

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Aim: To present the general conclusions of this study and to discuss the clinical implications of the results. The study is furthermore critically evaluated and recommendations for further studies are made.

6.1 INTRODUCTION

This study has highlighted the importance of early oral feeding intervention in premature infants which are part of an increasing population of infants/young children who require early intervention (Rossetti, 1996; Oehler et al., 1996; Widerstrom et al., 1997). As part of a team, the speech-language therapist often fulfils the role as the feeding specialist responsible for the successful and speedy transfer from nasogastric to oral feeding.

Early intervention for premature infants already starts in the NICU. This is based on the principle that the sooner intervention is introduced, the better the developmental outcome of the infant (Hyde & Jonkey, 1994; Rossetti 1998). A major proportion of premature infants experience oral feeding problems. This can have serious consequences for the premature infant (Bu'Lock et al., 1990; Lau & Hurst, 1999). Special consideration should be given to the oral feeding skills of the premature infant in the NICU, as the ability to take oral feeds successfully and reaching an acceptable weight (usually 1.8 – 2 kg) are often used as criteria for the discharge of these infants. Earlier discharge of a premature infant has significant advantages, such as: *Financial* – in state hospitals on a tight budget, a few days earlier discharge from a NICU is highly desirable. For infants in the NICU of a private hospital, the financial burden upon parents can be alleviated

substantially by a few days shorter hospital stay. *Psychological* – an earlier discharge enhances the mother-infant relationship and bonding, and the family routine can begin. Furthermore, mothers of infants with feeding problems suffer from a variety of negative feelings, e.g. anxiety, despair and unworthiness, etc., which can be avoided or decreased with appropriate early feeding intervention. *Communication* - a relationship between disorganised neonatal oral motor skills and delays in speech and language development at 30 months of age was found (Brake & Palmer, 1985) and Kritzinger (1994) found that the length of nasogastric tube feeding was a strong predictor of communication development. Early feeding intervention will therefore not only be beneficial for the infant itself, but also for the parents and hospital authorities. Efficient, accountable feeding intervention has to be preceded by a comprehensive, holistic evaluation.

The FEFARI designed for this study therefore included aspects other than only the oral-motor skills of these infants to ensure appropriate evaluation of their feeding skills. It also addressed the need expressed by Jolley et al. (1995) for a detailed assessment of feeding and swallowing abilities of premature infants, which includes aspects such as physiological and cardio-respiratory status as well as nutritive and non-nutritive sucking. Feeding therapy based on the information gathered by such a comprehensive evaluation, and in consultation with other team members in the NICU, is therefore the responsible accountable procedure. The feeding specialist should thus also have specialised knowledge of the premature infant as a whole in addition to all the medical complications that may occur in them (Hyde & Jonkey, 1994).

Since early intervention is still a relatively young discipline and limited information on the oral feeding skills of premature infants exists in the literature, more research in this field is necessary to improve the oral feeding services to this population, as oral feeding skills in these infants play such an important roll in their little lives, as briefly explained previously.

The aim of this study, then, was to describe the oral feeding skills of premature infants, in order to improve the understanding thereof by the feeding specialist. In search of an appropriate evaluation tool which would enable the researcher to do so, the need for a comprehensive evaluation protocol was identified. The FEFARI was designed and successfully applied to 42 premature infants.

Utilising the results obtained in the FEFARI, the oral feeding skills of the subjects could be described. Valuable information regarding the characteristics of the subjects provided insight into and enhanced the understanding of the influences of biological and medical factors on the oral feeding skills of the subjects. The non-nutritive sucking (NNS) skills as well as the nutritive sucking (NS) skills could be described in terms of the lip, jaw and tongue functioning and their effect on the physiological status of these infants. Swallowing skills could be described and associated stress identified to provide the feeding specialist with intervention guidelines. The influence of bottle- and cup-feeding on the physiological status of the subjects could be determined and information on developmental trends during bottle-feeding from 34 to 37 weeks gestational age could be obtained by using the FEFARI. The results were discussed fully in Chapter 5.

This chapter will discuss the conclusions drawn and implications of these results. A critical review of this study is done, followed by recommendations for future research.

