

CHAPTER 4

METHODOLOGY

Aim: To provide an overview of the research methodology followed in the investigation of the oral feeding skills of the premature infant. The aim and objectives of this research project, the research design, selection criteria, subjects, materials and data collection procedures are also described. The data analysis of the results is explained.

4.1 INTRODUCTION

One of the obvious impediments to research in oral feeding skills in premature infants is the lack of evaluation or assessment instruments with reported reliability and validity (Ottenbacher, Dauck, Grahn, Gevelinger & Hassett, 1985). Construction of such an assessment tool is an evolutionary and dynamic process (Ottenbacher et al., 1985).

This has specific relevance for the feeding evaluation of premature infants, whose feeding patterns have not been well described to date (Palmer et al., 1993). Palmer et al. (1993) developed the Neonatal Oral-Motor Assessment Scale (NOMAS) in an attempt to categorise oral-motor patterns in the premature infants in order to describe these infants' feeding patterns and to establish a good interrater reliability. They unfortunately failed to include aspects such as physiological status of the infants. Skuse, Stevenson, Reilly, App & Mathisen (1995) state that the accurate description of feeding behaviours in young infants requires the development of a system for objective rating of a complex set of interrelated motor skills. For such an assessment system to be of clinical value, it should be reliable and valid. The identification of disorganised or dysfunctional sucking patterns is important to the speech-language therapist, as research has

established the existence of a significant correlation between these disorganised and abnormal sucking patterns in the neonatal period and delays in speech and language at the ages of 30 and 38 months (Braun & Palmer, 1985). Kritzinger (1994) also found that the length of time taken by neonates to transfer from nasogastric feeding to bottle-feeding was the strongest predictor of their communication development.

According to Jolley et al. (1995), the growing population of ill, premature infants in neonatal intensive care units creates a need for more thorough and detailed assessment of their feeding and swallowing abilities. As stated previously, an effective, accountable feeding intervention programme has to be preceded by a comprehensive evaluation.

Glass and Wolf (1994) state that in order to provide effective feeding therapy, the complexity of infant feeding should be understood. The evaluation procedure that needs to precede intervention should therefore enable the feeding specialist to describe the feeding patterns of the premature infant in its widest sense and should provide the information needed to plan intervention strategies. According to Vergara (1993), no comprehensive feeding evaluation instrument which includes all the components of feeding difficulties in the premature infant, is currently available. It is clear that this clinical problem requires research, which can lead to guidelines for the clinical practice which would impact positively on service delivery.

Although limited information is available in the literature regarding the oral feeding skills of premature infants, information in respect of South African premature infants is not readily available. The current study aims to provide a comprehensive description of the feeding skills of this population and is intended to lead to a better understanding of the feeding patterns of these infants.

4.2 AIMS OF STUDY

The **main aim** of this study is to describe the oral feeding skills of premature infants. This will be divided into the following two sub-aims:

4.2.1 SUB-AIM 1

To develop a comprehensive evaluation scale to evaluate the feeding skills of premature infants.

4.2.2 SUB-AIM 2

The application of the evaluation scale in order to describe:

- The characteristics of the subjects, according to subject groups as well as the sample as a whole.
- The oral feeding skills and feeding-associated behaviour of a group of premature infants in terms of:
 - Their non-nutritive sucking skills,
 - Their nutritive sucking skills during bottle- and cupfeeding.
 - The impact of the two feeding methods on the subjects' physiological status.
- And to identify developmental trends.

4.3 RESEARCH DESIGN

The selected research design is discussed, followed by a description of the research phases.

A research design is a scientific arrangement that allows observation and measurement of variables of interest. A qualitative approach is usually followed in

an inquiring process aimed at understanding social and human problems. It is based on human behaviour, observed in a natural setting, with the purpose to describe, explore, explain and interpret information gained from a small sample (Leedy, 1997). This approach is appropriate for describing the feeding behaviour of premature infants in their usual or natural environment.

The choice of the research design is based on the means of collecting and analysing the research data (Leedy, 1997). The descriptive design focuses on a phenomenon. Many research problems in social and behavioural science cannot, according to Huysamen (1994), be investigated by experimental research, but need a descriptive design. For the current study a descriptive design was selected, as the purpose of the research is to *observe* feeding behaviour systematically, to *explore*, *explain* and eventually *interpret* the information. The population should be carefully chosen, clearly defined and specifically delimited to set precise parameters for ensuring discreteness to the population to be observed (Leedy, 1997). Descriptive statistical procedures will be used to analyse the data (Leedy, 1997).

A further advantage of a descriptive design is that the infant's feeding skills can be evaluated under natural conditions.

However, this design also poses some weaknesses. The descriptive design is particularly susceptible to distortion through bias (Leedy, 1997). Firstly, the results rely on the integrity of the researcher to provide accurate and reliable data. The interrater reliability cannot, therefore, be guaranteed. A further problem in South Africa, as in other developing countries, is that there are only a limited number of researchers. This researcher therefore had difficulties in finding available feeding specialists to act as second or third evaluators in the study, to comply with the need for interrater reliability as suggested by Ottenbacher et al. (1985) and Palmer et al. (1993). In order to improve the reliability, a pilot study was conducted to familiarize the researcher with the evaluation form, to identify any

problems in conducting the assessment and to ensure that the items in the evaluation form were formulated clearly and comprehensively.

Because of the nature of this study, the use of a descriptive design is appropriate, since observation and the written recording of data on the compiled evaluation form are the main means of collecting the data.

Finally, the design was applied in a quasi-experimental manner, which implies that neither a control group nor a random sample of subjects, but subjects to which access was possible, were used (Leedy, 1997; Uys, 1987). A sample of convenience or accidental sampling was used in this study, which means that the subjects were chosen as they arrived on the scene (Leedy, 1997). Leedy (1997) states that a sample of convenience may be crude, but can be appropriate if selection criteria are set carefully. Uys (1987) also states that randomised sampling is not always necessary, but that a control mechanism should be used to rule out the influence of extraneous variables. This is accomplished through selection criteria set for the selection of subjects.

4.4 RESEARCH PHASES OF THE STUDY

In order to achieve the two sub-aims of this study, namely to develop a comprehensive evaluation tool and to describe the oral feeding skills of the premature infants, the study was conducted in two research phases, as depicted in Figure 4.1.

