

Neonatal communication intervention in South Africa – training needs and future strategies

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**Submitted in fulfilment of the requirements for the degree
MCommunication Pathology in the
Department of Speech-Language Pathology and Audiology**

**Faculty of Humanities
University of Pretoria**

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March 2015

UNIVERSITY OF PRETORIA
FACULTY OF HUMANITIES
RESEARCH PROPOSAL & ETHICS COMMITTEE

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Acknowledgements

I would like to thank the following people who guided and supported me throughout this research study. The successful completion of this research would not have been possible without their input.

- **Prof Alta Kritzinger**, for your invaluable guidance throughout this research project. It was a privilege to learn about early intervention from you, and to fully comprehend your complete and irrevocable passion for babies! The knowledge I have gained will continue to support and inform my services to the paediatric population in future.
- **Dr Lidia Pottas**, for your ability to remain calm at all times. I become stressed easily, and your presence in our meetings truly helped me to remain focused. Your input regarding the methodology of this study, as well as the ideas about how to display results graphically, made a big difference.
- **All the respondents** who participated in this study, for your interest in neonatal communication intervention. With so little literature using this term, your support and passion for this field are truly inspiring.
- **Mr Erik van Zyl and Dr Dion van Zyl**, for your assistance in the compilation of the online questionnaire, database and statistical analysis of all results. Data analysis would have been completely impossible without your input and guidance.
- My **mother, Mrs Tessa Oppermann**, for your assistance with the language editing of this dissertation. You are always willing to help at short notice, and although I do not always fully show it, I truly appreciate everything you do for me at all times.
- My **colleagues** at Tyger Valley College, for your positivity throughout my research. **Lindy**, thank you for chasing me home when I needed to work on my dissertation. **Christelle**, I am so glad we went through the process of doing a Master's at the same time – it was really helpful to compare notes!
- My **dear friends**, who always unwaveringly believed in me. **Ilze**, I could always rely on your help when I hit a bump in the road – you even helped a few times to find literature! Jy is, en sal altyd, my hartsvriendin bly. **Christine**, you continued to believe in me, and prayed for me throughout this time of research. I thank you for your love, understanding and support.
- My **husband, André**, for your continued support throughout this long period of research. Your late-night solutions when I struggled to cope with the amount of work helped me to get through this. Also, your computer skills prevented me from throwing my laptop out the window!
- My **parents and sister**, for your love and support at all times. **Elsabé**, you are always willing to listen to my complaints, and I thank you for the fact that you always give such sage advice in difficult times. **Pappa**, baie dankie dat Pappa altyd weet wat om te sê om my beter te laat voel. Pappa is verseker die beste Pa in die wêreld! Also my **in-laws**, for your interest and support in my research endeavours. You have welcomed me into your family with such complete acceptance, and it means so much to me.
- My **Lord Jesus**, for giving me the ability to continue learning even when I felt like giving up. You are always with me, even when I feel alone, and I truly believe You led me to this topic, and that You guided me through this process. “Die Here is my herder, ek kom niks kort nie” (Psalm 23:1).

Abstract

Title	Neonatal communication intervention in South Africa – training needs and future strategies
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Advances in neonatal medicine during the past 35 years have led to the survival of more preterm infants than ever before. The focus of the management of preterm infants has consequently shifted from survival to providing for developmental needs, from as early as possible. The increased prevalence of at-risk infants born in South Africa necessitates the appropriate implementation of neonatal communication intervention (NCI) programmes. Since mothers do not always return to health care facilities for follow-up services but are available during the neonatal period, the speech-language therapist should assist them with feeding development, mother-infant attachment and reciprocal communication interaction. The paediatric audiologist should reduce noise levels in the neonatal intensive care unit (NICU) to protect neonatal hearing, conduct a hearing screening test within the first month of life and train parents to create the appropriate auditory environment that will facilitate listening and language development.

Audiologists and speech-language therapists need to be fully competent and well-trained in providing NCI, so that their services in the unique multicultural and multilingual South African context can become increasingly effective. The aim of the study was to describe the self-perceived skills and needs of South African audiologists and speech-language therapists regarding NCI.

A triangulation mixed model research design, which entails a combination of quantitative and qualitative research techniques, was used. A descriptive survey was employed to describe the self-perceived skills and needs in NCI of 73 participating South African audiologists and/or speech-language therapists.

The results of this study indicated that participants experienced the greatest difficulty with and the least confidence in feeding intervention. The participants perceived their skills in communication intervention, neonatal hearing intervention and general collaborative tasks in NCI to be better than their skills in feeding intervention. Some of the participants did not recognise their vital role in kangaroo mother care (KMC), although it is the ideal entry point for the implementation of NCI programmes. The participants identified needs in terms of knowledge and skills regarding feeding intervention, developmental care and KMC. The majority indicated that they perceived their level of practical training as lacking, and that any training in NCI should include practical aspects.

It was also found that the participants' current profession and their professional qualification significantly influenced their reported skills in feeding, communication and neonatal hearing intervention. The more recently qualified participants and those with more clinical experience also reported greater confidence in and less difficulty with feeding and communication intervention, as well as with general neonatal intervention tasks.

The findings of this study emphasise the need for audiologists and speech-language therapists to use KMC as the entry point for NCI services. Training in early communication intervention (ECI) and NCI at an undergraduate level should be expanded to include more practical activities, and may need to be standardised across tertiary institutions in South Africa. Professionals working in neonatal settings should also participate in professional development courses that include practical application of learnt skills. Through these activities, NCI services to the paediatric population may reach the necessary standard of best practice.

Key words: Neonatal communication intervention (NCI); early communication intervention (ECI); kangaroo mother care (KMC); developmental care; preterm infant; neonatal intensive care unit (NICU); feeding intervention; communication intervention; neonatal hearing intervention; newborn hearing screening.

Opsomming

Titel	Neonatale kommunikasie-intervensie in Suid-Afrika – opleidings-behoefte en strategieë vir die toekoms
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Vooruitgang in neonatologie oor die afgelope 35 jaar het gelei tot die oorlewing van meer premature neonate as ooit tevore. Die fokus van die versorging van premature neonate het dus verskuif van oorlewing na die vroeë voorsiening in hul ontwikkelingsbehoefte. Die toenemende voorkoms van hoërisiko neonate in Suid-Afrika vereis die toepaslike implementering van neonatale kommunikasie intervensie (NKI) programme. Aangesien moeders nie altyd terugkeer na gesondheidsfasiliteite vir opvolgdienste nie maar wel beskikbaar is tydens die neonatale tydperk, behoort spraak-taalterapeute hulle by te staan met voedingsontwikkeling, moeder-baba-hegting en wedersydse kommunikasie-interaksie. Die pediatriese oudioloog behoort geraasvlakke in die neonatale intensiewesorgeenheid (NISE) te verminder om neonatale gehoor te beskerm, en behoort binne die eerste lewensmaand 'n gehoorsifting te doen. Die oudioloog behoort die ouers te leer hoe om 'n toepaslike ouditiewe omgewing te skep wat luister- en taalontwikkeling sal bevorder.

Oudioloë en spraak-taalterapeute behoort dus ten volle bevoeg en opgelei te wees in die voorsiening van NKI, sodat hierdie dienste al hoe meer doeltreffend in die unieke multikulturele en veeltalige Suid-Afrikaanse konteks kan wees. Die doel van hierdie studie was om die selfwaargenome vaardighede en behoeftes van Suid-Afrikaanse oudioloë en spraak-taalterapeute rakende NKI te beskryf.

'n Trianguleringsontwerp, oftewel gemengdemodelnavorsing, wat 'n kombinasie van kwantitatiewe en kwalitatiewe navorsingstegnieke insluit, is gebruik. 'n Beskrywende vraelys is aangewend om die selfwaargenome vaardighede en behoeftes ten opsigte van NKI van 73 deelnemende Suid-Afrikaanse oudioloë en/of spraak-taalterapeute te ondersoek.

Die resultate van hierdie studie het getoon dat die deelnemers die meeste probleme met en die minste selfvertroue in voedingsintervensie ondervind het. Daarby het die deelnemers hul vaardighede in kommunikasie-intervensie, neonatale gehoorintervensie en algemene gesamentlike take in NKI gerapporteer as beter as hul vaardighede in voedingsintervensie. Sommige van die deelnemers het nie hul belangrike rol in kangaroo-moedersorg (KMS) besef nie, ten spyte van die feit dat KMS die ideale toegangspunt is vir die implementering van NKI-programme. Die deelnemers het behoeftes in terme van kennis en vaardighede rakende voedingsintervensie, ontwikkelingstoepaslike sorg en KMS geïdentifiseer. Die meerderheid het aangedui dat hulle hul vlak van praktiese opleiding as gebrekkig ervaar, en dat enige opleiding in NKI praktiese aspekte behoort in te sluit.

Daarby is gevind dat die deelnemers se huidige professie en hul professionele kwalifikasie 'n beduidende invloed op hul gerapporteerde vaardighede in voedings-, kommunikasie- en neonatale gehoorintervensie gehad het. Die meer onlangs gekwalifiseerde deelnemers en dié met meer kliniese ondervinding het ook meer selfvertroue en minder probleme rakende voedings- en kommunikasie-intervensie, sowel as met algemene neonatale intervensietake, gerapporteer.

Die bevindings van hierdie studie beklemtoon die behoefte dat oudioloë en spraak-
taalterapeute KMS as toegangspunt vir NKI-dienste behoort te gebruik. Opleiding in vroeë
kommunikasie-intervensie (VKI) en NKI behoort op voorgraadse vlak uitgebrei te word om
meer praktiese aktiwiteite in te sluit, en dit mag ook nodig wees om hierdie opleiding by die
veskillende tersiêre sentrums in Suid-Afrika te standaardiseer. Professionele persone wat
tans in die neonatale omgewing werk, behoort ook deel te neem aan professionele
ontwikkelingskursusse wat praktiese toepassings van aangeleerde vaardighede insluit.
Deur hierdie aktiwiteite kan NKI-dienste aan die pediatriese bevolking die nodige standaard
vir beste praktyk bereik.

Sleutelwoorde: Neonatale kommunikasie-intervensie (NKI); vroeë kommunikasie-
intervensie (VKI); kangaroo-moedersorg (KMS); ontwikkelingstoepaslike sorg; premature
neonaat; neonatale intensiewesorgeenheid (NISE); voedingsintervensie; kommunikasie-
intervensie; neonatale gehoorintervensie; neonatale gehoorsifting.