6.2 CONCLUSIONS AND IMPLICATIONS

Issues of importance during oral feeding of the subjects, emerged in the results and will be discussed in terms of their theoretical and clinical implications.

6.2.1 CHARACTERISTICS OF THE SUBJECTS

With regard to aspects of the **characteristics** of the subjects, the results raised the following issues:

Gestational age: According to the neuro-maturational criterion of when an infant is ready to feed orally, 47.6% of the subjects were ready *from birth*, as they were at least 34 weeks old, but according to the weight criterion, only 4.8% weighed over 1.8 kg and would have been considered ready. *At the time of the evaluation*, however, all of the subjects would have been neurologically ready to feed orally, but only 16.7% met the weight criterion. According to practices in NICU's (Lau & Hurst, 1999) as well as the local NICU, weight is used to determine the introduction of oral feeding. This implies that these infants were not exposed to oral feeding previously and explains why most of the subjects (80%) still received mainly nasogastric feeding at the time of the evaluation, putting the subjects at risk of the negative effects of long-term tube feeding, as discussed in par 2.4.4. These subjects thus had minimal experience in oral feeding. Experience in oral feeding plays a significant role in the transfer from nasogastric to oral feeding (Brake et al., 1988; Casaer et al., 1982; Wolf & Glass, 1991). The sooner this transfer can occur, the sooner the infant can be discharged. It is therefore clear that introduction of oral feeding should start at the appropriate gestational age of premature infants as advised by the literature (Merenstein & Gardener, 1989; Sheahan & Brockway, 1994; Vergara, 1993).

Weight: About three-quarters of the subjects (76.2%) were SGA, with the highest occurrence in Group 4 (90%). Group 4 experienced significantly more problems during both feeding methods although these subjects were the most mature. The subjects in the other groups with the least endurance to finish their whole feed, also had the lowest weights amongst that particular group. This study therefore also supports the view of Mullen et al. (1988) that SGA infants display more oral feeding problems than AGA infants. Clinically this would imply that although

maturation plays a major role in oral feeding skills, it has become clear during this study that the weight of an infant plays a significant role, contrary to the literature stating that oral feeding is only a neuro-maturational phenomena. A balance should therefore be found between providing the opportunity to suck to gain valuable sucking experience, and sustained weight gain. "The ultimate measure of feeding efficacy is weight gain which reflects the volume taken in, as well as total caloric expenditure" (Wolf & Glass, 1991: 267). Excessive energy expenditure for oral feeding should therefore be avoided, as well as stress, as this could possibly also cause avoidance behaviour and conditioned dysphagia. This implies that the SGA infant should be allowed to gain experience in oral feeding, but that the time of exposure to oral feeding may have to be limited. Other methods of oral stimulation like oral-motor stimulation and NNS may have to be used in a greater degree in SGA infants than in the AGA infants to enhance oral feeding skills and increase the maturation of sucking skills (Bernbaum et al., 1983; Bernbaum & Hoffman-Williamson, 1991; Mattes et al., 1996).

Respiratory Status: 40.5% of the subjects in the whole group suffered from BPD and 16.7% had a cardiovascular condition. These subjects were healthy at the time of the evaluation, but oral feeding experience and endurance to complete the feeds could previously have been affected negatively by the above-mentioned factors. Only 19.5% of the whole group could manage the whole feed at the time of the evaluation, illustrating the possible effect of lack of sucking experience and that the endurance to feed orally was still problematic. During the evaluation with the FEFARI, half of the subjects of Group 4 (the group with the most SGA infants) displayed unfavourable saturation levels, once again demonstrating the problems this group had with oral feeding. Generally, the drop in saturation levels may be due to the uncoordination of sucking, swallowing and breathing. Respiration is ceased every time swallowing occurs. Multiple swallows will therefore result in longer periods of cessation of respiration, which may result in a drop of saturation levels in this group. Approximately one third of the subjects did not have the strength or endurance to complete an oral feed without experiencing severe

stress. This information correlates with the findings of Morris et al. (1999) that respiratory problems contribute greatly to feeding problems in premature infants.

Clinically this implies that SGA infants and/or infants with a history of respiratory problems should be attached to a pulse oximeter so that the saturation levels can be monitored closely during oral feeding for signs of fatigue. The pace of oral feeding and the length of the feeding time can then be adapted according to the needs of these infants. Supplementing oxygen during oral feeding may have to be considered as well. This will ensure a safe and comfortable feeding experience to this group of infants.