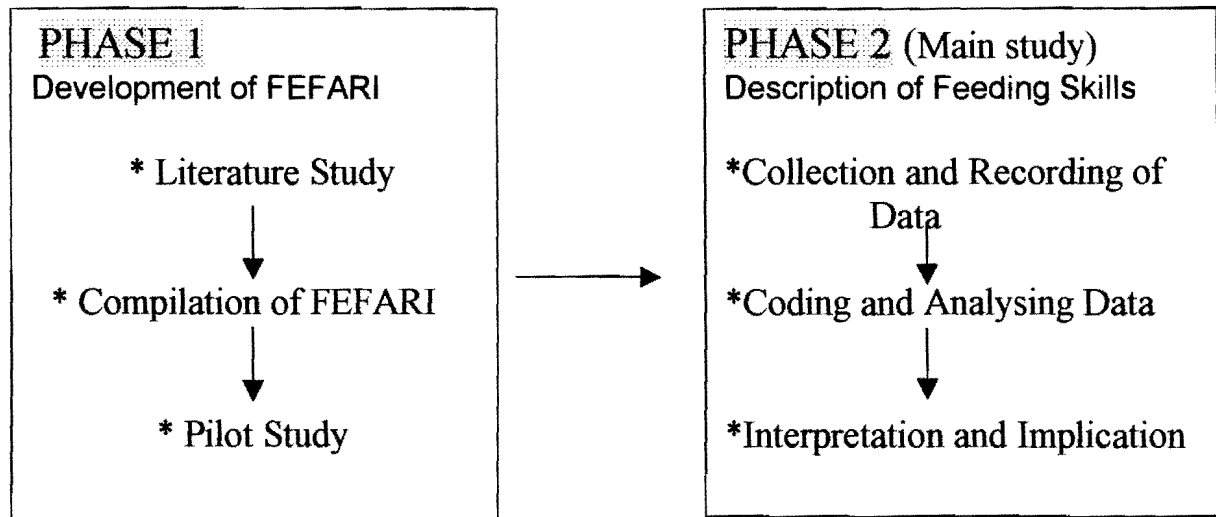


Figure 4.1 Research phases of the study

Phase 1: A comprehensive evaluation tool was developed, namely “The Feeding Evaluation Form for At-Risk Infants” (FEFARI). This was done after an extensive and in-depth literature study had been executed. The application and suitability of the FEFARI was then evaluated by conducting a pilot study.

Phase 2: The feeding skills of the premature infants were described. The appropriate subjects were selected, the data collected, recorded and scored by using the FEFARI. The data was then analysed and interpreted, from which implications could be drawn, which may provide appropriate feeding intervention strategies.

4.4.1 PHASE 1: DEVELOPMENT OF FEEDING EVALUATION INSTRUMENT

In order to achieve the first sub-aim of this study, a comprehensive feeding evaluation instrument for premature infants had to be designed. This process was conducted as follows:

4.4.1.1 Critical Review Of Existing Feeding Scales

The first step was to conduct a literature review to form a theoretical underpinning and gain guidelines for the description and evaluation of the feeding abilities of premature infants. The results of the literature review are given in Table 4.1.

Table 4.1. Critical review of the existing Feeding Scales

Existing scale	Author	Year	Evaluation Area	Norms	Limitations
Neonatal Oral Motor Scale (NOMAS)	Braun & Palmer Palmer, Crawley & Blanco	1985/6 1993	-Nutritive sucking (NS) (Oral phase) -Non-nutritive Sucking (NNS)	Newborn –	-Inappropriate for preterm infants -Only the oral phase assessed -Physiological functioning not assessed -Medical history not taken -Mother-infant communication not assessed.
Behavioral Assessment Scale of Oral Motor Functioning	Stratton	1981	-Nutritive sucking (Oral phase)	Developed For profound-ly retarded children, adolescents and adults	-Inappropriate for preterm infants -Only the oral phase assessed -Physiological functioning not assessed -Medical history not taken -Mother-infant communication not assessed -NNS not assessed
The Prespeech Assessment Scale	Morris & Klein	1987	-Nutritive sucking (Oral phase)	0-24 months	-Inappropriate for preterm infants -Only the oral phase assessed -Physiological functioning not assessed -Medical history not taken -Mother-infant communication not assessed - NNS not assessed
Oral Motor Feeding Scale	Jelm	1990	-NS-oral phase -Different utensils e.g. spoon, straw -Related areas, e.g. Diet, positioning -Notes on respiration phonation, gross and fine motor development	From Birth	- Inappropriate for preterm infants - NNS not assessed -Mother-Infant Communication not assessed - Only the oral phase assessed. - Utensils: spoon, straw, etc. inappropriate
RIC Clinical Evaluation of Dysphagia: Pediatrics	Chemey	1994	-Oral structures, at rest -Oral, Pharyngeal oesophageal phases -Different consistencies -Medical / Feeding History	From Birth	-No norms for preterm -Food consistencies inappropriate -Physiological functioning not assessed

Although various feeding scales exist, they were found to have limitations as they are mainly aimed at the age group from full-term birth and onwards. Furthermore, they evaluate feeding skills with different food textures which are inappropriate for preterm and young infants. Physiological status is not considered and only the oral phase of feeding is evaluated.

As indicated in Table 4.1, a number of feeding scales have been developed, e.g., "The Neonatal Oral-Motor Scale" (Braun & Palmer, 1985), "The Assessment Scale of Oral Function in Feeding" (Stratton, 1981), "The Prespeech Assessment Scale" (Morris, 1982), "Behavioural Assessment Scale of Oral Functions" (Stratton, 1981), "RIC Clinical Evaluation of Dysphagia: Pediatrics" (Cherney, 1994) and Jelm's (1990) "Oral Motor Feeding Scale". The use of aforementioned scales poses certain limitations for the comprehensive evaluation and description of the feeding skills of the premature infant, e.g. most of these scales only assess the oral phase of swallowing. Swallowing (deglutition) occurs in four phases, the oral preparatory, oral, pharyngeal and oesophageal phases (Chapter 3 - 3.5). All of these four phases should be included in a comprehensive feeding evaluation. "The RIC Clinical Evaluation Of Dysphagia: Pediatrics" (Cherney, 1994) does include all four phases of swallowing and provides norms from birth (full-term) to 24 months. Unfortunately, no norms for premature infants are available and, furthermore, the biggest portion of the evaluation form, evaluates the ability to manage solids, semisolids and chewing, which is inappropriate for describing the feeding patterns of preterm infants. As discussed in chapter 2, feeding of premature infants involves many aspects other than sucking. The preterm infant experiences very specific feeding problems, (Arvedson & Brodsky, 1993; Creger, 1995; Vergara, 1993; Wolf & Glass, 1991). The above-mentioned scales do not consider the physiological or cardio-respiratory responses of the infant to oral feeding, detailed assessment of nutritional and non-nutritional sucking, the interaction between infant and caregiver and the effectiveness of this interaction during oral feeding. It is important to include these aspects in a comprehensive evaluation of the oral feeding skills of the premature infant to enable the feeding specialist to form a holistic picture of the premature infant and to plan effective,

accountable feeding intervention based on the information obtained from such an evaluation procedure.

It appears that no single comprehensive feeding evaluation scale for the premature population currently exists. Although research has been conducted and oral feeding scales have been designed to assess infants' feeding skills, they appear to describe and evaluate the oral feeding skills of premature infants only to a limited degree. The following question arises: **which tool or evaluation form can be used to enable the researcher to evaluate and comprehensively describe oral feeding skills of the premature infant?** Due to the dearth in the literature, it was deemed necessary to compile a new assessment form for the evaluation of oral feeding skills in premature infants in order to answer to the question asked above.

4.4.1.2 Compilation Of “The Feeding Evaluation Form For At-Risk Infants” (FEFARI) (Appendix A)

A comprehensive evaluation form should enable the user to accurately describe the feeding behaviour of the premature infant. It should also include all important aspects concerning the preterm infant as discussed in earlier chapters. Based on in-depth literature review of the infant feeding process and the premature infant, the following areas need to be included: A full history (medical and feeding) of the infant with accompanying risk factors; clinical observation of the oral structures, anatomically at rest and in function during feeding, which includes the oral, pharyngeal and oesophageal phases of swallowing (Glass & Wolf, 1994; Cherney, 1994; Rosenthal et al., 1995). Apart from the primary swallowing function, aspects like the ability to control behaviour and state, respiration (or breathing pattern), response to tactile input, general neuromotor control, positioning and the control of basic vital functions, during feeding should be considered throughout the evaluation (Glass & Wolf, 1994; Jolley et al., 1995). A system of objective rating and observation of a complex set of oral-motor skills is

needed to accomplish this. The evaluation needs to be reliable and valid to be of clinical value (Skuse et al., 1995). In an attempt to comply with all the previously stated requirements, a comprehensive evaluation form, the FEFARI, was developed (Appendix A.).