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List of abbreviations used

The following abbreviations are used in the dissertation:

ASHA	American Speech-Language-Hearing Association
AU	Audiologist
CPD	Continuous Professional Development
EBP	Evidence-Based Practice
ECI	Early Communication Intervention
EDHI	Early Detection and Hearing Intervention
HPCSA	Health Professions Council of South Africa
JCIH	Joint Committee on Infant Hearing
KMC	Kangaroo Mother Care
NCI	Neonatal Communication Intervention
NHS	Newborn Hearing Screening
NICU	Neonatal Intensive Care Unit
SASLHA	South African Speech-Language-Hearing Association
SAAA	South African Association of Audiologists
ST	Speech-language Therapist
STA	Speech-language Therapist and Audiologist
WHO	World Health Organization

Chapter 1

Introduction and orientation

CHAPTER AIM: The aim of the chapter is to orientate the reader to the practice of neonatal communication intervention (NCI) and its place in early intervention services, and to explain the importance of evidence-based practice (EBP) by audiologists and speech-language therapists, especially in the South African context. The chapter concludes with the problem statement and a research question. Key terms are clarified, and an outline of all chapters is provided.

1.1. Introduction

Since the eighties there have been groundbreaking advances in neonatal medicine, technology and public health, resulting in the survival of more infants than ever before (Rossetti, 2001; World Health Organization [WHO], 2012). The earliest intervention for this newly surviving population of preterm infants consequently shifted from ensuring survival only to providing for their developmental needs, already in the Neonatal Intensive Care Unit [NICU] (Als, 1997; Brown, 2009; Rossetti, 2001).

If an infant is born too soon, the implications extend well beyond the neonatal period and throughout the life cycle (WHO, 2012). Newborn infants who are not physically ready for the world require special care and face an increased risk of serious health problems, including intellectual impairment, cerebral palsy, chronic lung disease, visual impairment and hearing loss (Allen, 2008; WHO, 2012). These infants are also at risk for a wide range of cognitive, language, visual-perceptual, attention and learning deficits (Allen, 2008).

Developmental care (primarily provided by neonatologists and nurses) and **NCI** (provided by audiologists and speech-language therapists) are two of the available developmental strategies that currently provide for the needs of infants in the perinatal period.

Developmental care is an established evidence-based intervention strategy used in the NICU to help mediate some of the risks for preterm infants and their families (Als & Lawhon, 2004; Goldberg-Hamblin, Singer, Singer & Denney, 2007). When an

infant's cues suggest overstimulation and disorganisation, caregivers use different strategies to help the infant to self-regulate (Goldberg-Hamblin et al., 2007). Opportunities are therefore created to support the infant's development (Kenner & McGrath, 2004; Smith et al., 2011). These include:

- Creating an appropriate physical environment in the NICU for the infant and the family (Smith, Buehler, Hedlund, Kosta & Als, 2011). This involves appropriate infant positioning, regulation of all sensory stimulation, as well as barrier-free family access (Kenner & McGrath, 2004).
- Appropriate timing and organisation of medical and nursing interventions unique to the particular infant and family (Smith et al., 2011).
- Nurturing parent-infant bonding, which will improve the family's responsivity to their infant's deficient capacity to elicit care, and confidence in supporting their infant's development (Als, 1997). Appropriate attachment also contributes to a confident approach in supporting the infant's development (Tessier et al., 1998). The evidence-based technique of **Kangaroo Mother Care (KMC)** is an important developmental care strategy in this regard. KMC is an intervention that consists of three components: position with thermal care, nutrition through exclusive breastfeeding and clinical control so that complications can be recognised early and responded to in an appropriate manner (Lawn, Mwansa-Kambafwile, Horta, Barros & Cousens, 2010; Tessier et al., 1998). The mother holds the infant on her chest (skin-to-skin contact) in the kangaroo position; she then feeds the infant breast milk on demand (nutrition) (Kritzinger & Van Rooyen, 2014; Pattinson, Bergh, Malan & Prinsloo, 2006); and finally the infant is monitored on a daily basis until he/she gains at least 20 grams per day (Tessier et al., 1998). When KMC is implemented, the quality of care improves and mortality rates for low birth weight and preterm infants decrease significantly (Pattinson et al., 2006). KMC stabilises a neonate's physiological functions, behavioural functions, state of alertness regulation, and leads to better organised and cyclical sleep patterns (Kritzinger & Van Rooyen, 2014). Better sleep patterns may enhance brain organisation and neuromaturation (Kritzinger & Van Rooyen, 2014). Infants are therefore discharged earlier than in hospitals where KMC has not been implemented (Pattinson et al., 2006; Rodgers, 2013).

- Appropriate coordination within the developmental framework of the care delivered by all professional members of the transdisciplinary team in the NICU (Smith et al., 2011).

In contrast with developmental care, NCI is an emerging intervention strategy which can be defined as services provided by audiologists and speech-language therapists, that are designed to improve communication, support oral feeding and treat feeding difficulties of an infant in the perinatal period (South African Speech-Language-Hearing Association [SASLHA], 2011b). In addition, noise levels in the NICU are reduced (SASLHA, 2011c), early detection of hearing loss is ensured in the form of targeted newborn screening programmes (Joint Committee on Infant Hearing [JCIH], 2007; Swanepoel, Delpont & Swart, 2004), and parents are trained to create an appropriate auditory environment that encourages listening and language development. Furthermore, attachment between mother and infant and appropriate communication interaction are encouraged (SASLHA, 2011b).

NCI is receiving increased attention in academic and clinical settings in South Africa (Kritzinger & Van Rooyen, 2014; McInroy & Kritzinger, 2005; Strasheim, 2009). Although undergraduate modules in Early Communication Intervention (ECI) are presented at tertiary academic institutions across South Africa during the training of audiologists and speech-language therapists, the current level of training in NCI is unknown.

1.2. Problem statement and rationale

During clinical practice, the researcher became aware of a generally low awareness amongst allied health professionals regarding communication intervention in neonatal settings (including the NICU, high care special units and KMC wards). Audiologists and speech-language therapists appear to be better informed regarding the audiologist's role than regarding the speech-language therapist's role in neonatal settings. Increased knowledge about the audiologist's role in neonatal settings may be understandable. Significant and rapid progress has been made in the development of Early Hearing Detection and Intervention (EHDI) services, especially in the United States of America (USA) and other developed countries (JCIH, 2007). EHDI services typically start in the neonatal period.

In South Africa, the Professional Board for Speech, Language and Hearing Professions of the Health Professions Council of South Africa (HPCSA) has for some time been promoting early detection of and intervention for infants with hearing impairment (HPCSA, 2002, 2007). However, in a 2012 South African study, it was found that only 7.5% of hospitals provide some form of Newborn Hearing Screening (NHS), and virtually no (less than 1%) universal screening was in place (Meyer, Swanepoel, Le Roux & Van der Linde, 2012).

There has also been a dearth of reports from sub-Saharan African countries, which may reflect a total lack of EHDI services (Swanepoel, Störbeck & Friedland, 2009). This can be due to many different factors, such as a high burden of infectious diseases diverting the attention away from a less threatening condition such as hearing loss, as well as restricted resources and the lack of tertiary education for audiologists and other hearing specialists (Swanepoel et al., 2009). Currently South Africa is the only country in sub-Saharan Africa that offers a professional tertiary qualification in audiology. South Africa is the strongest economic power in this region, and therefore has the responsibility to lead advocacy and development of EHDI services throughout the region (Swanepoel et al., 2009).

Screening and assessment for hearing loss form an integral part of NCI (JCIH, 2007), but is currently not being implemented optimally (Theunissen & Swanepoel, 2008), especially in the public sector. Often there is a lack of funding, as the main priority in neonatal settings remains infant mortality (Pattinson et al., 2006). The implementation of NCI is therefore a complex activity with many factors contributing to its success or failure.

Effective communication and adequate nutrition are fundamental to human functioning (ASHA, 2004c). As NCI specifically focuses on mother-infant interaction, which is critically important for the development of communication skills in infants, professionals working in neonatal care need a high level of expertise to provide these services (ASHA, 2004b). Apart from limited neonatal hearing screening services, there is also limited NCI service provision in NICUs in South Africa. Contributing factors include difficult working conditions, an under-appreciation of the potential of the services, lack of training and proper equipment, as well as cultural

and linguistic constraints (Strasheim, Kritzinger & Louw, 2011). It is, however, important that NCI should receive the same level of effort as EHDI programmes during promotional and training endeavours.

In the USA, guidelines have been published relating to the roles and responsibilities of speech-language therapists in the NICU (ASHA, 2004a, b, c; 2005), as they have already been working in neonatal settings for a number of years (ASHA, 2004a). These documents are easily accessible globally, and were prepared in response to the following:

- Practical questions from ASHA members regarding the roles of speech-language therapists in the NICU.
- A need for resources for speech-language therapists regarding the required knowledge and skills to provide appropriate intervention in the NICU.
- A need for information on how to form effective collaborative partnerships among speech-language therapists and the rest of the transdisciplinary team (including the involved families).
- A need for information on how to promote the essential role of speech-language therapists in the NICU.

Although the preceding reasons for information and training were identified in the USA, the same information needs may apply to South African audiologists and speech-language therapists working in neonatal settings. The ASHA guidelines (2004a, b, c; 2005) also focus predominantly on feeding, and not as much on the promotion of communication development as in South Africa.

In South Africa – and especially in state hospitals – audiologists and speech-language therapists have the unique opportunity to provide extensive information and training to parents regarding appropriate infant stimulation in the neonatal period (Kritzinger & Louw, 2003). Mothers do not always return to follow-up clinics at the hospital where they gave birth, and they may live in areas where no ECI services are available or accessible (Kritzinger & Van Rooyen, 2014; SASLHA, 2011b). Consequently, neonates who are at risk for health problems and developmental delay may not receive intervention timeously or be treated as effectively as is necessary to minimise delays.

While the mothers are still available, the speech-language therapist needs to assist with feeding difficulties, mother-infant attachment and reciprocal communication interaction (SASLHA, 2011b). The paediatric audiologist needs to reduce noise levels in the NICU to protect neonatal hearing (SASLHA, 2011c), conduct a hearing screening test within the first month of life (JCIH, 2007; SASLHA, 2011c) and train parents to create the appropriate auditory environment that will facilitate listening and language development (Vouloumanos & Werker, 2007). These activities will only be completed successfully if audiologists and speech-language therapists are fully competent and well-trained in providing NCI, so that services in the unique multicultural and multilingual South African context can become increasingly effective.

1.3. Research question

Based on the preceding discussion, the following research question is posed: *What are the self-perceived skills and needs of South African audiologists and speech-language therapists regarding NCI?*

In order to provide evidence-based NCI services, audiologists and speech-language therapists need specialised knowledge and skills. If training needs in NCI can be identified, future strategies can be recommended. These professionals need to be able to engage in evidence-based clinical decision-making, integrating the best research evidence with clinical expertise and patient values (Johnson, 2006). Since training in NCI is not yet standardised at undergraduate level, such training would most probably be included in Continuing Professional Development (CPD) courses.

The aim of this study is to describe the perceived skills and training needs of participating South African audiologists and speech-language therapists in the practice of NCI. The study will furthermore endeavour to determine whether there are significant associations between certain participant characteristics and their perceived skills.

