of mothers with small for gestational age babies.

INVITATION

We are inviting you to take part in this research project to determine whether an educational video and additional pamphlet on breastfeeding will have an effect on the length of breastfeeding.

SELECTION

If your baby is small for gestational age (less than a certain weight for the number of weeks pregnant) you will be invited to participate in the study. You will be randomly allocated (like a toss of a coin) to receive either routine care (education and assistance with breastfeeding through the usual hospital and home care facilities) or to watch a 30 minute video, and be given additional written information on breastfeeding.

POSSIBLE RISKS, DISCOMFORTS, AND INCONVENIENCES

There are no possible risks or discomforts associated with this study. The only possible inconvenience may be, having to watch the half-hour video during your stay in the postnatal ward. There will also be a questionnaire at nine months after the birth, which will take ten minutes to fill in.

If you choose not to take part in this study, your care and that of your baby will not be affected in any way. You may withdraw from this study if you wish to any time without giving any reason. You do not need to decide now about taking part in this study. However, it would be helpful if you made a decision before you went home.

In the unlikely event of you suffering any personal injury from medical error or medical mishap as a result of taking part in the study. You are entitled to Accident Rehabilitation and Compensation Insurance (ACC) cover.

BENEFITS

If receiving the educational information is shown to improve the length of breast feeding this may be of benefit to you after the current pregnancy and may also be of benefit to women who deliver small for gestational age babies in the future.

CONFIDENTIALITY

Any information gathered about your pregnancy or baby will be kept strictly confidential and the results of any questionnaires involving you will not reveal your identity.

QUERIES

If you have any queries or concerns regarding your rights as a participant in this research you may contact the Health Advocates Trust, Auckland, phone 09-638-9638.

If you have any further questions you may contact Sarah Barker (6389919 ext. 3226 or locater 94-4766) or Dr Lesley McCowan in the department of Obstetrics and Gynaecology, National Women's Hospital (6389919 ext.3240). If you would like a further opinion as to whether you should take part in this study, please discuss it further with your friends and family and your own doctor.

APPENDIX 6:**CONSENT FORM**

Title of Project: **THE EFFECT OF AN EDUCATIONAL INFORMATION ON BREASTFEEDING RATES AND DURATION OF BREASTFEEDING IN WOMEN WITH SMALL FOR GESTATIONAL AGE BABIES.**

SARAH BARKER

NAME OF PATIENT: _____

DATE OF BIRTH: _____

English	I wish to have an interpreter	Yes	No
Maori	E hiahia ana koe tetahi tangata hei korero Maori Kia koe.	Ae	Kao
Samoan	Oute mana'o e iai se fa'amatala upu	Ioe	Leai
Tongan	'Oku fiema'u ha fakatonulea.	Io	Ikai
Cook Island	ka inangaro au i tetai tangata uri reo.	Ae	Kare
Niuean	Fia manako au ke fakaaoga e tagata fakahokohoko vagahau.	E	Nakai

I have heard and understood an explanation of the research project I have been invited to take part in. I have been given, and have read, a written explanation of what has been asked of me, and I have had an opportunity to ask questions and to have them answered. I understand that I may withdraw from the project at any time and that, if I do, my medical care will not be effected in any way. I understand that my consent to take part does not alter my legal rights.

I consent to take part as a subject in this research.

I agree to be randomised to receive either routine postnatal care or to watch an extra educational video and receive written information on breastfeeding in addition to receiving routine postnatal care.

Signed: _____ Subject

In my opinion consent was given freely and with understanding.

_____ Witness name (please print)

_____ Witness signature _____ Date

Consent obtained by: _____ Name
 _____ Signature

Study Number: _____

Hospital Number: _____

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