The final form of the FEFARI is discussed and the variation used in the pilot study is indicated where appropriate. The following areas of assessment were included in the FEFARI:

.1 Medical History

It is important to determine whether the infant has any risk factors that could compromise his/her feeding skills (Jaffe, 1989; Kramer & Eicher, 1993; Kritzinger, Louw & Hugo, 1995). It was decided to include only those risk factors identified in the literature that can be associated with feeding problems. However, for the *pilot study, all the risk factors for developmental delay were included*. The factors that were finally included, are: prematurity, neurological problems, cranio-facial anomalies, polyhydramnios, placenta abruptio or previa, umbilical cord complications, Meconium aspiration, RDS/BPD, surfactant therapy, asphyxia, mechanical ventilation, cardiovascular condition and intra-ventricular haemorrhage (IVH), TORCH infections, the Apgar count and tube feeding history (Bernbaum & Hoffman-Williamson, 1991; Harris, 1986; Kritzinger et al., 1995; Sheahan & Brockway, 1994). The various risk factors were described in detail in Chapter 2.

.2 Current State and Behaviour

The state and behaviour of the infant at the time of the evaluation is of importance, because factors like hyperbilirubinemia, chronic infections or medication could influence the infant's feeding abilities negatively. Lethargic infants do not perform as well as alert ones (Sheahan & Brockway, 1994; Vergara,

1993). Respiratory problems will also influence their feeding skills negatively. Apnea often occurs in premature infants, but feeding apnea occurs even more often than sleep apnea in the premature infant and is therefore important to include (Dreier et al., 1979; Garg et al., 1988; Rosen et al., 1984). Thus, it is important that a saturation monitor (pulse oximetry) as well as the apnea monitor should be in use while feeding the premature infant.

.3 Physical Examination

A physical examination of the infant is necessary as body positioning, e.g. good alignment of the head and trunk, is a prerequisite for oral feeding (Kramer & Eicher, 1993; Morris & Klein, 1987; Morris, 1989). Bernbaum & Hoffman-Williamson, (1991) and Vergara (1993) support this idea and add that the position whilst feeding is also of importance.

If any hyper/hypotonicity exists, it may affect the feeding skills of the infant and is therefore important for the examiner to take cognisance of.

Dysmorphic features, e.g. cleft palate, Pierre Robin sequence, are marked in this section as well. Any other dysmorphic features may be indicative of a syndrome or sequence. Whether the oral feeding problems or dysphagia, are part of the syndrome or not, may then be established. That information will help the feeding specialist when planning effective intervention.

.4 Oral Feeding History

Information about the current feeding habits is important to help the feeding specialist in determining when the optimum time for the evaluation is, more or less what to expect, which method of feeding should be recommended and which adaptation should be made or special precautions taken (Bernbaum & Hoffman-Williamson, 1991; Jaffe, 1989; Palmer et al., 1993; Sheahan & Brockway, 1994; Vergara, 1993).

.5 Mother-Infant Interaction during Feeding

Feeding time is one of the first communication interactions that the infant and his/her mother share (Billeaud, 1993). The infant communicates his/her hunger and the mother responds to the infant's signals appropriately by presenting the food. Communication between mother and the premature infant can be problematic. It is therefore important that the feeding specialist identifies any problems in this area as soon as possible to ensure appropriate communication development of the premature infant, and to facilitate bonding and attachment between mother and infant. The mother-infant relationship has, as far as known, not previously been included as part of a feeding evaluation, as it traditionally formed part of communication evaluation procedures which did not include the feeding situation. *The form compiled by Kritzinger (1994) for the evaluation of communication skills of neonates was used in the pilot study*, but because the form was compiled for full-term neonates, it could not be used for premature infants in the main study. Communication aspects of caregivers and infants that were included in the FEFARI were selected from the following authors: Bernbaum & Hoffman-Williamson (1991), Harris (1986), Kritzinger, 1994 and Vergara (1993).

.6 Evaluation of the Feeding Process

The evaluation of the feeding process should be done by evaluating the **oral structures at rest**, as well as **during function** (Cherney, 1994; Glass & Wolf, 1994; Morris & Klein, 1987; Wolf & Glass, 1991). The functioning of the oral structures includes *non-nutritive* as well as *nutritive sucking*. Nutritive sucking is assessed in terms of the different phases of swallowing, namely, oral preparatory/oral, pharyngeal and oesophageal phases.

❖ Oral Structures AT REST

Information collected from Bernbaum & Hoffman-Williamson (1991), Jaffe (1989), Merenstein & Gardener (1989), Sheahan & Brockway (1994) and Vergara (1993) was used to determine which items should be included in this section. All structures involved in feeding: the lips, cheeks, jaw palate, velum and tongue, should be evaluated in terms of the anatomical structure, tone, reaction to touch and the appropriate reflexes. Asymmetry and abnormal tone can be an early sign of neurological involvement, as can the absence of certain reflexes (e.g. rooting reflex) or the presence of others (tonic biting reflex). The gag reflex only develops around 34 weeks gestational age and is needed to ensure safe oral feeding. It is therefore important to know whether this reflex has emerged in an infant (Merenstein & Gardener, 1989; Sheahan & Brockway, 1994). Anterior displacement of the reflex, a hypo- or a hyperactive reflex can also affect oral feeding skills (Bernbaum & Hoffman-Williamson, 1991; Palmer et al., 1993; Vergara, 1993). Anatomical deviancies like cleft palate and micrognathia may have substantial influence on the feeding abilities of an infant.

❖ The FUNCTIONING of Oral Structures

The functioning includes both *non-nutritive* and *nutritive sucking* skills.

Firstly, with reference to *non-nutritive sucking (NNS)*: NNS is evaluated by observing the functioning of the lips and tongue, as well as the sucking bursts and rate of movement. The breathing and heart rate before and during NNS are noted and whether stress in the infant increases or decreases while he/she is sucking on the pacifier (Field, Ignatoff, Stringer, Brennan, Greenberg, Widmayer & Anderson, 1982; Lotas & Walden, 1996; Vergara, 1993). Various authors stress the importance of NNS. According to researchers, a few of the positive relationships between NNS and oral-motor functioning are the following: that NNS facilitates sucking movements for oral feeding; it enhances the maturation of the sucking reflex; the muscles needed for oral feeding are being strengthened; and

the disappearance of the sucking reflex due to lack of experience can be prevented (Bernbaum, Pereira, Watkins & Peckham, 1983; Bernbaum & Hoffman-Williamson, 1991; Creger, 1995; Field et al., 1982; Harris, 1986; Mattes et al., 1994; Morris, 1989; Sheahan & Brockway, 1994; Solis, Schutz, McCarty & Stotko, 1989; Vergara, 1993). For the infant under the gestational age of 34 weeks and the older Small for Gestational Age (SGA) infant, NNS is the only way of exercising the oral motor skills and preparing the infant for nutritive sucking. Non-nutritive sucking during tube feeding also enhances general growth and maturation in the premature infant (Bernbaum et al., 1983). The feeding specialist should therefore have knowledge of what the premature infant's NNS abilities are, in order to provide therapy in this area if needed, in preparation of oral feeding. Efficient NNS will also speed up the transfer from tube to oral feeding, which will result in earlier hospital discharge of the infant (Premji & Paes, 2000). This will enhance the mother-infant relationship and is also cost effective (Bazyk, 1990; Lotas & Walden, 1996; Mattes, 1996; Vergara, 1993). Existing scales like the Oral Motor Feeding Rating Scale (Jelm, 1990) and the RIC Clinical Evaluation of Dysphagia: Pediatrics and the RIC Evaluation of Prefeeding skills (Cherney, 1994) do not include the evaluation of NNS. The NOMAS by Palmer, Crawley & Blanco (1993) is the only scale that includes NNS in the evaluation. That is another reason why aspects of NNS were included in the FEFARI (a more comprehensive evaluation form, for the preterm and young at risk infants), to ensure that efficient intervention can be implemented if the need is identified.