It is believed that the information obtained from this study can be used to find ways to expand the field of NCI in South Africa. There is a need to build a sustainable and evidence-based neonatal intervention approach, which is also multidisciplinary, in South Africa. The practice of NCI should be further established and expanded in

different settings, and the different functions that form a part of this intervention strategy need to be described. Professional training and services should be applicable to the unique challenges and opportunities in South African hospitals. The results of this study may therefore ultimately contribute to strategies to increase the efficacy of this intervention approach provided by South Africa's professionals.

1.4. Explanation of terminology as used in this dissertation

1.4.1. Neonate

A neonate is an infant who is less than 28 days old (Papalia, Olds & Feldman, 2002). For the purpose of this study, a neonate is defined as any infant who is receiving neonatal care.

1.4.2. Perinatal period

The perinatal period is the period surrounding the time of birth, during which the neonate makes the important transition from depending on maternal and placental support to establishing independent life (Gleason & Juul, 2012). Traditionally this period was described as from 28 weeks' gestation to one week of life, but the World Health Organization changed this description in 2004 to include 22 weeks' gestation (Gleason & Juul, 2012).

1.4.3. Neonatal Intensive Care Unit (NICU)

The NICU is a highly sophisticated nursery where infants who need specialised medical and surgical interventions are treated (Billeaud, 2003; Rennie & Kendall, 2013). State of the art monitoring equipment is available to ensure that infants receive adequate oxygen and nutrition, maintain appropriate body temperature, and are treated promptly for any problems (Billeaud, 2003). The NICU provides the whole range of medical and surgical neonatal care, including monitoring, treatment, medications and surgical interventions (Rennie & Kendall, 2013).

1.4.4. Neonatal settings

For the purpose of this study, the term "neonatal settings" will be used collectively to refer to the neonatal intensive care unit (NICU), high care special units and kangaroo mother care (KMC) wards.

1.4.5. Kangaroo Mother Care (KMC)

KMC is an intervention in which the mother holds the infant on her chest (skin-to-skin contact) in the kangaroo position and then feeds the infant breast milk on demand, followed by early discharge from the hospital (Kritzinger & Van Rooyen, 2014; Pattinson et al., 2006; Rodgers, 2013).

1.4.6. Early communication intervention (ECI)

ECI is a transdisciplinary field in which audiologists and speech-language therapists share roles while also contributing unique services directed at families with infants and preschool children with feeding difficulties, hearing loss and disorders, established and emerging communication disorders, or those who are at risk for developing difficulties in these areas (SASLHA, 2011b). These services are specifically directed at children from 0 – 3 years.

Rossetti (1996) introduced this term with the title of his book, *Communication intervention. Birth to three*. Following his visits to South Africa in 1996 and 1998, the Department of Speech-Language Pathology and Audiology at the University of Pretoria started using the term **early communication intervention**. This term has also been included in the 1997 and 2011b SASLHA guidelines for early intervention.

1.4.7. Neonatal communication intervention (NCI)

NCI can be defined as transdisciplinary services provided by audiologists and speech-language therapists, that are designed to improve hearing and communication development, support oral feeding and treat feeding difficulties of an infant in the perinatal period, improve mother-infant attachment and interaction, and ultimately train parents to ensure the optimal development of their preterm infants (SASLHA, 2011b). NCI furthermore expands on the benefits of KMC, but extends these benefits to hearing protection, graded sensory stimulation and a focus on communication interaction between mother and infant.

1.4.8. Early Hearing Detection and Intervention (EHDI)

EHDI programmes incorporate early screening, diagnosis and intervention for hearing loss (HPCSA, 2007; SASLHA, 2011c). This screening should be conducted by the age of one month. The infants who fail the screening should be followed up diagnostically by the age of three months, and should be enrolled in an appropriate intervention programme by the age of six months. The ideal form of EHDI is

Universal Newborn Hearing Screening (UNHS), which aims for a coverage of 100% newborns (JCIH, 2007). Since UNHS programmes are not currently a reality in South Africa, targeted screening of high-risk infants is necessary (Swanepoel et al., 2004).

1.4.9. Evidence-based practice (EBP)

EBP entails a critical mindset and thorough methods that foster the judicious integration of scientific evidence into clinical decision-making (Johnson, 2006).

1.5. Outline of chapters

The dissertation consists of five chapters and a description of each chapter is provided below.

1.5.1. Chapter 1: Introduction and orientation

The practice of NCI is introduced and its place in early intervention services is explained. The importance of evidence-based intervention regarding neonates and their families by audiologists and speech-language therapists, especially in the South African context, is discussed, to arrive at the problem statement, rationale and research question. Key terms are also clarified.

1.5.2. Chapter 2: New developments in the field of NCI

The chapter provides a discussion of the latest research in NCI, indicating the dynamic development of the field and the need to continuously translate empirical evidence into neonatal practice. The chapter serves as justification of a survey to gauge the self-perceived skills and training needs of South African audiologists and speech-language therapists in NCI.

1.5.3. Chapter 3: Methodology

This chapter describes and specifies the planning and implementation of the study to determine the participants' self-perceived skills, as well as their self-perceived needs regarding NCI. The procedures used to arrive at the results of the study are described in detail to facilitate duplication of the study by other researchers.

1.5.4. Chapter 4: Results and discussion

Chapter 4 presents the results of the study according to the objectives that were formulated to fulfil the main aim of the study. The results are discussed and interpreted against the background of related and current research in NCI.

1.5.5. Chapter 5: Conclusion and recommendations

This chapter provides the final conclusions of the entire study. It clarifies the clinical and research implications of the results, outlines future strategies, presents the limitations of the current study and indicates the recommendations for future research.

1.6. Conclusion

NCI is a relatively new field of practice in early intervention, but it is expanding. An understanding of South African audiologists' and speech-language therapists' self-perceived knowledge and skills is needed for the future development of NCI services. A survey was therefore chosen to help elucidate the participating professionals' experiences of their NCI work.

1.7. Summary

Chapter 1 describes the two available developmental strategies that are used to improve a preterm infant's intervention outcomes, including Developmental Care and NCI. A definition of NCI was formulated to encompass intervention services provided by audiologists and speech-language therapists in the NICU. These services include, but are not limited to, early detection of hearing loss, noise reduction, promotion of effective communication skills, oral feeding support and parent training. The problem statement, rationale and research question were described and motivated. A description of the terminology used in the dissertation is provided as well as an outline of the chapters. In the next chapter, new developments in the field of NCI will be reviewed.

Chapter 2

New developments in the field of NCI

CHAPTER AIM: This chapter provides a critical discussion of the latest research in NCI, indicating the dynamic development of the field and the need to continuously translate empirical evidence into neonatal practice. The chapter serves as justification of a survey to gauge the self-perceived skills and training needs of South African audiologists and speech-language therapists in NCI.

2.1. Introduction

A wide array of professionals have become acutely aware of the importance of promoting communication skills as a crucial part of comprehensive services provided to children under the age of three (Rossetti, 2001). Rossetti (2001) furthermore reiterated that literature at that stage continued to support the premise that communication skills remain the single best predictor of future school success. The ASHA guidelines for services in the NICU (2004a, b, c), however, still mostly focus on feeding intervention, rather than communication intervention.

Rossetti's book about ECI, which was first published in 1996, with the second edition in 2001, fuelled the interest of the South African audiologists and speech-language therapists in the Department of Speech-Language Pathology and Audiology at the University of Pretoria. With increased undergraduate and postgraduate research in the field of ECI conducted at the Department and Rossetti's visits to South Africa in 1996 and 1998, the foundations for NCI were laid.

The field of NCI gradually developed at the University of Pretoria with a number of research studies, including Kritzinger, Louw and Hugo (1995), McInroy and Kritzinger (2005), McInroy (2007), and Strasheim et al. (2011). Guidelines for student training in NCI were also published in 2003 (Kritzinger & Louw, 2003). This development finally culminated in the publishing of the 2011 SASLHA revised guidelines for ECI, which included specific information on NCI services (SASLHA, 2011b), as well as an intervention study conducted by Kritzinger and Van Rooyen (2014).

It appears that the Department of Speech-Language Pathology and Audiology at the University of Pretoria in South Africa is making a valuable contribution to a wide array of services to neonates and their families in neonatal settings. Further research is now needed, as professionals working in neonatal settings should be knowledgeable about new developments in the field, and be able to implement EBP. These steps as well as the development of appropriate policy guidelines in future may contribute to the increased implementation of NCI.

Knowledge about foetal sensory development and the earliest stages of postnatal life has increased greatly in recent years.

2.2. Early auditory exposure

It is a known fact that the foetus perceives sounds and reacts to it with body movement from the 26th to 28th week of gestational age (Picciolini et al., 2014). All major structures of the ear, including the cochlea, are fully formed between 23 and 25 weeks gestational age (Knutson, 2013; McMahon, Wintermark & Lahav, 2012).

During pregnancy the foetus is exposed to the maternal voice in a different manner than to any other sound. The sound of the maternal voice penetrates the tissues and fluids around the foetal head, which then stimulates the inner ear through a bone conduction route (Picciolini et al., 2014). Following this route, the sound pressure that moves to the amniotic fluid leads to skull vibrations which are directly transmitted to the contents of the cranial cavity, and then into the cochlear fluids (Picciolini et al., 2014). The foetus appears to receive an ideal signal-to-noise ratio of auditory input in the womb (Kritzinger & Van Rooyen, 2014) which allows hearing the mother's voice against the background of internal and external sound.

The auditory and sensory environment of preterm infants after birth is, however, vastly different from that of full-term infants. Preterm infants are exposed to continuous adverse environmental stimuli such as lights, noise, electromagnetic fields, drugs, inadequate manipulations and inappropriate temperature while in the NICU (Picciolini et al., 2014).

When singling out auditory exposure, NICUs are often characterised by loud unpredictable noise from external sources such as alarms, ventilators, telephones and staff conversations (Knutson, 2013). These fragile infants can close their eyes in

response to bright lights, but they cannot close their ears (McMahon et al., 2012). These high sound levels are a major source of environmental stress for preterm infants (Knutson, 2013).

In addition to adverse incoming stimulation, and while no longer protected by maternal tissue, preterm infants are at a critical time for neurodevelopment of their auditory systems (Brown, 2009; McMahon et al., 2012). They are therefore more sensitive and vulnerable to environmental stimuli than full-term infants. Exposure to NICU stimuli has been reported to lead to an advanced progression of the infant's sensory systems maturation, which deeply affects the cortical functional organisation (Picciolini et al., 2014). Noise and light stimulation in the NICU environment could furthermore lead to persistent developmental difficulties at school age, as the stimulation levels exceed the capacity of the preterm infant's central nervous system (Brown, 2009).