It can be concluded that readiness to feed orally may be dependent on the neuro-maturity of the premature infant, but the ability to endure the whole feed is related to the weight and respiratory status of the infant.

State & Behaviour: Most of the subjects were lethargic (85%) at the scheduled time of feeding for their evaluation, which affected oral feeding negatively, especially in terms of endurance to complete a whole feed. The literature is clear that an alert state is a prerequisite for oral feeding (Mandich & Ritchie, 1996), but also recognises that premature infants find it hard to maintain an alert state (Creger, 1995). It can therefore be stated that the subjects were not ready (in terms of the state they were in) to be fed at that particular time, because scheduled feeding times were followed, which may not have correlated with the subjects' natural time to be ready. General practice in NICU's is to feed infants at scheduled feeding times. Cagan (1995) established that a great number of premature infants are ready to feed orally at a time other than the scheduled feeding time. Furthermore, the subjects became stressed during oral feeds and a significant percentage reverted to falling asleep. More subjects fell asleep during cup-feeding than during bottle-feeding.

Clinically, the feeding specialist and staff working in NICU's must therefore know and accommodate these facts and should reconsider the practice of scheduled feeding times and move towards more individual-based feeding needs, as with the individualised developmental programmes (e.g. NIDCAP). Such a change in management may not only lead to improved oral feeding skills of these infants, but may also shorten the time needed to transfer from tube to oral feeding. That may lead to earlier discharge of these infants and hence would be cost-effective intervention.

Although **maturation** plays a major role in oral feeding skills, it has become clear during this study that **weight** and the **medical history** of an infant play an important role in efficient oral feeding as well.

6.2.2 ORAL FEEDING SKILLS

The conclusions and implications with regard to the oral feeding skills are provided below.

6.2.2.1 Non-Nutritive Sucking (NNS)

In conclusion, the NNS skills can be categorised as disorganised and moderately affected, with the most problems occurring with the sucking bursts. NNS skills seemed to deteriorate with maturity in the subjects. A possible explanation may be that sucking may diminish if it is not stimulated (Morris, 1989) and if the infant is often exposed to noxious procedures in and around the oral structures. The fact that NNS skills seemed to deteriorate with maturity in the subjects, highlights the need to provide the opportunity for non-nutritive sucking in the NICU's as early as possible, preferably from birth. The feeding specialist should endeavour to provide the premature infant with appropriate sucking experience. This can further be achieved by training the nursing staff as well as the mothers to provide sufficient NNS opportunities and by informing them about the benefits of NNS. This is

important, not only to avoid the scenario stated by Morris (1989) that infants who once had the ability to suck, may lose it if they are denied the opportunity to do so, but also for all of the many other good reasons found in the literature (Bazyk, 1990; Bernbaum et al., 1983, 1991; Creger, 1995; Lotas & Walden, 1996; Vergara, 1993) as discussed in chapter 4 (4.3.1.2 under .6).

6.2.2.2 Nutritive Sucking (NS)

The conclusions drawn from and implications of the results of NS skills during **bottle- and cup-feeding** will be discussed according to the different phases of deglutition.

Firstly, the *oral preparatory/oral phase*: It can be concluded that the functioning of the oral structures are generally disorganised and oral feeding skills moderately affected in the group as a whole. The most pronounced problems were arrhythmic and uncoordinated movements which were mainly observed in the lips, jaw and tongue. Improvement of rhythm and coordination occurred in the lip and jaw movements with maturity, with the biggest improvement between 34 and 35 weeks gestational age in bottle-feeding. A slight improvement with maturity was displayed from 35 weeks gestational age onwards. The tongue displayed good central grooving from 34 weeks onwards for both feeding methods. The length of the sucking bursts also seemed to increase with maturity. The younger the subjects the more multiple swallows occurred. Oral feeding was the most stressful for the 34-week gestational age-group, whether it was by cup or by bottle. Uncoordinated and arrhythmic movements of the oral structures were problematic in approximately half of the subjects and fatigue was experienced after approximately 5 minutes of oral feeding, but they could sustain good saturation levels.