Secondly, with regard to *Nutritive sucking (NS)*: This should be evaluated in terms of the oral preparatory/oral, pharyngeal and oesophageal phases of swallowing, to include the whole process of oral feeding. This implies that for the assessment to be comprehensive, the evaluation should be done from the time the food bolus enters the mouth until it reaches the stomach as recommended by Cherney (1993) and Rosenthal et al. (1995).

➤ **Oral preparatory/oral phase**

Existing feeding scales mainly evaluate this phase of swallowing, e.g. the NOMAS (Braun & Palmer, 1986; Palmer, Crawley & Blanco, 1993), the Prespeech Assessment Scale (Morris & Klein, 1987), Behavioral Assessment Scale of Oral Functions in Feeding (Stratton, 1981) and the Oral Motor Feeding Rating Scale (Jelm, 1990). These scales evaluate the oral motor skills with different food textures (thin and thick liquids, pureed and ground solids). Since premature and young infants' diets are restricted to liquids, the greater part of the other scales is therefore inappropriate for the evaluation of young infants' feeding skills. The existing scales, the evaluation forms of RIC and information from other sources (Bernbaum & Hoffman-Williamson, 1991; Vergara, 1993), were useful in the selection of items for this section of the evaluation form in this study. The functioning of the different oral structures, lips, jaw and tongue, is rated in columns as Normal or Deviant. The Deviant column is divided into two columns: Moderate/Disorganized and Severe/Dysfunctional similar to the NOMAS (Palmer et al., 1993). Disorganised sucking refers to a lack of rhythm when sucking actively and dysfunctional refers to an interruption of feeding due to abnormal movements of the tongue and jaw (Palmer et al., 1993). It is expected that the premature infant's skills may be classified as disorganized, as we expect maturation to change oral feeding skills to normal over time with the appropriate stimulation (Gaebler & Hanzlik, 1995). Infants with neurological insults are expected to fall anywhere between disorganized and dysfunctional depending on the severity of the insult. Apart from the functioning of the lips, jaw and tongue, the coordination and rhythm of the sucking and sucking bursts are evaluated as well. The flow rate, bolus formation and timely, coordinated swallowing are also evaluated (Daniëls, Casaer, Devlieger & Eggermont, 1986; Rosenthal et al., 1995).

➤ **Pharyngeal phase**

The pharyngeal phase is evaluated in terms of the elevation of the hyoid bone and larynx, nasopharyngeal reflux and voice quality (Cherney, 1994). The physiological status including the heart rate and breathing rate and whether any stress is experienced by the infant, is also monitored here (Bernbaum & Hoffman-Williamson, 1991; Vergara, 1993). The researcher is of the opinion that problems in this phase are associated with respiratory problems and these should therefore be included in a comprehensive evaluation of the premature infant's feeding skills. Stress symptoms were divided into moderate and severe (Bernbaum & Hoffman-Williamson, 1991; Harris, 1986; Hussey, 1988; Kramer & Eicher, 1993). Premature infants can experience sensory overload very easily, as discussed previously, and stress should therefore be monitored. Feeding apnea occurs more often than sleeping apnea and is therefore important to be monitored (Rosen et al., 1984; Shivpuri et al., 1983; Solomano et al., 1986). Nasopharyngeal reflux can cause apnea in the young infant (Plaxido & Loughlin, 1981). This may influence the sucking of the infant negatively. Apart from the RIC scales (Cherney, 1994), neither of the other feeding scales included the pharyngeal phase and none of them observed the physiological status of the infant during oral feeding, rendering the FEFARI to be more comprehensive.

➤ **Oesophageal phase**

The only aspects of the oesophageal phase that can be clinically observed are: emesis during feeding, projectile vomiting or gastro-oesophageal reflux (GER) and truncal arching (Cherney, 1994; Vergara, 1993). Projectile vomiting can indicate pilorus stenosis, truncal arching is associated with painful swallowing (odynophagia) and GER can cause refusal of oral feeding in the infant because it causes discomfort. Chronic GER can also cause odynophagia (Rosenthal et al., 1995; Wolf & Glass, 1991). Only the RIC Scales (Cherney, 1994) included this phase. The information collected during this phase is also important to plan intervention strategies and was therefore included in the FEFARI.

.7 General Information

The overall feeding time, as well as the reason for ending the feed, need to be recorded. The changes that had a positive outcome on the feeding abilities of the infant should be noted, as well as the changes that had a negative outcome and should therefore be avoided. This information will provide therapy guidelines.

.8 Additional Information

Objective measures can be recorded in this section of the FEFARI. Although these are very useful methods of assessment, which may be necessary to describe aspects of oral feeding and identify problems relevant for the planning of efficient and effective feeding intervention, this kind of high technology is unfortunately often limited in South Africa.

Space is provided on the FEFARI for the description of results of the following instrumental evaluations.

❖ Video Fluoroscopic Evaluation (VFS)

VFS is a valuable, objective method of radiological evaluation of the swallowing process and is widely considered to be the gold standard for identifying aspiration. If a VFS is needed, for instance when aspiration is suspected, the results of the oral, pharyngeal and oesophageal phases can be recorded in this section. Information gained from the VFS can provide the best information to plan effective and safe feeding therapy (Cherney, 1994; Kramer & Eicher, 1993; Rosenthal et al., 1995; Wolf & Glass, 1991). The RIC evaluation form (Cherney, 1994) is the only feeding scale to include VFS.

❖ Pulse Oximetry

The measurement of the saturation levels with pulse oximetry is an objective measurement upon which the feeding can be stopped or delayed until the infant

has recovered to a normal saturation level. The recording of the saturation levels before, during and after feeding in this section of the FEFARI provides the feeding specialist with vital information on feeding apnea, the stress and fatigue levels of the infant. The feeding intervention can thus appropriately be adapted according to the needs of the infant (Bernbaum & Hoffman-Williamson, 1991; Garg et al., 1988; Harris, 1986; Mathew, 1988; Rosen et al., 1984; Vergara, 1993).

❖ **Cervical Auscultation**

Kramer & Eicher (1993) and Vice et al. (1990) consider cervical auscultation as a valuable procedure to provide extra information on the pharyngeal phase of swallowing, since whether a swallow is delayed or absent can be heard by stethoscope. Gurgling sounds can be heard if a partial swallow was performed and bolus residue still exists in the pharynx. The danger of aspiration is possible if the infant is not swallowing effectively. Multiple swallows can also be detected more easily with cervical auscultation. An indication of the suck-swallow-breathing rate can also be gained with cervical auscultation. The information obtained can be notated in this section if the procedure was performed.