In addition to the variety of noises that they are exposed to, preterm infants in the NICU also experience prolonged periods of silence with little language input (Caskey, Stephens, Tucker & Vohr, 2014). Preterm infants are at known risk for language delay (Allen, 2008). The combination of a language-poor environment (Caskey et al., 2014) with excessive noise at times may disrupt their growth and development in ways not yet well understood. Inappropriate auditory stimulation may increase the risk of hearing, language and cognitive disabilities (Brown, 2009; McMahon et al., 2012).

A number of studies describe the adverse physiological changes in preterm infants associated with high noise levels in the NICU and concerns for overstimulation (McMahon et al., 2012; Milgrom et al., 2013). The American Academy of Pediatrics determined that noise above 45 dB may result in cochlear damage or may disrupt the normal development of the auditory systems of preterm infants (Knutson, 2013). However, reports indicate that the ambient sound levels in the NICU may range from 50 to 90 dB, which is far above the current recommended standards (Goldberg-Hamblin et al., 2007; Knutson, 2013).

Caregivers should therefore learn to recognise the readiness and stress cues of the preterm infant so that their interactions can be specifically tailored to the infant's individual tolerance for stimulation (Caskey et al., 2014). Developmental care

strategies and NCI strategies can help to identify the ideal sensory environment for preterm infants in the NICU in order to maximise their developmental outcomes (Caskey et al., 2014). By using autonomic, motor and behavioural cues to understand the infant's capabilities and needs, ways of supporting the infant and increasing his or her abilities to self-regulate and stabilise can be devised (Goldberg-Hamblin et al., 2007).

Based on recent research it appears that there are certain interventions which may have a positive effect and may counterbalance the effects of noise in the NICU environment. In a longitudinal study conducted by Caskey et al. in 2014, the authors found that infants who were exposed to high volumes of adult speech (measured by word counts) in the NICU would have high cognitive, language, receptive and expressive communication scores at 7 and 18 months' corrected age. The findings suggested a positive association between adult talk to preterm infants and subsequent cognitive and language development, clearly highlighting the benefits of neonatal intervention.

Lee and White-Traut (2014) conducted a study to investigate the physiological responses of preterm infants to male and female voices. These authors concluded that human vocal stimulation can be safely presented to preterm infants in the NICU, provided that infants with low postnatal age and low Apgar scores are carefully considered. These two factors should be evaluated to determine whether the infant is medically stable for stimulation to be beneficial rather than detrimental. The researchers furthermore suggested that the immature auditory systems of preterm infants have a relatively high sensitivity to low pitched voices, such as a male or the father's voice (Lee & White-Traut, 2014). The unique role of fathers and the mother's lowered voice pitch therefore become important to provide appropriate auditory stimulation.

In a study conducted by Picciolini et al. (2014) the effect on preterm infants' development of early exposure to the maternal voice was investigated. During this study exposure to the maternal voice was given through bone conduction to mimic the prevalent method of operation of the foetal auditory system (Picciolini et al., 2014). The findings also confirm the benefits of early exposure to the human voice

on preterm infant auditory development. Both these studies (i.e. Lee & White-Traut [2014] and Picciolini et al. [2014]) reported a decrease in heart rate, and thus decreased stress, in preterm infants who were exposed to the maternal voice. An infant's early attentive behaviour to the maternal voice, such as quiet-alert and self-organised behaviour, furthermore enhances early communication interaction between the mother and her infant (Lee & White-Traut, 2014). By observing these communication behaviours of preterm infants, maternal responses can be adapted to provide developmentally appropriate stimulation that further enhances early communication interaction.

2.3. Preterm infant communication behaviours and maternal responses

Infant communication behaviours are observable actions that infants exhibit during interactions with their mothers or caregivers (Ota et al., 2006). Such behaviours include eye-gaze, reaching, manipulation, smiling and vocalisations. Maternal responsiveness can be seen as the mother's prompt and appropriate response to an infant (Leigh, Nievar & Nathans, 2011).

Parents are in the position to promote their child's development from the very start of life, especially regarding language development (Leigh et al., 2011). According to Owens (2001) a newborn's hearing is within the frequency range of the human voice, the newborn has visual preference for the human face, and vision attains the best focus at approximately 19 centimeters. This is also the distance at which most infant-mother interactions occur. Since the mother's eyes are at approximately seven and a half inches from the newborn, feeding time can be used as an opportunity to stimulate interactive communication patterns (Owens, 2001).

Research has shown that parents usually modify their interactional patterns when speaking to their infant as opposed to talking to other adults (Leigh et al., 2011). The parental language level therefore moves closer to their child's current language level. As an infant's communication develops, the mother unconsciously adapts her own behaviour so that she requires more participation from her infant (Owens, 2001). The natural modification of the mother's speech and communication patterns is known as motherese (Owens, 2001). The modifications may then lead to short-term gains in language and communication competence, and long-term cognitive and academic success (Leigh et al., 2011).

The mother-infant relationship is formed by the degree of coordination or synchrony between infant and maternal communication signals (DiCarlo, Onwujuba & Baumgartner, 2014). Parents of preterm infants, however, must adjust to the unexpected complications of their infant's birth, and must also adjust to the highly technical environment of the NICU (Hutchinson, Spillett & Cronin, 2012). In a study conducted by Browne and Talmi (2005) the effect of educational interventions on maternal knowledge, behaviours and stress was investigated. The results showed that educational intervention of the mother before the infant's discharge increased maternal knowledge, changed maternal behaviours positively and decreased maternal stress (Browne & Talmi, 2005). Interventions that are aimed at increasing the mother's accurate interpretation and appropriate response to infant communication cues were likely to increase positive parenting skills, self-esteem and parenting efficacy (Paris, Bolton & Spielman, 2011).

Preterm infants have been described as passive, compliant and agitated during interactions with their mothers (Agostini, Neri, Dellabartola, Biasini, & Monti, 2014; McInroy & Kritzinger, 2005). Due to physiological immaturity, preterm infants are initially in the in-turned developmental state, evidenced by showing reduced attentive and alert responses (McInroy, 2007). Preterm infants may therefore not be able to provide clear cues to their caregiver (Agostini et al., 2014). Maternal interactive behaviours with preterm infants have also been described. Studies describe behaviours ranging from less maternal sensitivity, more intrusive and controlling behaviours, fewer smiles and lower attention to preterm infants' cues than they may have shown naturally if their infant was full-term (Agostini et al., 2014). As preterm infants develop and move towards the coming-out developmental state, they create increased opportunities for their mothers to respond to them and initiate communication stimulation (McInroy, 2007).

The risk of providing excessive sensory stimulation may extend the duration of the infant's time in the in-turned state (Rossetti, 2001). In a single case study conducted by McInroy and Kritzinger (2005) the communication development of a high-risk neonate, from birth to discharge from the NICU, was investigated. By observing the infant's successive development of communication skills, McInroy and Kritzinger (2005) concluded that sensory experiences should be introduced gradually. Noise

exposure should be avoided and replaced with gradual exposure to human voices, preferably the voices of the infant's primary caregivers (McInroy & Kritzinger, 2005). The interactive component of language development should, however, only be introduced when the preterm infant displays readiness for reciprocity, as evidenced by self-quieting behaviours and an ability to respond to caregivers.

The research findings highlight the need for increased evidence-based NCI interventions that may influence parental responsiveness positively and train the parents to identify their preterm infant's cues and communication behaviours. Parents may then be able to stimulate their infant's development in the most developmentally appropriate manner possible.

McInroy (2007) found that when preterm infants and their mothers were enrolled in a KMC programme, the infants demonstrated little to no crying. It is well-known that KMC fosters neurobehavioural development (Feldman, 2004). McInroy (2007) concluded that the practice of KMC calms the infant, and consequently primes the infant for interaction with its environment. KMC therefore appears to be the ideal entry point for NCI services.

2.4. KMC as the starting point of NCI services

There is a high prevalence of infants with low birth weight and preterm birth. Approximately 15 million infants are born prematurely every year, with statistics rising (WHO, 2012). Audiologists and speech-language therapists are offered a unique opportunity to have close contact with parents while the preterm infant is in a neonatal setting, especially when the evidence-based nursing science intervention of KMC is practised (SASLHA, 2011b). During this early period of life it is crucial that parents receive information about typical hearing and communication development, and especially the mothers' role in early communication development (SASLHA, 2011b).

KMC is now extensively practised in state hospitals in South Africa, as it has been proven to be an effective care technique for low birth weight and preterm neonates (Cooper, Morrill, Russell, Gooding, Miller, & Berns, 2014). Since mothers are primed by KMC to be sensitive to their infants, they may show an increased interest in their infants (SASLHA, 2011b). KMC is a family-centred approach within a natural

environment of care and prolonged breastfeeding (Kritzinger & Van Rooyen, 2014). The care pattern is culturally responsive, developmentally supportive, team-based, and should start as early as possible in a child's life (Kritzinger & Van Rooyen, 2014). These principles are similar to those of early communication intervention as formulated by ASHA (2008) and endorsed by SASLHA (2011b). The period of optimal care during KMC is therefore the ideal time to introduce communication intervention programmes.

According to SASLHA's 2011 guidelines for ECI, an NCI programme should ideally expand upon the benefits of an existing KMC programme. NCI programmes then add unique components such as hearing protection, carefully graded sensory stimulation of the infant and a focus on communication interaction between mother and infant (SASLHA, 2011b).

While nurses and doctors train mothers to practise KMC, speech-language therapists train them to appropriately facilitate their infants' communication development. Continuous KMC practice over time helps develop strong bonds between mother and preterm infant (Kritzinger & Van Rooyen, 2014). Strong attachment in turn forms the basis of mother-infant communication interaction (Billeaud, 2003). Through the provision of information and training by speech-language therapists, mothers can learn to identify their infants' stress signs, readiness for stimulation, and subtle cues to communicate (Kritzinger & Van Rooyen, 2014).

The provision of information to parents and parent training by both audiologists and speech-language therapists form part of NCI strategies.

2.5. NCI strategies

A Brazilian study by Monti, Botega, Lima and Kubota (2013) states that speech and hearing therapy in the neonatal period is focused on aspects of feeding, the development of hearing and language, and mother-infant interactions. This description of "speech therapy intervention" in neonatal care settings is similar to that which is referred to as NCI in South Africa, but locally there appears to be a greater focus on the unique roles of the audiologist and the speech-language therapist respectively.

SASLHA (2011b) recommends that both audiologists and speech-language therapists should be involved in screening preterm infants for hearing loss, risk conditions for communication disorders, the identification of feeding difficulties and dysphagia, and educating and supporting parents. NCI is therefore an intervention strategy fulfilled by two closely related professions. The areas of intervention may determine which profession is involved.

Table 1 provides an outline of the components that form part of NCI. These components were selected based on research studies focusing on NCI, such as Strasheim (2009) and Strasheim et al. (2011), as well as guidelines provided by ASHA (2004c). Feeding intervention and communication intervention are conducted by the speech-language therapist, whereas the role of neonatal hearing intervention is mainly fulfilled by the audiologist. The general tasks form part of both professional roles.