The clinical implication of these findings is that although 34 weeks gestational age is considered an appropriate age to introduce oral feeding according to the

literature (Arvedson & Brodsky, 1993), oral feeding intervention may have to be provided with great caution at this age. This implies that oral feeding may have to be limited to 5-10 minutes per session to avoid fatigue. The saturation monitors should be used to ensure that the saturation levels stay above 90%. Intervention should be directed towards the facilitation of *rhythm* and *coordination* without causing stress. The advice by Cagan (1995) to feed an infant when he/she gives *clues* that he/she is *ready* to feed, to optimise the learning experience, should also be considered. Even though oral feeding is still problematic at this age (34 weeks), these infants should be exposed to the *experience*, even if it means only the opportunity for NNS, since Casaer et al. (1982) and Brake et al. (1988) found a correlation between feeding efficacy and experience above 34 weeks gestational age. Wolf & Glass (1991), support the importance of experience by stating that experience interplays with maturation to improve efficacy of oral feeding. Further clinical implications according to the information obtained from the FEFARI would be that guidelines are provided for the management for all the age groups, such as the regulation of flow to facilitate appropriate sucking bursts to reduce the possibility of large boluses that may result in multiple swallowing and stress.

Secondly, the *pharyngeal phase*: It can be concluded that most of the problems in this phase occurred with the coordination of sucking, swallowing and breathing. This caused severe stress in the subjects. Swallowing in the subjects of this study can be described as ineffective, uncoordinated and disorganised. Multiple swallows were probably needed because the swallowing was still ineffective. Delayed swallowing is indicative of uncoordinated and disorganised swallowing. The swallowing skills (namely: timely, coordinated swallowing and single swallows), however, improved with maturity. Clinically, this information suggests that oral feeding therapy should be directed at enhancing organization and coordination of swallowing by pacing, for example. The flow can furthermore be regulated to facilitate appropriate sucking bursts and to reduce the possibility of large boluses that will result in multiple swallowing and stress. Ample time should

be allowed for the infant to complete multiple swallows should they still occur, before the next bolus is presented. This should reduce stress experienced in the premature infant during oral feeding and should improve the overall pleasurable experience of oral feeding to these infants. These principles can be applied in the hospital situation as well as in the home environment. Mothers will therefore have to be trained to present oral feedings in the appropriate manner as discussed above.

Lastly, the *oesophageal phase* showed minimal problems in the subjects of this study. This implies that peristalsis of the oesophagus has matured enough to manage the boluses formed by these subjects.

The following statement can be derived from the above-mentioned facts: weight seems to play a roll in the success of sucking skills and sucking bursts, but neuro-maturity plays a bigger role in the competence of swallowing and the functioning of the oesophagus.

Cup-feeding caused more disorganised movements of the lips and jaw, as well as stressful, uncoordinated swallowing, than bottle-feeding in the subjects of this study. The lips and jaw generally functioned significantly better during bottle- than cup-feeding. The smallest difference between bottle- and cup-feeding occurred in Group 1. More stress associated with swallowing was experienced with cup-feeding (82.1% of the total group) than with bottle-feeding (53.7% of the total group) (see Table 5.16). It can thus be concluded that the subjects generally managed bottle-feeding better than cup-feeding.

The clinical implication is that cup-feeding may not be the best method of feeding for premature infants, especially after 35 weeks gestational age. Although the local hospital policy is to present cup-feeding to all premature infants to promote breastfeeding, all premature infants do not end up being breastfed, e.g. a HIV positive mother who chose not put her infant at risk with breastfeeding. Many

practical problems in terms of the availability of the mothers to establish breastfeeding are experienced in the local hospital. The reason for presenting cup-feeding should therefore be considered very carefully when deciding to expose a premature infant to this method of oral feeding. Cup-feeding does not appear to be facilitative for the development of good oral–motor skills associated with sucking and should therefore, as it was intended initially, only be limited to be used as an interim method of oral feeding until breastfeeding can be established. Preterm infants benefit greatly by breast milk even if it is expressed (Boo et al., 2000) and should therefore actively be encouraged. If aggressive attempts to establish breastfeeding have failed, cup-feeding should be terminated in favour of bottle-feeding. If cup-feeding is to be maintained, the mother has to be trained to present the cup appropriately and to provide other stimulation to enhance the transfer to oral feeding (breastfeeding) in order to keep the period of time exposed to cup-feeding to the minimum.