.9 Summary of Information

A summary sheet, which can be detached after completion and left in the infant's medical file, is attached to the back of the FEFARI. The main method of feeding is noted here. The overall levels of functioning are recorded for the three phases of swallowing in terms of being adequate (normal); adequate, but with reduced function (mild impairment); interferes with function (moderate impairment) and non-functional (severe impairment). The main problem/s, diagnosis and recommendations are also described. Finally, a space is provided for the signature of the feeding/speech therapist who performed the assessment.

4.4.1.3 Wording and Format

The format of the FEFARI was designed to make it user-friendly for clinicians. The purpose of the assessment is to gain as much information as possible regarding the oral feeding skills of the premature infant. The evaluation format contains descriptions of observations which require judgements to be recorded, thus guiding the feeding specialist to cover all areas of the feeding process and carry out a comprehensive assessment.

On the first page, space is provided for patient information and the date of evaluation. There are subsections for all aspects on which the feeding specialist requires information, as described above. Under each of the first five subsections, involving the history, state and behaviour, etc., a list is given of items that can be marked as No (absent) or Yes (present). The column representing the normal structure/behaviour/functioning is shaded to give the feeding specialist an instant indication of the status of the infant. Next to the “yes” column, a comments column was inserted where the evaluator can make qualitative remarks. The columns under the evaluation of the feeding process are divided into normal and deviant. Again, the column representing the normal is shaded to give an instant view of problem areas. Under the nutritive sucking subsection in the oral preparatory/oral phase, a further distinction in the deviant column was made between moderate /disorganised and severe/dysfunctional. This phase represents all the lip, jaw and tongue movements needed for sucking by the young infant. After this section has been completed, the evaluator can gain an immediate idea of the severity of the problem. The items under each section are listed comprehensively and should enable the feeding specialist to describe the oral-motor skills of the premature infant in terms of functioning and to plan appropriate and safe intervention strategies.

For the purpose of this study, two sets of nutritive sucking subsections were included in the form, one for bottle-feeding and one for cup-feeding. The different

and/or same skills used by the two different methods of feeding can be recorded and compared. This should enable the evaluator to describe the difference in oral-motor behaviour, if present, between these two methods of oral feeding. Numerical values were assigned to feeding behaviour, namely, a number 1 was awarded for normal behaviour/functioning and a 2 for deviant behaviour/functioning. Deviant was further divided into moderate and severe, a 2 was awarded for moderately affected and disorganised behaviour/functioning, and a 3 for severe affected and dysfunctional behaviour. This information will be helpful in determining the degree of the problems and serve as a guide for intervention strategies to be followed.

4.5 PILOT STUDY

A pilot study was carried out as the final step of Phase 1 of the research project. According to Matins, Loubser & Van Wyk (1996), the primary purpose of a pilot study is to detect weaknesses in design and instrumentation. This was therefore adopted as the aim of this pilot study. Guy, Edgeley, Arafat & Allen (1987) also consider the purpose of the pilot study to evaluate the adequacy and clarity of a form. The following sub-aims for the pilot study were formulated to achieve the main aim:

Sub-aim 1: to evaluate the *adequacy and appropriateness* of the evaluation process and the "Feeding evaluation form for at risk infants" (FEFARI). To achieve the first sub-aim the following objectives were formulated:

- To evaluate the applicability of the evaluation form in terms of *relevance* of items included,
- To identify the presence of any misleading or *ambiguous* items,
- To ensure the *clarity* of the terminology,
- To gain an idea of the complexity of items and the ease of *coding*.

- To gain an indication of which strategies might be needed to analyse the data.

Sub-aim 2: to *familiarize* the researcher with the assessment procedure, in an attempt to improve the reliability, since another evaluator was not available for interrater reliability.

4.5.1 SUBJECTS

Five normal, full-term infants without feeding problems were selected to act as subjects for the pilot study. Since no problems concerning these infants' feeding abilities were expected, the researcher could concentrate on the execution of the FEFARI and the realization of the sub-aims of the pilot study without being distracted by actual feeding problems.

4.5.2 PROCEDURE

.1 A research proposal had to be handed in and permission had to be obtained from the Ethical Committee of the Pretoria Academic Hospital to conduct the study. The consent of the Head of the Neonatal Unit of the Pretoria Academic Hospital also had to be obtained before the pilot study could be conducted.

.2 The High Risk Register (Kritzinger, 1994) was used as part of the medical history. The risk register was included because it was considered necessary for a comprehensive evaluation system, to determine whether the infant had any factors that could compromise his development or feeding abilities. The list of risk factors by Kritzinger (1994) was used, as it was a comprehensive set of risk factors that she used in her well-conducted study. Information was collected from the subject's medical file.

.3 The Feeding Evaluation Form for At Risk Infants, (FEFARI) was then used to evaluate their oral feeding skills at their usual feeding time, with their normal method of feeding and drinking milk that they are used to. They were attached to an oximeter to measure saturation levels and a stethoscope was placed for cervical auscultation. The information was then recorded on the FEFARI.

.4 Communication Interaction was assessed using the comprehensive form for the communication skills of neonates which was developed by Kritzing (1994).

4.5.3 RESULTS OF THE PILOT STUDY

The results of the pilot study are discussed according to the sub-aims.

4.5.3.1 Sub-aim 1 of Pilot Study

The first sub-aim of the pilot study was to evaluate the *adequacy and appropriateness* of the evaluation procedure and the FEFARI. The separate forms for the risk factors by Kritzing (1994) resulted in a vast amount of extra paperwork. A great number of risk factors applied to developmental delays only and did not affect feeding skills. It was decided to include only the risk factors associated with feeding problems on the FEFARI itself, e.g. Prematurity (length of pregnancy), TORCH infections, Cord collapse/knotted/around the neck, Meconium aspiration, Apgar count, ventilation, Respiratory Distress syndrome (RDS)/Hyaline Membrane Disease (HMD) and Intra Ventricular Haemorrhage (IVH) (Bernbaum & Hoffman-Williamson, 1991; Harris, 1986; Kritzing, 1995; Sheahan & Brockway, 1994; Vergara, 1993; Wolf & Glass, 1991). These risk factors are also *relevant* as risk factors for developmental delays, which means that these selected factors can still be considered comprehensive enough for also identifying developmental delays in the absence of feeding problems, thus resulting in appropriate and adequate test items.

Hyperbilirubinemia, apnea and stridor were also added to **current state** as these were *relevant* aspects that should be included since they may also influence feeding skills, as discussed in previous chapters (Sheahan & Brockway, 1994; Vergara, 1993).

Mother infant interaction during feeding was added to the FEFARI, including aspects involving the premature infant (Vergara, 1993), as this would improve the *applicability* of the form. For the main study, premature infants will be used and the evaluation of communication skills formulated for full-term infants (Kritzinger, 1994) will therefore be inappropriate. It is nevertheless important to include this aspect because communication of the premature infant can pose problems, as discussed in chapter 2. Items for this section were compiled from information gathered from the literature (Bernbaum & Hoffman-Williamson, 1991, Harris, 1986; Semmler, 1989; Vergara, 1993). No problems with *ambiguity or clarity* were found.