The promotion of KMC is listed as part of feeding intervention in Table 1, although it also forms part of communication intervention (as was described in 2.4.). KMC is an all-encompassing technique of NCI – it improves infant feeding development, enhances mother-infant attachment due to the close proximity between mother and infant, and provides the mother with an intimate opportunity for language and listening development (Kritzinger & Van Rooyen, 2014).

Table 1 is followed by a discussion on each of the listed components of NCI.

Table 1: NCI components

Feeding intervention	Assessment of feeding (including sucking and swallowing)
	Performing modified barium swallow studies for the assessment of swallowing disorders
	Direct treatment of neonate (e.g. oral-facial stimulation to promote non-nutritive sucking)
	Parent training for feeding difficulties
	Deciding when infant can progress from tube feeding to breast/bottle feeding
	Providing guidance on breast milk or formula options
	Providing feeding intervention for neonates with cranio-facial anomalies such as cleft lip and palate
	Promoting continuous or intermittent KMC
Communication intervention	Assessment of infant communication functioning
	Assessment of mother-infant attachment
	Facilitating mother-infant communication interaction
	Parent training for the prevention of communication delay
Neonatal hearing intervention	Conducting hearing screening
	Providing feedback on hearing testing results
	Convincing parents that hearing screening is important
General tasks	Gaining access to work in neonatal care settings
	Informative counselling to parents when a child has an established condition which will impact on hearing, feeding and communication development
	Implementing a developmentally appropriate care programme (including carefully graded sensory stimulation)
	Establishing a noise reduction programme in the unit
	Collaborating with other professionals to obtain and share information
	Participating in ward rounds with other professionals
	Becoming part of the neonatal care team
	Providing input to the discharge plan for the family
	Advocacy for the importance of audiologist and speech-language therapist roles
	Providing in-service training and guidance of staff/team members
	Informing parents, family members and caregivers of the infant's risk for future developmental difficulties
	Providing emotional support to families when they are concerned about their infant's condition
Making culturally-appropriate adaptations to the intervention plan	

2.5.1. Feeding intervention

According to Arvedson and Brodsky (2002) breathing and feeding are the most basic physiological functions that define the beginning of life for newborn infants outside of the mother's womb. Oral feeding in preterm infants is often characterised by immature sucking and/or uncoordinated suck, swallow and breathing sequencing (Arvedson, Clark, Lazarus, Schooling & Frymark, 2010). These difficulties may lead to delay in successful breast and bottle feeding, poor weight gain and dehydration during the early postnatal period (Arvedson et al., 2010). The estimated prevalence of feeding disorders ranges from 25% to 45% in typically developing children and from 33% to 80% in children with developmental delays (Arvedson et al., 2010). A reported 40% of preterm infants present with feeding difficulties (ASHA, 2004c), thereby indicating the great need for feeding intervention.

Feeding intervention is the oldest form of intervention provided by speech-language therapists in the NICU. Even though the focus in the NICU has shifted from pure survival to the developmental outcomes of survivors due to technological advances in neonatal medicine, attention will never be directed away from issues related to improved survival (Rossetti, 2001). The aim of feeding intervention is to promote healthy, efficient feeding, adequate nutrition, weight gain, mother-infant bonding and minimising the risk of aspiration and stress (Monti et al., 2013). Successful feeding in the preterm infant is crucial as it forms the foundation for appropriate general development, communication skills, psychosocial welfare and weight gain (McInroy, 2007). Developmental care and KMC should therefore be implemented first to promote readiness for oral feeding, followed by direct feeding intervention (Arvedson & Brodsky, 2002).

Direct feeding intervention of the neonate may include the promotion of non-nutritive sucking at first, followed by oral-facial stimulation (Arvedson & Brodsky, 2002). These interventions are described as follows by Garber (2013):

- ***Non-nutritive sucking***

Non-nutritive sucking is elicited by the placement of a caregiver's gloved finger or a pacifier in the infant's mouth. It is done to elicit at least some degree of sucking effort with minimal fluid besides oral secretions to control.

- **Oral-facial stimulation**

This type of treatment includes peri-oral and intra-oral sensory input. Peri-oral stimulation consists of pressure input alone or in combination with slow, firm stroking of cheeks and lips, before intra-oral input. Intra-oral stimulation usually includes pressure with or without slow movement along the upper gum, centre of the tongue and/or palate in different combinations and sequences. These two types of stimulation are provided for different periods of time within the neonate's level of tolerance.

The ability to feed depends on a coordinated sucking, swallowing and breathing pattern (Pinelli & Symington, 2011). During week 26 to 28 gestation, **non-nutritive sucking** appears. If an infant is born at this stage, non-nutritive sucking should be encouraged to maintain the natural need and ability to suck (Uys, 2000). The non-nutritive sucking pattern is the precursor to nutritive sucking (Arvedson & Brodsky, 2002).

Pinelli and Symington (2011) conducted a systematic review of 21 studies regarding the benefits of promoting non-nutritive sucking in preterm infants. The aim was to determine whether non-nutritive sucking in preterm infants influenced weight gain, energy intake, heart rate, oxygen saturation, length of hospital stay, intestinal transit time, age at full oral feeds or any other clinically relevant outcomes. The results of the review indicated a significant advantage of non-nutritive sucking on length of hospital stay only (in days), but no benefits with respect to the other major clinical variables (Pinelli & Symington, 2011). Non-nutritive sucking intervention is therefore beneficial to a limited extent only, thereby reminding speech-language therapists to be cautious of the benefits and limitations of different techniques. In this way evidence-based feeding intervention can be individualised to meet each unique preterm infant's developmental outcomes as well as the mother's needs.

Research investigating the effectiveness of **oral-facial stimulation**, however, indicated mixed results, ranging from an increase in breast milk volume at oral feedings and improvement of oral reflexes, to no significant changes in breast milk volume, sucking pressure or rate of sucking (Arvedson et al., 2010). Garber (2013) reported increased nipple feeding intake, increased rate of weight gain, early

discharge from the hospital, and early nipple feeding competence. However, Garber (2013) concedes that these positive findings may also be due to maturation, and not necessarily due to additional oral stimulation.

Given the risk of overstimulation of a vulnerable preterm infant, speech-language therapists need to ensure that oral stimulation interventions are appropriate for the particular infant, and that the infant is developmentally ready for such stimulation. The decision to use oral stimulation intervention should therefore be based on a comprehensive feeding assessment. Oral stimulation may lead to a sudden increase in saliva which may overwhelm the preterm infant and increase stress and risk of aspiration on oral secretions (Greene, Walshe & O'Donnell, 2012).

Feeding intervention as part of NCI should therefore include assessment of feeding skills, direct intervention of the neonate and parent training to manage feeding difficulties. The mother remains the most important team member, with the speech-language therapist taking part in team decisions regarding the most appropriate feeding method, and deciding between breast milk and formula. KMC should always be promoted when feeding difficulties are present, as KMC is known to enhance breastfeeding. As discussed earlier, KMC also enhances mother-infant communication patterns.

2.5.2. Communication intervention

According to Rossetti (2001) communication skills offer the highest predictive correlation with later intelligence attainment and school performance. Rossetti (2001: 2) furthermore depicts risks of communication delay as follows: "Anything that interferes with a child's ability to interact with the environment in a normal manner is a potential cause of, or contributing factor to, the presence of developmental and, more specifically, communication delay".

Research has shown that the communication behaviour of preterm infants differ from that of full-term infants as they are passive but also agitated during interactions with their mothers (Agostini et al., 2014). Foster-Cohen, Edgin, Champion and Woodward (2007) examined the effects of very preterm birth on children's early language development. Long-term language skills of infants born before 33 weeks gestational age and/or with a birth weight below 1 500 grams were compared to that of children

born full-term. The results suggest that children who were born very preterm were at an increased risk of experiencing early delays in language development. The risk increased with lower gestational age, and the associations remained even after a wide range of other child and family factors that are known to contribute to early language development were controlled (Foster-Cohen et al., 2007).

Delayed language development is one of the most enduring and pervasive effects of preterm birth (Cusson, 2003). Many believe that preterm infants will “catch up” by the age of two years, and although mental and physical development improves gradually as the preterm infant’s brain develops and he/she recovers from injury, language delay may persist into the later childhood years (Allen, 2008; Cusson, 2003).

The role of the speech-language therapist in communication development is therefore crucial in the lives of preterm infants, in the NICU but also beyond. Maternal responsiveness has been proven to affect developmental outcomes, especially language development (DiCarlo et al., 2014). Communication intervention should therefore include the following (ASHA, 2004b; SASLHA, 2011b):

- Assessment and promotion of mother-infant attachment.
- Assessment and development of the infant’s current communication functioning, including communicative behaviours such as eye gaze, reaching, manipulation, smiling and vocalisations (DiCarlo et al., 2014).
- Promotion of a quiet environment ideal for listening skill development.
- Promotion of maternal responsiveness to infant communication behaviours and signs of stress.
- Parent training for the prevention of communication delay.

Examples of existing parent training programmes include the NCI tool developed by Strasheim (2009) for group training, as well as the individual formal, neonatal communication intervention training provided for mothers in the KMC unit at Kalafong hospital (Kritzinger & Van Rooyen, 2014). The latter currently shows short-term improvement in mothers’ interaction with their infants.

2.5.3. Neonatal hearing intervention

It is estimated that every year more than 800 000 infants globally are born with or acquire permanent bilateral hearing loss (above 40 dBHL) within the first few weeks of life (Meyer et al., 2012). According to recent South African reports some progress has been made to initiate pilot EHDI programmes, but no mandated systematic hearing screening programmes are available (Meyer et al., 2012).

It is important that infants with hearing loss be detected early enough for optimal intervention outcomes. Effective early identification can only be conducted through widespread newborn and infant hearing screening programmes which use objective screening tests such as otoacoustic emissions and auditory brainstem responses (Meyer et al., 2012).

However, preterm infants represent a high risk population for hearing loss associated with a family history of permanent childhood hearing impairment, craniofacial abnormalities, a syndrome associated with hearing impairment, an in utero infection due to herpes virus, cytomegalovirus, toxoplasmosis, rubella or syphilis, and infants who had been admitted to an NICU for more than 48 hours (Swanepoel et al., 2004). These risks have been expanded with new independent neonatal risk factors such as need for ventilation, use of oxygen supplementation, respiratory failure, low Apgar scores, use of ototoxic drugs, treatment for hypotension and noise (Martines, Martines, Mucia, Sciacca & Salvago, 2013). High-risk infants should therefore be screened by means of targeted hearing screening.

Audiologists providing NCI services need to convince new parents that hearing screening is important, since other key health professionals such as family physicians and paediatricians may discourage parents from prioritising hearing screening follow-up (Meyer et al., 2012). Appropriate hearing screening should be conducted within the first month of life by using the recommended objective tests and providing feedback on hearing testing results (JCIH, 2007). Infants who do not pass screening should undergo a comprehensive audiological evaluation at no later than three months of age, and if hearing loss is confirmed, appropriate intervention should be implemented at no later than six months of age (JCIH, 2007).