From the afore-going discussion it is clear that the FEFARI designed for and applied in this study, proved to be invaluable in obtaining information that can be used to plan appropriate, effective and accountable intervention strategies for feeding therapy in premature infants in NICU's. It may also be valuable for the use in paediatric wards of hospitals where other infants with feeding problems are treated.

6.2.3 TRAINING OPPORTUNITIES

First of all, the speech-language therapist who wishes to act as feeding specialist in a NICU will have to be trained in all aspects covered by the literature review. He/she will also have to become familiar with the content, application and interpretation of evaluation tools such as the FEFARI and obtain knowledge with regard to various intervention strategies.

The feeding specialist should then be responsible for the training of staff and caregivers or mothers involved with the oral feeding of the premature infants. The nursing staff are involved with these infants 24 hours of the day and are therefore the sensible persons to assist the feeding specialist. The medical staff are important in establishing a clinical gestational age for the infants and are responsible for the medical status of the premature infant. The feeding specialist can and should not work in isolation. Teamwork increases the accountability and quality of the service provided to the premature infant (ASHA, 1991). In-service training of the NICU staff can be provided by the feeding specialist. According to the results obtained in this study, the aspects described below should be included in such training.

Firstly, with regard to the safe **introduction of oral feeding skills**: Knowledge of the appropriate age to introduce oral feeding should be acquired, as well as the insight of the roll that weight can play. The importance of establishing a clinical age is thus crucial in the decision regarding the introduction of oral feeding. The influences of risk factors such as, for example, cardio-respiratory status should be explained, and special precautions to be taken during oral feeding in such cases should be emphasised. Individual needs, e.g. the length of time exposed to oral feeding for each premature infant, should be highlighted. A checklist can be useful to determine readiness of an infant to transfer from nasogastric to oral feedings (Appendix B)

Secondly, for the infant who is not ready to transfer to oral feeding, the training of the nursing and medical staff and the parents regarding the implementation of and the advantages of **NNS** is also very important, as explained previously.

Feeding specialists involved in the NICU should thus act in the capacity of consultant and trainer, as well as actively giving individual therapy regarding more severe or complicated cases. The study thus supports the importance of team

work in the NICU, which should be regarded at all times, and collaboration with each other should be promoted.

Lastly, it can be stated that valuable conclusions were drawn from the results obtained from the FEFARI. The clinical implications provided the feeding specialist with guidelines for appropriate accountable service delivery to premature infants in NICU's.

6.3 CRITICAL EVALUATION OF STUDY

A critical evaluation is necessary to establish the value of this study, and the worth of the clinical implementation thereof, and to guide the planning and execution of further research.

A descriptive research design was chosen for this study, since the behaviour of the subjects was observed and evaluated under natural conditions. Although this design and the scoring which is subjective, can be susceptible to bias, it was controlled, in part, by conducting a pilot study and by the well-considered selection of the items in the FEFARI after an in-depth literature study by the researcher. More raters would have increased the reliability and validity of the study. However, other therapists to act as second and/or third raters were not available at the time of the study. The problem in South Africa, as in other developing countries, is the scarcity of speech-language therapists and, even more, so of feeding specialists. Video-recording could have been helpful with observations of current state and behaviour, oral structures at rest, jaw and lip movements during feeding as well as stress symptoms displayed by the subjects. Aspects such as cervical auscultation for the detection of multiple and/or delayed swallowing and the observation of tongue movements can, however, not be evaluated by video-recording.

Generalization to all premature infants can not be made, as only a small sample size (10 subjects per group) was used in this study (Leedy, 1997) and the group as a whole group was not homogenous in terms of gestational age. The number of subjects in each group was, however, sufficient to establish the statistically significant difference between lip, tongue and jaw movements during the different feeding methods in each group. The study was successful by presenting results which provided an indication of tendencies in oral feeding skills of the subjects and clues for feeding intervention.