A separate heading for **non-nutritive sucking skills** was added to ease recording for this information. The form had to be adapted to enable the punching in of data in the computer, by providing line numbers etc. for easier *coding*. Normal structures/ behaviour/functioning was awarded a numerical 1, deviant a numerical 2. Where deviant was divided between moderate and severe, the first-mentioned was awarded a numerical 2 and the latter a numerical 3.

After completion of the pilot study, minor modifications to the evaluation form were needed. The results obtained, indicated that the instrument was acceptable and effective in obtaining the data needed for this study.

4.5.3.2 Sub-aim 2 of Pilot Study

The researcher gained experience in using the FEFARI and was now familiar with the evaluation form and procedure.

4.5.4 VALIDITY AND RELIABILITY

Validity is the attempt to determine whether a measurement tool actually measures what it is presumed to measure (Leedy, 1997). Content validity is one type of validity that is relevant in the compilation of the comprehensive feeding evaluation scale, FEFARI. Content validity is the accuracy with which the instrument measures the factors under study. Reliability means that the information which is gathered with the evaluation form, should not vary as a result of characteristics of the study, e.g. test-retest reliability (Ottenbacher, 1985).

To ensure content validity of the FEFARI, the evaluation form was based on a thorough and in-depth literature review of all aspects involved in the safe oral feeding process of premature infants. The selection of items was also based on the clinical experience of the researcher in managing oral feeding in premature infants in the NICU, for several years. Furthermore, a pilot study was conducted to assess content validity and the results indicated that the items were appropriate.

The research design and the fact that the researcher was the only scorer of the FEFARI, could lead to bias. The reliability can also be compromised by subjective judgment (Leedy, 1997). This was overcome by conducting the pilot study to develop experience in applying the FEFARI. Very specific guidelines for the content and construction of the FEFARI were followed based on extensive literature research. The researcher has years of experience in the assessing and managing of premature infants, which should limit inaccurate recording.

Phase 1 of the study was completed and the second phase could follow. It is discussed below.

4.6 PHASE 2: MAIN STUDY

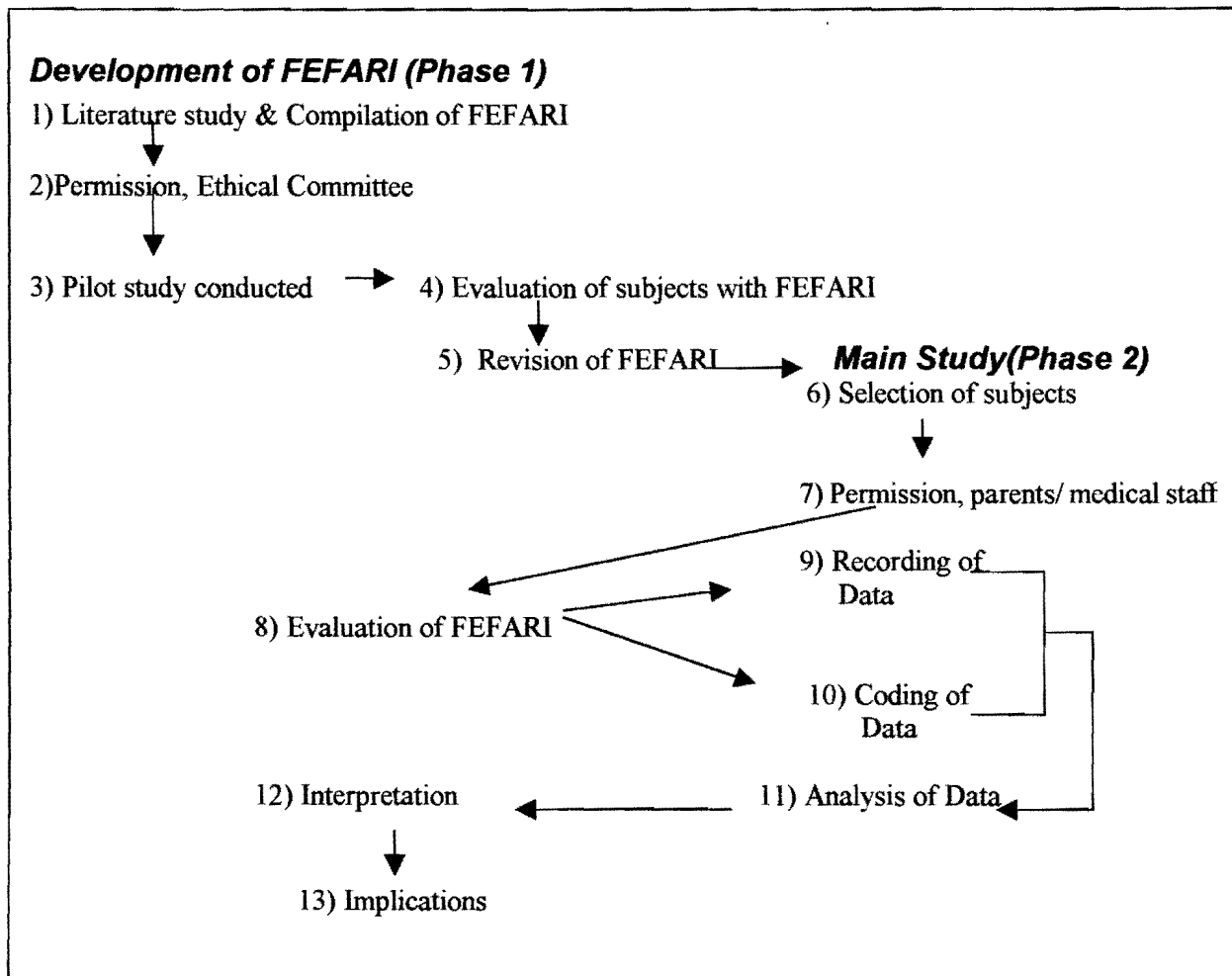


Figure 4.2 Procedures followed in both phases of this study

4.6.1 AIMS

The **main aim** of this study is to describe the oral feeding skills of premature infants. To achieve this, two **sub-aims** were formulated for this study: **Sub-Aim 1** (see par. 4.2) was realised in phase 1.

The main study was thereupon conducted to realise **Sub-Aim 2**, which is:

The application of the evaluation tool in order to describe:

- The characteristics of the subjects, according to subject groups as well as the sample as a whole.
- The oral feeding skills and behaviour of a group of premature infants during bottle- and cupfeeding in terms of:
 - Their non-nutritive sucking skills,
 - Their nutritive sucking skills.
 - The impact of the two feeding methods on the subjects' physiological status.
- And identify developmental trends.
- To identify suitable intervention strategies for different subject groups (Clinical implication)

4.6.2 SUBJECTS

4.6.2.1 Selection Criteria

The integrity of the research can be ensured by setting criteria beforehand and thus making it more trustworthy. By selecting the participants purposefully, more can be learned about the behaviour studied (Leedy, 1997).