2.5.4. General tasks in neonatal settings

In addition to the audiologist's role in neonatal hearing intervention and the speech-language therapist's role in feeding and communication intervention, certain general tasks are also important. These professionals should be able to gain access to work in neonatal care settings where the dominant professions are neonatology and nursing. Audiologists and speech-language therapists require specialised knowledge, including knowledge of foetal and newborn brain development, medical conditions to which preterm and full-term neonates are susceptible, specific medical conditions that affect normal hearing, feeding and communication development, neonatal preterm and full-term infant behaviours and development, knowledge of the environment of the nursery, staffing patterns and routines and the cultural patterns that are present in each NICU, and information concerned with parenting in the NICU (Rossetti, 2001). Specialised knowledge enables audiologists and speech-language therapists to give appropriate information to parents whose child is at risk or has an established condition, and also to convince the neonatal team of their important role in the NICU.

The general tasks as listed in Table 1 do not fit exclusively into feeding intervention, communication intervention or hearing intervention, and may be seen as collaborative roles performed by professionals other than audiologists and speech-language therapists. Some of these general tasks also form part of the more specific intervention areas, such as parent training, team work/collaboration, implementation of developmentally appropriate care programmes and advocacy.

The implementation of a developmentally appropriate care programme requires a collaborative effort. Since developmental care is a broad category of interventions designed to minimise the stress placed on the infant and the family by the NICU, it implies that different professionals with different interventions should be involved. Developmental care is based on the principle that each infant's neuro-regulatory capacities are guided by developmentally supportive, family-centred, evidence-based and collaborative care (Barbosa, 2013).

As a part of NCI, developmentally appropriate care is shared between the audiologist and speech-language therapist in a transdisciplinary, collaborative manner, but each professional also contributes uniquely to services directed at families with infants

with feeding difficulties, hearing loss, established and emerging communication disorders, and those that are at risk of developing difficulties in these areas (SASLHA, 2011b). These unique services include many aspects of parent training.

One aspect of developmentally appropriate care that has not as yet been described in this chapter is noise reduction programmes which are primarily introduced by the audiologist. The implementation of strategies to reduce noise should, however, be conducted by all professionals involved with care of the preterm infant in the NICU. Research has revealed that the nursery staff members contribute significantly to noise levels (Rossetti, 2001).

Noise reduction programmes include suggestions that are simple to implement and which should not lead to major disruption of the routine for any NICU staff member (Rossetti, 2001). These include, but are not limited to, quiet closing of incubator portholes, not placing feeding bottles and equipment on top of incubators, eliminating finger tapping on incubators, encouraging staff members to silence alarms as quickly as possible, switching off ventilator alarms before commencing suctioning, using the vibration option on cellular phones rather than the ringtone, reducing talking over incubators or across the room, and, finally, eliminating radios, television and music (Rossetti, 2001). Staff members' awareness of noise-generating behaviours, such as washing hands, opening disposable equipment, disposing of linens, trash and especially glass bottles into the garbage, should also be increased (Liu, 2010).

The audiologist and speech-language therapist may furthermore assist in planning the transition from the NICU to the home setting. Several steps help to make the passage home less stressful (Rossetti, 2001):

- Step 1: Determine the family's resources and major concerns.
- Step 2: Parent training is designed to enhance parental feelings of competence in the self-management of their infant's medical and developmental needs. It is during parent training that the audiologist and the speech-language therapist can provide the most input regarding developmental activities which help to stimulate hearing, speech, language and feeding skills in high-risk infants.
- Step 3: Providing parents with information regarding community resources and their need to advocate for additional services that the infant may need.

2.6. Conclusion

A literature search regarding NCI services revealed that the term “neonatal communication intervention” is currently only used in South Africa. ECI is a powerful strategy that makes a difference in the lives of families and their infants and young children, and NCI offers the earliest form of intervention (SASLHA, 2011b).

In 1997 SASLHA’s guidelines for ECI services advocated a nationwide move toward early intervention in South Africa, and much progress has been made in this regard. All undergraduate Audiology and Speech-Language Pathology training programmes in South Africa now offer ECI modules. With such training in place, South African audiologists and speech-language therapists are working in neonatal settings (Strasheim et al., 2011). It is, however, unknown whether audiologists and speech-language therapists in South Africa are keeping up with new developments, such as NCI, in the field of ECI. The current research study therefore aims at investigating South African professionals’ self-perceived knowledge and practices in NCI. A survey was deemed to be the most appropriate way to investigate self-perceived skills and needs in the dynamic new field of neonatal intervention.

2.7. Summary

In Chapter 2 the history and the development of the term “neonatal communication intervention” were discussed with its basis in ECI as described by Rossetti in 2001. The early auditory exposure of preterm infants was compared to that of full-term infants, and the differences between these infants regarding their communication behaviours and maternal responses were discussed. KMC was described as the starting point of NCI services. Strategies included in NCI were presented in a table and discussed in detail to justify why all components are important for the comprehensive promotion of positive developmental outcomes in preterm infants. Finally, a justification for the use of survey research to study the self-perceived skills and needs of South African audiologists and speech-language therapists in NCI was given. Chapter 3 will describe the research design and methodology that were used in this research study.

Chapter 3

Methodology

CHAPTER AIM: The aim of this chapter is to describe the planning and the implementation of the study to determine the participants' self-perceived skills, as well as their self-perceived needs regarding NCI. The research aims and design will be outlined in this chapter, as well as the ethical considerations, participants, material and procedures.

3.1. Introduction

It is important that researchers plan their research design and methodology in a functional, purposeful way so as to acquire the needed data that will be relevant to their research problem (Leedy & Ormrod, 2010).

During early intervention services, especially in neonatal care settings, the involved professionals have the unique opportunity to influence the developmental outcomes of preterm infants in a positive and long-lasting way. It is therefore crucial that these services be based on the highest available evidence. EBP ensures that clinical decisions are made while integrating the best research evidence with clinical expertise and patient values (Johnson, 2006).

3.2. Research aims

3.2.1. Main aim

The main aim of the study was to describe the self-perceived skills and needs of South African audiologists and speech-language therapists regarding NCI.

3.2.2. Objectives

The following objectives were formulated in order to reach the main aim:

- To describe the participating audiologists' and speech-language therapists' undergraduate training in NCI.
- To describe the participants' perceived levels of difficulty in different NCI areas.
- To describe the participants' perceived levels of confidence in different NCI areas.

- To describe the needs of the participants regarding NCI.
- To determine whether there were significant associations and correlations between certain participant characteristics and the participants' self-perceived skills and needs.

3.3. Research design

This study was conducted by using a combination of quantitative and qualitative research. A triangulation mixed model research design was therefore utilised. In a triangulation mixed model research design the researcher mixes or combines quantitative and qualitative research techniques into a single research study within a single phase (Delpont & Fouché, 2011; Johnson & Christensen, 2004). The research therefore not only involved collecting quantitative and qualitative sets of data, but also integrating, relating and mixing the data. By combining quantitative and qualitative data, a comprehensive analysis of the data was achieved. Trends and details of the particular situation were therefore captured (Creswell, Fetters & Ivankova, 2004).

Data regarding the involved professionals' self-perceived skills and needs in the area of NCI were collected in a *quantitative and qualitative* manner through the use of a *descriptive survey*.

Quantitative research involves looking at quantities of one or more variables of interest (Leedy & Ormrod, 2010). In this study the categorical variables of interest were the participants' experienced levels of difficulty and confidence in various areas that were identified as forming part of NCI. The researcher deemed this information as important in order to give an idea of the participating professionals' self-perceived skills. The other variable of interest was the needs of the participants regarding NCI. The quantitative descriptions of the variables included basic descriptive and frequency tables, reliability analysis and the identification of relationships between the categorical variables and certain participant characteristics (Field, 2009; Fouché & Bartley, 2011).

Qualitative research was also used to analyse the data collected in the open-ended questions in the questionnaire. According to Leedy and Ormrod (2010) *qualitative research* is used to answer questions about the complex nature of a phenomenon,

such as the strategies that should be included to advocate for and expand NCI. In this study the data collected in the open-ended questions were examined and interpreted in a non-numerical way to discover the underlying themes that were most prominent (Schurink, Fouché & De Vos, 2011).

Descriptive research was used to provide a comprehensive view of the specific details of a situation as it is (Fouché & De Vos, 2011). Strasheim (2009) also used descriptive research, but within an exploratory research format. As many research studies in this field have been conducted since then, the current study attempted to extend the survey that was conducted six years ago (Strasheim, 2009). In this way new data could be collected and change could be described. Descriptive research was put into practice by conducting a survey of individuals who were likely to have opinions on NCI. In such a way a large volume of information could be gathered from a relatively small sample. A descriptive survey was used to explore and describe the participating audiologists' and speech-language therapists' self-perceived skills and needs regarding the provision of NCI in South Africa.

Electronic survey research therefore provided an effective way of acquiring information about South African audiologists and speech-language therapists by asking them questions and then tabulating their answers (Leedy & Ormrod, 2010). As the participating professionals' opinions were predicted to be varied, a combination of descriptive and exploratory methods was deemed necessary to achieve the aims of this research study.

3.4. Ethical considerations

When the participation of people is required in order to conduct research, the ethical implications must be carefully considered (Leedy & Ormrod, 2010). Research ethics present researchers with a set of moral guidelines on how to conduct research in a morally acceptable manner (Struwig & Stead, 2001). In this study human participation was an integral aspect. The Research Ethics Committee of the Faculty of Humanities, University of Pretoria, gave permission to conduct the study (see Appendix A).

The following aspects of ethical conduct were considered during this research study:

- ***Informed consent from the participating audiologists and speech-language therapists:*** When people are intentionally enlisted to participate in a research study, they should be informed of the nature of the study and given an opportunity to decide whether they wish to participate (Leedy & Ormrod, 2010).

The electronic questionnaire was therefore introduced by an informed consent letter (see Appendix B) explaining the aims of the study and the importance thereof. This informed consent letter contained a brief description of the nature of the study, the participants' involvement (how long completion would take and how valuable the participants' time and opinion were to the researcher), and an assurance that the questionnaire would give clear instructions and that all responses would remain confidential (Leedy & Ormrod, 2010). The informed consent letter concluded with a tick box where participants had to indicate their consent (Leedy & Ormrod, 2010). The participants' answers could only be submitted if the box had been marked.

- ***Confidentiality:*** The information given in the letter to ensure informed consent clearly stated that the participants' identifying particulars would not be included in the study.

Study participants completed the questionnaire electronically, and their identities therefore remained anonymous (the researcher had no way of identifying each participant). In addition, the electronic questionnaire was not e-mailed to participants, but was completed on the Internet, thereby further ensuring anonymity.