A sample of convenience was used. Thus, the first subjects who complied with the selection criteria were selected. The subjects selected by this procedure for Group 4 (37 weeks gestational age) proved not to be representative of healthy AGA premature infants with a gestational age of 37 weeks. They were the only available subjects of that age complying with the selection criteria in the local NICU, and weight was not one of the selection criteria which proved, in this study, to play a roll in oral feeding. AGA infants of this age might already have been discharged from the hospital. The use of a larger sample size, including AGA, by using subjects from other NICU's and possibly already discharged 37-week-old infants, would provide information that could be generalized.

This study was successful in fulfilling its aims, namely to develop a comprehensive holistic evaluation tool (FEFARI) to enable the feeding specialist to describe the oral feeding skills of the premature infant. The inclusion of certain aspects in the FEFARI, such as the medical condition, biographical information (characteristics), cardio-respiratory status, state and behaviour and neuro-maturity, as suggested by Lau & Hurst (1999) and Vergara (1993), in the evaluation of the oral feeding skills of the premature infant, proved to be necessary for the understanding and interpretation of the information gathered, to form a holistic picture of their oral feeding skills. The inclusion of the different phases of swallowing as recommended by Cherney (1994) and Rosenthal et al. (1995), also provided valuable additional information regarding the efficacy of

swallowing in premature infants. The description of their oral feeding skills according to this holistic view enabled the researcher to establish clinical implications, which can be used to plan appropriate, effective and accountable oral feeding intervention for premature infants.

Although the FEFARI appears to be ready to be clinically used in its present form, the inexperienced user of the FEFARI may need some form of training in the application thereof. Alternatively, a brief manual may need to be compiled to accompany the FEFARI to explain definitions and descriptions of the items used in the FEFARI and to provide guidelines for scoring.

The execution of the FEFARI may be time-consuming if the user is unfamiliar with it, and if it is used for the evaluation of both feeding methods. In the clinical situation, though, evaluation of only one method of preference (based on the collaborative decision of team members) is usually needed. The FEFARI was, however, not intended to be a screening tool for a quicker way of evaluation, but as a comprehensive evaluation tool with which intervention could be planned. It will therefore need more time to execute.

The information obtained from the FEFARI, used in this study, also succeeded in supplying an answer for the statement of DeMontrice et al. (1992), that more information about the maturational patterns of oral feeding in premature infants was needed, since a decrease in feeding problems with maturation could be detected with the FEFARI.

This study is also valuable in the light that it is the first study to evaluate oral feeding skills during cup-feeding and the influence thereof on the physiological status of the infant. The FEFARI, once again, was a sensitive tool to provide information on cup-feeding to plan appropriate efficient oral feeding therapy.

Due to circumstances, the mothers of the infants were rarely present in the NICU and could the mother-infant interaction not be evaluated. Valuable information regarding the communication of the premature infants could therefore unfortunately not be collected.

Due to practical circumstances during this study, only the pre-feeding breathing rates could be collected. Information on the influence of bottle- and cup-feeding on the breathing rates during and after oral feeding could unfortunately not be obtained in this study. This information could have been used to ascertain the possible stress levels of the subjects or to provide a possible explanation of how they maintained their saturation levels.

6.4 RECOMMENDATIONS

It is concluded that the design and development of the FEFARI has led to a new clinical tool for the evaluation of the oral feeding skills of premature infants. It does not only provide valuable information on the oral-motor skills of these infants, but also regarding the premature infant as a whole, e.g. the physiological status. However, based on this research, further studies are needed to address the limitations discussed in 6.4. The following recommendations can therefore be made:

6.4.1 RESEARCH RECOMMENDATIONS

In order to generalize the information obtained from the FEFARI, it can be applied to a large sample and to subjects from different geographical areas. The results of such a study may serve as a baseline “norm” for the oral feeding skills of premature infants of different gestational ages and would therefore provide a baseline for identifying abnormal or deviant oral feeding skills. Different evaluators can use the FEFARI to establish interrater reliability. Further research should

therefore endeavour to standardize the FEFARI. It may be necessary to compile a manual for the appropriate and consistent use thereof.