The target group for the main study had to comply with the following criteria:

- **Prematurity:** The infants had to be born *prematurely* – On or before 36 weeks gestational age (Rossetti, 1986). The sucking patterns of premature infants are different from the patterns used by full-term infants (Bu'Lock, Woolridge & Baum, 1990) and the purpose of this study is to describe the patterns used by premature infants. The age will be determined with the Ballard score, which will be established by the clinical assistant or paediatrician in the neonatal unit. Clinically it was found that the obstetric dates were unreliable and that the age as determined by the Ballard score was more realistic and reliable to determine the gestational age of an infant (De Witt, 1999)

- ***Gestational age*** of 34 and 37 weeks. According to Geertsma et al. (1985), oral feeding cannot be expected of infants under the age of 34 weeks. This is firstly, because the gag reflex necessary to protect the airways is not developed sufficiently yet (Harris, 1986; Merenstein & Gardener, 1989; Sheahan & Brockway, 1994; Solis et al., 1989). Secondly, defined periods of sleep-and alertness appear between 34 and 36 weeks and sucking is generally better in the awake state (Geertsma et al., 1985). Mandich & Ritchie (1996) state that factors like the ability to keep a quiet, alert state and organization of behaviour are also necessary for feeding success. Thirdly, the literature also states that the infant under the gestational age of 34 weeks is at risk of aspirating because he is neurologically not equipped to coordinate sucking, swallowing and breathing. By 37 weeks, feeding patterns can be the same as those used by full-term infants (Casaer et al., 1982; Brake, Alfasi & Fleischman, 1988; Braun & Palmer, 1985; Bu'Lock et al., 1990). Lastly, the hunger and thirst cycle is also only noticeable by 35 weeks. Since satiety inhibits sucking (Morris & Klein, 1987) it is advisable to evaluate the infants when they are hungry. No weight restrictions will be made since feeding abilities seem to be more related to gestational age than to weight, as sucking depends on neuromotor maturation and maturation depends on gestational age (Brake et al., 1988; Merenstein & Gardener, 1989; Sheahan & Brockway, 1994; Solis et al., 1989; Vergara, 1993).
- ***Neurological intactness:*** Subjects had to be neurologically intact, therefore neurologically involved infants were excluded. For instance, infants with intra-ventricular bleeding (IVH) were excluded, as this could cause damage to the central nervous system (Bazyk, 1990) and feeding problems could be a result of neurological involvement rather than immaturity. The aim of this study is the description of the oral feeding skills of the premature infant where problems are due to immaturity only and not to neurogenic dysphagia.

- **Apgar count:** The subject's 5-minute Apgar count must be above 7 to exclude the neurologically involved infants for this study (De Witt, 1999).
- **Medical condition:** The infant must be medically stable, tolerate room air and vital signs must be within normal limits, to limit variables which could have a negative impact on oral feeding skills and behaviour (Braun & Palmer, 1995; Geertsma et al., 1985). This implies that the infant should be medically and physiologically ready for oral feeding (Vergara, 1993). Phototherapy must have been discontinued for at least 24 hours, because hyperbilirubinemia can make the infant lethargic and this may affect his/her sucking behaviour (De Witt, 1999).
- **Feeding method:** The infants must feed from a bottle and a cup, as these are the methods of feeding being investigated in the study and are the methods currently used in "Baby Friendly Hospitals" as well as the Pretoria Academic Hospital.
- **Place of birth:** The subjects must all be patients of the Maternity Hospital of the Pretoria Academic Hospital, as these were the infants for whom consent for the study had been obtained from the Ethical Committee.
- **Gender:** Subjects from both genders were included, as the literature does not make any distinction in feeding skills between the genders (Kritzinger, 1995; Rossetti, 1996; Rosenthal et al., 1995; Glass & Wolf, 1994).
- **Race:** No distinction was made regarding the race of subjects, as no mention of racial differences in terms of feeding skills could be found in the literature. The editors of the journal, Paediatric and Perinatal Epidemiology (2000,14, page 13) further state that race is a social construct and not a biological variable.

4.6.2.2 Selection Procedures

A selection of convenience was made by selecting the first ten infants in each of the age groups: 34, 35, 36 and 37 weeks who met the selection criteria (Leedy, 1997; Uys 1987). Permission had to be obtained from the medical staff of the neonatal unit to evaluate the selected infants. Consent was also obtained from the parents of the infants [Figure 4.2: (points 6,7)]

4.6.2.3 Description of Subjects:

Forty-two (42) premature infants were selected as subjects for the main study. They were patients in the Neonatal Intensive Care Unit (NICU) of the Maternity Hospital of the Pretoria Academic Hospital. Although the hospital is situated in Pretoria, the infants came from various geographical areas.

Four groups were formed according to their gestational age, namely:

- Group 1: 34-weeks gestational age (N=10)
- Group 2: 35-weeks gestational age (N=11),
- Group 3: 36-weeks gestational age (N=11) and
- Group 4: 37-weeks gestational age (N=10) to allow for maturational differences.

The first 10/11 infants of each gestational age group who met the selection criteria, were used.

Table 4.2 provides an overview of the subjects used in the study in terms of their gestational age, birth weight, their current weight as well as their chronological age. It is interesting to note that all of the subjects had a low or very low birth weight. The number of males and females in most groups were virtually equal except in the 37-weeks group, in which about 1/3 were males and 2/3 females. The majority of subjects were black (70%-80%).

Table 4.2. Description of subjects

Gestational age	Group 1 34 weeks N=10		Group 2 35 weeks N=11		Group 3 36 weeks N=11		Group 4 37 weeks N=10	
	Range	Average	Range	Average	Range	Average	Range	Average
Ballard score	31-34 weeks	32.6 weeks	29-35 weeks	32.5 weeks	28-36 weeks	33 weeks	29-36 weeks	34.4 weeks
Birthweight (kg)	1.07-1.65	1.4	1.02-1.46	1.22	1.05-1.91	1.35	1.01-1.85	1.42
Chronological age	1 - 3 weeks	1.5 weeks	1- 6 weeks	2.5 weeks	1- 8 weeks	3 weeks	1- 7 weeks	2.5 weeks
Current weight (kg)	1.16-1.75	1.45	1.07-1.81	1.44	1.34-1.86	1.65	1.32-1.92	1.67

	Number of Subjects	%	Number of Subjects	%	Number of Subjects	%	Number of Subjects	%
Low Birth Weight	4	40	0	0	3	27	5	50
Very Low Birth weight	6	60	11	100	8	73	5	50

Gender	Male 5	Female 5	Male 5	Female 6	Male 6	Female 5	Male 3	Female 7
Race	Black 8	White 2	Black 9	White 2	Black 7	White 4	Black 7	White 3

4.6.3 ETHICAL CONSIDERATIONS

Before this research could be conducted in the hospital setting, a comprehensive research proposal was submitted to, and permission granted by, the Ethical

Committee of the Pretoria Academic Hospital. Aspects as mentioned by Leedy (1997), namely, simple consideration for the patient, openness of the research, respect for the privacy of the patient and avoidance of any harm to the subjects, were considered. Permission to use subjects from the NICU had to be obtained from the head of the neonatal unit as well. After an infant complied with the selection criteria, permission to evaluate the infant had to be obtained from the parents by presenting them with an informed letter of consent. The paediatrician in whose care the infant was, also had to certify that the infant was medically stable enough for the evaluation procedure. As an act of courtesy, the nursing staff's consent was also asked. The feeding time of the ward had to be respected and the availability of a pulse oximeter was needed before the evaluation could proceed.

4.6.4 MATERIALS AND EQUIPMENT

The material and equipment used in the study are summarized in Table 4.3.