- ***Data storage:*** To comply with the regulations of the University of Pretoria, the collected data will be stored for 15 years (see Appendix C).
- ***Non-harmful procedures:*** A primary ethical rule of social research is that it must not bring harm to the participants (Babbie, 2007).

Each participant only needed to complete a questionnaire, with questions pertaining to NCI. Questions regarding their opinions were asked, and although their knowledge was not tested directly, self-reported understanding of issues was obtained. As knowledge was not tested directly, the risk of discomfort or embarrassment was eliminated. The risk/benefit ratio for participants was therefore optimal (Maxwell & Satake, 2006).

- **Actions and competence of the researcher:** The researcher is ethically obligated to ensure competent and honest reporting of information obtained from participants (Strydom, 2011a). Plagiarism, the direct copying of work or using ideas of others without acknowledging the source, as well as manipulating or creating false data, was avoided (Strydom, 2011a).
- **Publication of the findings:** On completion of the research component of this study, the findings were compiled into this dissertation and an article was written. These documents will be available from the library of the University of Pretoria where scholars, participants and students will be able to access it. This was done in order to ensure that the research project becomes a learning experience for all concerned (Strydom, 2011a), and to advance the field of NCI in South Africa.

3.5. Participants

3.5.1. Selection criteria

The following selection criteria were deemed appropriate for the purpose of this study:

- **Occupation:** Participants should have been qualified (a minimum of a bachelor degree in the fields) and practising audiologists, speech-language therapists or professionals dually qualified in both fields. Although these professionals may be involved in NCI in a variety of tasks, including newborn hearing screening by audiologists (Theunissen & Swanepoel, 2008) and feeding and communication intervention by speech-language therapists (ASHA, 2004; SASLHA, 2011a; SASLHA, 2011b), they did not have to be working in neonatal settings to participate in the study. Their experience in neonatal settings was also not a criterion for inclusion as a participant due to the fact that professional needs were investigated. The number of years of experience in the fields of Audiology and/or Speech-language Pathology was also not a criterion for inclusion as a participant.
- **Computer literate:** As the survey was distributed and completed electronically, participants had to have access to the Internet and be computer literate. As these skills are acquired during undergraduate studies, it would not have limited the sample.

3.5.2. Sampling method

Audiologists and speech-language therapists registered at the South African Speech-Language-Hearing Association (SASLHA) as well as the South African Association of Audiologists (SAAA) were approached to take part in this study. These two bodies are the only professional organisations for audiologists and speech-language therapists in South Africa. SASLHA and SAAA provided permission to invite their members formally in their newsletters to participate in the survey by clicking on an electronic link (see permission notes in Appendix D). Additionally, this invitation was extended to audiology and speech-language therapy groups on social networking sites such as *Facebook*.

Participants were therefore selected by using *purposive sampling*, in which the participants are selected with a particular purpose in mind (Leedy & Ormrod, 2010). The sample was therefore based on the judgement of the researcher, in that it consisted of elements which contained the most characteristic, representative or typical attributes of the population to best serve the purpose of the study (Strydom, 2011b). As SASLHA and SAAA have members working in academic and clinical settings, within the private and public sector, it was believed that the members would have diverse perspectives on NCI, ranging from a great amount of knowledge to limited knowledge and experience (Leedy & Ormrod, 2010).

3.5.3. Sample size

In May 2014, a total of 2 567 health care professionals was registered at the HPCSA in the categories of “Audiologist [AU]”, “Speech Therapist [ST]” and “Speech Therapist and Audiologist [STA]” (HPCSA, 2014). According to Leedy and Ormrod (2010) a sample should consist of about 20% of the population in the case of a population size of about 1 500 (therefore a sample size of about 300). If the population size is above 5 000, a sample size of about 400 is representative of that population (Leedy & Ormrod, 2010). As the population of audiologists and speech-language therapists in South Africa at the time of data collection was 2 567, which is between 1 500 and 5 000, this study aimed at achieving a response rate of between 300 and 400. At the end of 2013 SASLHA had about 1 200 South African members (SASLHA, 2013) and SAAA had about 200 members (SAAA, 2013). By inviting

SASLHA and SAAA members, the researcher believed that a representative sample of between 300 and 400 would be achievable.

The questionnaire was distributed and completed electronically. After several invitations were extended via the different channels of communication chosen for the distribution of the survey link, a small sample size of 73 only was achieved. A similar survey on the same topic was completed in 2009 which achieved a response rate of 41 out of 175 possible participants (Strasheim, 2009). In this study only qualified audiologists and speech-language therapists working in neonatal settings were contacted (Strasheim, 2009). It therefore appears that low response rates can be expected in survey research.

The electronic distribution of the surveys in this study seems to have increased the achieved sample size to 73 participants. In addition, 87.7% of the participants indicated that they were familiar with NCI and 69.6% reported that they enjoyed providing this type of intervention. The researcher therefore concluded that the majority of participants completed the survey because they were aware of the field, and experienced enjoyment in this new and exciting field. Professionals who were unaware of the field may have chosen not to participate, as they may have felt that they did not have a valuable contribution to make.

The goal was to receive between 300 and 400 responses in order to obtain a representative sample of the 1 400 professionals registered at SASLHA and SAAA. With an obtained sample of 73 participants, a representative sample was not achieved (Leedy & Ormrod, 2010). Generalisations are thus not possible, but certain trends are described in Chapter 4.

3.5.4. Description of participants

The characteristics of the 73 participants are provided in Table 2. As some participants did not complete Section A entirely, some of the characteristics represent less than 73 participants (as indicated in Table 2).

Table 2: Participant characteristics (n=73)

Characteristics	Categories	Frequency	(%)
Professional qualification	Audiology	7	9.6%
	Speech-language therapy	21	28.8%
	Audiology and Speech-language therapy	45	61.6%
	TOTAL	73	100%
Level of qualification	Graduate	57	78.1%
	Postgraduate	16	21.9%
	TOTAL	73	100%
Current profession	Audiology	15	20.6%
	Speech-language therapy	42	57.5%
	Audiology and Speech-language therapy	16	21.9%
	TOTAL	73	100%
Institution where qualified	Stellenbosch University	9	12.3%
	University of Cape Town	10	13.7%
	University of KwaZulu-Natal	8	11.0%
	University of Pretoria	31	42.5%
	University of the Witwatersrand	13	17.8%
	Other	2	2.7%
	TOTAL	73	100%
When qualified (three missing values)	≤ 2000	18	25.7%
	≥ 2000	52	74.3%
	TOTAL	70	100%
Province where practising (one missing value)	Eastern Cape	2	2.8%
	Free State	1	1.4%
	Gauteng	41	56.9%
	KwaZulu-Natal	7	9.7%
	Limpopo	1	1.4%
	Mpumalanga	1	1.4%
	Northwest	3	4.2%
	Western Cape	14	19.4%
	Other	2	2.8%
	TOTAL	72	100%
Work context	Public sector	28	38.4%
	Private sector	45	61.6%
	TOTAL	73	100%
Clinical experience in neonatal intervention	None	17	23.3%
	≤ 3 years	25	34.2%
	≥ 4 years	31	42.5%
	TOTAL	73	100%
Early intervention training	Theoretical module	16	21.9%
	Practical module	2	2.8%
	Theoretical and practical module	42	57.5%
	None	13	17.8%
	TOTAL	73	100%
Neonatal intervention training (15 missing values)	Yes	47	81.0%
	No	11	19.0%
	TOTAL	58	100%

According to Table 2 the participants were mostly dually qualified in Audiology and Speech-language therapy, but the majority practise as speech-language therapists only. A substantial number of participants have a postgraduate qualification, mostly from the University of Pretoria. Almost all universities offering speech-language therapy and audiology training are represented in the sample, except for Sefako Makgatho Health Sciences University.

By far the majority of participants (74.3%) qualified after 2000, thus indicating that the sample represents a young generation of practitioners. The participants furthermore practise across the country in eight provinces, except the Northern Cape. The largest group of participants (56.9%) practises in Gauteng, the most populous province in South Africa. They also represent both the public and private sector, but mostly the private sector.

Most participants received theoretical and practical training in ECI and a large majority (81%) indicated that they received neonatal intervention training. Considering the importance of ECI as a preventative approach, it is concerning that 17.8% and 19% of participants respectively indicated that they had no early or neonatal intervention training. It appears that there is no uniform training in ECI or NCI in South Africa.

In addition, the small number of participants that could be recruited for the study may confirm the generally accepted view that NCI is still an emerging area of practice in South Africa.

In summary, the majority of participants practise as private speech-language therapists with a graduate qualification, in Gauteng. They represent a young group of professionals as most of them qualified since 2000. Most participants, but not all, received ECI and NCI training. The majority (76.7%), however, have experience in neonatal intervention.

3.6. Material used for data collection and analysis

- **Web-based electronic questionnaire**

A web-based electronic questionnaire (see Appendix E) was used to determine the participants' training needs regarding NCI. An electronic questionnaire eliminates the

use of paper and generates an automatic electronic computerised database (Delport & Roestenburg, 2011) which limits errors.

In this study the questionnaire was initially designed in Microsoft Word, after which it was converted into an HTML format. The following tasks were conducted as part of this process:

- Questionnaire conversion and HTML coding.
- HTML questionnaire hosting.
- Database design and maintenance.
- Data export to SPSS and/or XLS.

The questionnaire investigated the participants' attributes, behaviour and opinions and included the following sections:

○ **Section A: Biographical information (14 questions)**

Closed-ended/structured questions were used in this section to collect information regarding the participants' qualification, profession, year of qualification, current province and work contexts, years of clinical experience, and finally information regarding the participants' training and whether ECI and NCI were included (e.g. Section A, questions 1-4 and 6-10). The biographical data collected in this section were used to interpret the data from other sections of the questionnaire.

○ **Section B: Perceptions regarding NCI (10 questions)**

Closed-ended/structured questions were used in this section to collect data regarding the participants' current provision of NCI services, including how often and for how many years thus far. Rating scales were also used to investigate the participants' perception of how knowledgeable and prepared they felt to provide NCI, as well as their level of enjoyment in the provision of NCI, and how much they felt they would benefit from completing an NCI training programme (e.g. Section B, questions 20-23). The information that was collected in this area provided the researcher with a general idea of the participants' attitudes and perception of NCI services.

- **Section C: Skills and needs analysis (18 questions)**

The rating scales that were developed for Section C of the questionnaire investigated the participants' self-perceived skills. By determining how difficult the participants found different NCI tasks, and also their levels of confidence in the specified tasks, the researcher was provided with information regarding the self-perceived skills of the participants (i.e. Section C, questions 25-32). The NCI tasks included, but are not limited to, assessment of feeding, communication development, hearing and mother-child communication interaction, intervention for feeding and hearing problems, and prevention of communication delays in the form of parent guidance/training (ASHA, 2004a; Feldman, 2004; Kenner & McGrath, 2004; SASLHA, 2011b; Smith et al., 2011).