6.4.2 RECOMMENDATIONS WITH REGARD TO THE APPLICATION OF THE FEFARI

The applicability of the FEFARI to other situations, such as breastfeeding, or to other population groups can be evaluated. Application of the FEFARI to other infants with risk factors for feeding problems, e.g. neurologically involved infants, can establish the appropriateness and applicability of the FEFARI for infants other than premature infants. Mandich & Ritchie (1996) stated that a lack of information on oral feeding skills of infants with apnoea exists. Only a few subjects suffered from apnoea in this study, therefore apnoea did not seem to cause problems in this study. The FEFARI can therefore be applied to a subject group with significant apnoea, to determine how apnoea as such may influence the characteristics of the sucking and swallowing patterns of infants who experience apnoea.

A wider variety of age groups can be included to identify at which age oral feeding skills of premature infants match the oral feeding skills of full-term infants. This information may be helpful in planning intervention, and the training and support provided by the parents of these infants. If baseline information is available, the sensitivity of the FEFARI on identifying differences in various population groups can be evaluated.

Further research to obtain information on the mother-Infant communication can be conducted, as this section of the FEFARI could unfortunately not be completed during this study. The influence of the mother-infant interaction on the transfer time to oral feeding can also be studied in order to motivate the active involvement of mothers with their infants in the NICU's.

Further studies can be conducted on SGA infants, firstly, to compare the number of SGA infants born in South Africa (and the incidence of SGA in the local black population) to the number born in other countries, as it appears that a higher number of SGA infants are born locally. There is a correlation between the prevalence of SGA infants and poor socio-economical status (SES). South Africa has a vast number of people suffering from SES and it is expected to reflect in the number of SGA infants. Secondly, the FEFARI can be used to compare the oral feeding skills of SGA and AGA infants. The SGA infants are associated with poorer developmental outcome and more feeding problems due to an overall weak state compared to their AGA counterparts (Mullen et al, 1988; Vohr 1991; Widerstrom et al. 1997). This will imply that a larger number of infants in South Africa may need oral feeding intervention, needing the services of feeding specialists. A desperate need for the training of more feeding specialists may be proved by such information.

6.4.3 RECOMMENDATIONS FOR THE HOSPITAL SETTING

Follow-up studies can be conducted to establish the role of experience and the cost effectiveness of appropriate oral feeding intervention based on the information gathered with the FEFARI. Cost effectiveness in state hospitals is an important issue. The salary of a feeding specialist may have to be weighed against the cost of longer hospital stays of premature infants. Such information may be helpful in establishing new or preserving existing posts for feeding specialists

The influence of the manipulation of the NICU environment (as advocated by Rossetti, 1998) on oral feeding skills can also be studied. This information may have important clinical implications for the oral feeding therapy for premature infants.

6.5 CONCLUSION

Premature infants form an increasing proportion of the population in need of early intervention (Oehler et al., 1996). One of the most serious problems that they experience concerns their feeding. The feeding specialist, as part of a team, has the important task of providing these infants with appropriate, effective and accountable feeding therapy. Comprehensive evaluation of the oral feeding skills of the premature infants is essential for the planning of such therapy. Existing feeding scales pose many limitations. The FEFARI was therefore designed for this study, with the main aim to describe the oral feeding skills of the premature infant and to plan intervention strategies based on the information obtained from the FEFARI. This study thus succeeded in the attempt to provide, firstly, a comprehensive evaluation tool for the oral feeding skills of the premature infant and, secondly, a description of all aspects involved with oral feeding in premature infants. The study also proved to be of great clinical value for the feeding specialist.

The use of the FEFARI and the information obtained from the results of this study will hopefully lead to much needed improved service delivery in terms of feeding intervention to all infants with oral feeding problems.

6.6 SUMMARY

Chapter 6 presents the conclusions drawn from the results on the oral feeding skills of premature infants, of this study. Important clinical implications with regard to service delivery to the premature infant in the NICU, are raised. A critical evaluation of the study was done to identify the contributions and limitations thereof. Finally, recommendations for further studies were made. A general conclusion is reached, namely that premature infants should be introduced to oral feeding as from 34 weeks gestational age, that their weight, physiological and

medical status should be carefully considered when implementing feeding therapy and that bottle-feeding is preferred to cup-feeding in premature infants.

This study concludes by emphasizing the importance of successful oral feeding in premature infants. Should intervention be necessary, a comprehensive evaluation should precede feeding therapy by a thoroughly trained feeding specialist.