A brief overview of the material contained in Table 4.3 is discussed:

- The same nipples generally used in the hospital, were used.
- The same bottles and teats used for oral feeding were used. The hole in the teat should allow for a flow rate of one drop per second. Jain (1987) and Matthew's (1994) found adverse effects on sucking and breathing patterns of infants when a teat with a high flow rate is used for feeding.
- The bottle caps were used as cups for cupfeeding.
- Formula milk or expressed milk, whichever the infant was used to, were used, to limit the possibility of the influence of taste on the sucking behaviour of the infant (Mattes, 1996). Only milk was presented, as it was the only consistency of food that the infants can manage at this age (Rosenthal et al., 1995).
- Feeding Evaluation form for at Risk Infants (FEFARI).

Table 4.3. Material and equipment used in study

	Object	Description	Use
Material	Nipple for Non-Nutritive Sucking (NNS)	Same shape than for Nutritive Sucking	Assessment of NNS skills
	Bottle and nipple	Those provided by hospital. Flow rate: 1 drop/s	Assessment of oral, pharyngeal and oesophageal phases
	Cup	Top of bottle provided by hospital	Assessment of oral, pharyngeal and oesophageal phases
	Milk (formula or expressed breast milk)	Milk that the infant is used to	The only food type used for oral feeding
	FEFARI	Comprehensive feeding evaluation form	Assessment of all aspects of oral feeding
Equipment	Pulse Oximeter	Scientific measuring instrument	Measuring of O ₂ saturation levels and heart rate
	Watch	Watch with a second-hand	Measuring of feeding time and breathing rate
	Stethoscope	Medical instrument for listening to body sounds	Cervical auscultation – listen for swallowing

A brief overview of the equipment mentioned in Table 4.3 is discussed:

- A portable oximeter with fast recording speed and flex probes for the feet, was used to measure the oxygen saturation levels pre-, mid- and post-feeding to give an indication of stress experienced by the infant or possible aspiration. If feeding apnea occurs successively, it might reflect in lower saturation levels as well. Saturation levels of under 90% will be an indication to stop oral feeding until the levels return to baseline values (Bernbaum & Hoffman-Williamson, 1991; Garg et al., 1988; Rosen et al., 1984; Vergara, 1993). The readings pre, mid and post feeding (for NNS and NS) were recorded on the FEFARI.

- A watch indicating seconds, to measure the duration of the feeding and the breaths per minute for breathing rates pre-, mid- and post-feeding, was used.
- A stethoscope was used for cervical auscultation during the evaluation of nutritive sucking. A stethoscope with a small head is placed on the neck, at the level of the larynx, when nutritive sucking is evaluated. The feeding specialist will be listening for pharyngeal sounds accompanying swallowing. Assessment of swallows can be made in terms of a timely or delayed swallow, or multiple swallows. The quality of the swallow can be estimated. The information is recorded under swallowing in the oral phase and further qualitative comments can be made on the FEFARI under a specific heading designated for cervical auscultation (Kramer & Eicher, 1993; Logan & Bosma, 1967, Vice et al., 1990).

4.6.5 DATA COLLECTION PROCEDURES

Arrangements had to be made with the daily nursing staff to do the evaluation at approximately the same time that the feeding usually occurs (Bu'Lock et al., 1990). The infant had to be awake and an oximeter had to be connected near the infant.

The following steps were followed during data collection:

- The medical and oral feeding history of the infant was obtained from the medical file. The infant was then observed for his current state and behaviour, and a physical examination was performed as required by the evaluation form. An evaluation of the oral structures at rest was also made before picking up the infant.
- The infant was placed in a semi-upright flexed position. Shivpuri (1983), Sheppard (1987) and Tuchman (1988) recorded the best saturation levels in premature infants when they were in the semi-upright position. The chest must be partially exposed to observe respiratory movements.

- The flex probe of the oximeter was fitted on the infant's foot. The researcher waited for the infant to calm down before the readings were recorded. The saturation levels were recorded for the duration of the whole feed. The highest and lowest values were recorded (Garg et al., 1988).
- After the baseline breathing and saturation levels were established, the researcher then cradled the infant and presented the pacifier first to evaluate the non-nutritive sucking. This was then notated on the FEFARI.
- The researcher placed the stethoscope in a position for the cervical auscultation. The bottle was then presented and the infant was closely observed for all the test items on the form and the readings on the saturation monitor (oximeter) were notated on the FEFARI.
- After the information was obtained, the infant had a rest period while the researcher recorded the information regarding all the phases of swallowing for bottle-feeding and feeding time on the FEFARI.
- The cap of the bottle was filled with milk for the evaluation of cup feeding. When the infant reached baseline breathing and saturation levels again, the stethoscope was again positioned and the milk presented with the cup. The infant was observed in the same manner and for the same aspects as feeding with the bottle. After the required information had been obtained and recorded, the probe of the oximeter was removed and the infant made comfortable in the bassinet/incubator.
- The mother-infant interaction was evaluated by observing the mother interacting with the infant during feeding and the information was recorded on the FEFARI.
- A maximum of two infants per day were evaluated, to avoid fatigue of the observer (Kritzinger, 1995).
- All of the information was gathered over a period of 12 months, although the majority of subjects (34 of the 42) were evaluated within 6 months.

4.6.6 DATA ANALYSIS AND STATISTICAL PROCEDURES

A discussion of the scoring, recording and statistical procedures used to analyse the data, follows.

4.6.6.1 Data Scoring and Recording

All the data was recorded on the compiled evaluation form (FEFARI). Every line was numbered for coding of the raw data. The responses were given as values: a numerical 1 was awarded if the behaviour/functioning for the item was considered as being normal and a numerical 2 if the behaviour/functioning was considered as a risk factor or deviant. The deviant column in the oral phase was divided into two columns, namely 1) Moderately, disorganized which was awarded a numerical 2 and 2) Severe, dysfunctional column which was awarded a numerical 3. This was done to distinguish between the severities of the problem. Disorganised refers to a lack of rhythm of the total sucking activity and implies that the response is immature and in the process of developing. Dysfunctional refers to an interruption of the feeding process by abnormal movements of the oral structures, which may be indicative of neurological involvement. (Braun & Palmer, 1985)

4.6.6.2 Data Analysis and Data Processing

- After each of the 42 subjects' data was recorded on their own FEFARI form, the data was entered into a computer for the statistical analysis.
- For the analysis of data the following computer programmes were used in the analysing process: The Statistical Analysis System (SAS) computer programming package for descriptive statistics and the frequency distribution. BMDP-Statistical Software Inc for the determination of the T-tests, Wilcoxon and Kruskal-Wallis tests.
- The significance of a phenomenon was determined by the use of the Kruskal-Wallis test, which is especially useful in smaller samples (sample

size greater than 5) and the Wilcoxon test (Steyn, Smit, Du Toit & Strasheim, 1994).

4.7 CONCLUSION

Existing feeding scales demonstrated limitations in their usefulness to describe the oral feeding skills and behaviour of premature infants. The growing number of premature infants specifically in South Africa, created a need for a thorough, detailed assessment tool for the evaluation of their oral feeding skills, to ensure effective, accountable service delivery in the neonatal units. This clinical problem required investigation. A comprehensive evaluation form (FEFARI) was compiled and used in a carefully selected subject group in this study, in an attempt to enable the feeding specialist to describe the oral feeding skills of the premature infant in order to provide some solutions to above-mentioned needs.

4.8 SUMMARY

This chapter described the research methodology which directed this study. It included the aims and sub-aims of the study, and the objectives that were necessary to meet the aims. The research design, subjects, the materials and equipment, and procedures to collect and analyse the data for the main study were described in detail. In this manner, scientific accountability for this study is provided.