Closed-ended/structured questions in the form of multiple choice questions were used to investigate the participants' self-perceived needs regarding NCI. Open-ended questions were also included (e.g. Section C, questions 40 and 41) so that the participants could elaborate, and possibly mention areas of need that were not included in the closed-ended questions.

3.7. Pilot study

A pilot study is a brief exploratory investigation that can be used to determine the feasibility of a study (Leedy & Ormrod, 2010). In the current research project, a pilot study was used to pre-test the questionnaire, to determine its efficacy and practicality. To test and validate the questionnaire, it was administered to a small group of participants from the intended population (Strydom, 2011c).

3.7.1. Aim of the pilot study

The aim of the pilot study was therefore to test the electronic questionnaire in terms of the understandability of the questions, whether it was user-friendly to complete, as well as the time required for completion.

3.7.2. Participants in the pilot study

The supervisor, statistician and a fellow professional dually qualified in Audiology and Speech-language therapy participated in the pilot study.

3.7.3. Materials used in the pilot study

A link to a pilot version of the electronic questionnaire was sent to the participants to review. These participants were requested to focus on the design and flow of the questionnaire, the ease of electronic completion, as well as the wording of the questions.

3.7.4. Results of the pilot study

- The layout of the questionnaire was deemed user-friendly and aesthetically pleasing to most participants.
- Although the participants felt that the informed consent letter at the start of the questionnaire contained all the necessary information, the wording was deemed too direct and unfriendly. The necessary changes were made to create a positive feeling before commencing with the completion of the questionnaire.
- The wording of some of the questions created the idea that the participant was working in neonatal settings at the time of completing the questionnaire, such as Question 35 in Section C (i.e. “What are you struggling with in NCI?”). Since participants were not required to be working in neonatal settings at the time of participation, the wording of such questions was adapted (i.e. “What do you struggle with in NCI?”).
- The participants had differing opinions regarding scrolling down the page to complete the full questionnaire, rather than submitting a few answers at a time. The system that was used to create the electronic questionnaire does not, however, allow for submission of a few answers at a time. This aspect was therefore left unchanged, and clear instructions were provided at the beginning of the questionnaire to remind participants to continue scrolling down to complete the entire questionnaire.

3.8. Data collection procedures

- An electronic questionnaire was designed in Microsoft Word, and converted into an HTML format.
- A pilot study was performed to pre-test the electronic questionnaire in terms of design, user-friendliness, wording, efficacy and practicality.

- Appropriate changes were made to the questionnaire before commencing with data collection.
- After the questionnaire had been finalised, the final web link was made live.
- SASLHA and SAAA were then contacted, and permission to invite their members was obtained.
- A formal invitation providing the final web link to the questionnaire (which included an informed consent letter) was distributed via the SASLHA and SAAA newsletters and any other available sources of participants found on social networking websites, e.g. *Facebook*.
- The questionnaire was open and receiving responses for three months. During this time willing participants completed and submitted the questionnaire electronically.
- While the questionnaire was open to participants, the progress was monitored.
- During the data collection period, delegates at a CPD seminar at the University of Pretoria were addressed to inform them of the questionnaire and invite them to participate in the survey.
- The researcher then obtained as many e-mail addresses of South African practising audiologists and speech-language therapists as possible, and extended another invitation to participate.
- After three months the questionnaire was closed, as no further responses were received.

3.9. Data analysis procedures

The information obtained from the questionnaire was processed and analysed by means of data tabulation, using *quantitative methods*. Any errors in the data file, including out-of-range values on any of the variables, were removed (Pallant, 2011). Descriptive statistics were then used to process the data and to compile a general representation of all the data (Struwig & Stead, 2001). These included the compilation of basic descriptive and frequency tables, as well as a reliability analysis.

- The *basic descriptive tables* included calculation of mean, standard error of mean, median and standard deviation (see Appendix F for a selection of these tables).

- The *basic frequency tables* merely provided the researcher with the numbers of participants who chose each option of each question, as well as the related percentages (see Appendix G for a selection of these tables).
- *Reliability analysis* was conducted to check the internal consistency of the rating scales that were used in the questionnaire (Pallant, 2011). *Cronbach's Alpha* was used to test the internal consistency (Pallant, 2011). A value above .7 is usually an indication of acceptable internal consistency within a rating scale (Pallant, 2011). The internal consistency of the rating scales used in the questionnaire in this study was acceptable, as evidenced by *Cronbach's Alpha* scores ranging from .826 to .926 (see Appendix H for a selection of these scores).

In addition, inferential statistics were used to make inferences about the larger population from a small sample (Leedy & Ormrod, 2010). In this way statistically valid conclusions could be made (Welman, Kruger & Mitchell, 2012). During this study, the professionals' self-perceived skills as presented by their perception of difficulty and confidence levels were seen as the dependent variables (Welman et al., 2012). These variables depended on the individuals' qualification, current profession, the year in which they qualified and their clinical experience [independent variables] (Welman et al., 2012).

The identified dependent variables were categorised according to degree (e.g. great confidence versus low confidence). These categories were then compared with the independent variables (Welman et al., 2012). In this way, the researcher attempted to discover relationships between the various variables. The comparisons could then indicate significant or non-significant differences between groups as well as correlations between groups. These differences and correlations deepened the researcher's understanding of the participants' self-perceived skills and training needs regarding NCI (Leedy & Ormrod, 2010).

Inferential statistics were performed by means of a Pearson's chi-square test to determine the relationship between the independent and dependent variables, for example whether the level of confidence in feeding intervention relates to the professional qualification of the participant (Field, 2009). This test is based on the idea of comparing the frequencies that are observed in certain categories to the frequencies that are expected in those categories by chance (Field, 2009).

For the chi-square test to be a valid test, the expected counts in all cells must be larger than five (Field, 2009). In larger samples approximations are acceptable, but in small samples the significance tests of the chi-square distribution become inaccurate (Field, 2009). In cases where the sample size is less than five, an exact test such as Fisher's exact test and the Monte Carlo algorithm may be applied as a test of association between the two variables. Exact tests enable the researcher to make reliable inferences when datasets are small, sparse, heavily tied or unbalanced and the validity of the corresponding large sample theory is in doubt (Mehta & Patel, 1996).

All these test statistics (i.e. Pearson, Fisher and Monte Carlo) are associated with a p -value. According to Field (2009) a conclusion about the rejection or not of a null hypothesis should be based on comparing the p -value with a significance level of 5%, which measures how frequently the conclusion, drawn from the statistical inference, will be incorrect. A p -value of less than 5% (or 0.05) indicates that the difference between two variables is statistically significant (Pallant, 2011).

The independent variables of "professional qualification" and "current profession" were nominal categories. A difference in groups for nominal categories was determined by using the Kruskal-Wallis H test, which is a non-parametric alternative to a one-way between-groups analysis of variance (Pallant, 2011). In this way it could be tested whether there were associations between the variables. Since the sample sizes were small, Monte Carlo significance was used (Mehta & Patel, 1996).

The independent variables of the year in which the participants qualified and their years of clinical experience are ordinal categories. For these independent variables, the Pearson's correlation coefficient was used to determine whether correlations exist.

Qualitative methods were also employed to analyse the data collected in the open-ended questions of the questionnaire. Thematic analysis was used to identify recurring themes in the data (Welman et al., 2012). Data tabulation was used to reduce the qualitative data to manageable information that could be analysed (Schurink et al., 2011). The data in these tables were then coded to represent responses from audiologists [AU], speech-language therapists [ST] and speech-language therapists/audiologists [STA]. The words, context, internal consistency,

frequency of comments, extensiveness of comments and the specificity of comments, as well as the overall perception of the group as a whole, were then considered in order to describe the different themes that were identified (Greeff, 2011).

3.10. Reliability and validity

Reliability is the consistency and dependability of a research instrument to measure a specific variable (Brink, 2006). Validity is the extent to which the instrument measures the intended variable (Brink, 2006). In this study, reliability and validity were enhanced on the following levels:

3.10.1. Reliability and validity of the questionnaire

Reliability and validity are two very important factors to consider when a tool/instrument is used to measure a certain phenomenon (Delpont & Roestenburg, 2011). Reliability occurs when an instrument, in this case the questionnaire, measures the same set of questions more than once and results in the same outcomes (Delpont & Roestenburg, 2011). To increase the reliability of the questionnaire, the following procedures were implemented (Delpont & Roestenburg, 2011):

- **Data triangulation:** Multiple indicators of each variable were used in order to achieve data triangulation. Data triangulation not only involves using more than one question to strengthen reliability, but also combining quantitative and qualitative data on the same topics (Delpont & Fouché, 2011). In this study the variables were the participants' self-perceived skills and training needs in NCI. Two or more questions were used to measure different aspects of these skills and needs. For the self-perceived skills, the participants' experienced levels of difficulty and confidence in various NCI areas were determined. For the training needs, multiple questions were used to measure different aspects of their needs (e.g. Section C, questions 39-41). In this way the internal consistency aspect of its reliability was increased (Leedy & Ormrod, 2010).
- **Pilot study:** During a pilot study, unclear items and instructions were determined. All ambiguities were eliminated from the final questionnaire (Delpont & Roestenburg, 2011).

- **Measurement conditions:** The conditions under which the questionnaire was completed, were standardised so that all participants responded in the same way (Delpont & Roestenburg, 2011). This was partly ensured by the fact that the questionnaire was completed electronically. The system would, for example, not allow the participants to submit their responses if certain required questions were not completed. This ensured that each respondent completed the majority of questions, and therefore most data sets were complete.
- **Objectivity:** In this study, scoring of the questionnaire was conducted electronically through the SPSS system. All answers were therefore scored in a consistent manner and human errors were avoided. The researcher therefore had no role in the initial coding of the data gained from the questionnaire. As the survey results were therefore processed by an automatic computer system, a high measure of objectivity could be obtained.

Validity is the extent to which an instrument measures what it is intended to measure (Leedy & Ormrod, 2010). To increase the validity of the questionnaire, a pilot study was conducted to determine whether it actually measured the self-perceived skills and training needs of audiologists and/or speech-language therapists. The following types of validity were considered in the development of the questionnaire:

- **Content validity:** an evaluation of how well the instrument represents all the components of the variable to be measured (Brink, 2006). During this study, content validity therefore provided an evaluation of whether the questionnaire presented all the components that formed a part of NCI according to literature. An extensive literature study on the topic was conducted.
- **Face validity:** the least scientific level of validity that provides a means of measuring whether the instrument appears to measure what it is supposed to measure (Brink, 2006). The general layout, readability and clarity of the questions and instructions were evaluated during a pilot study to ensure that the questions addressed the actual needs, and therefore contained face validity. The visual appeal of the questionnaire was also addressed, as prospective participants often easily abandon questionnaires if they do not look professional (Delpont & Roestenburg, 2011).

- **Construct validity:** the extent to which an instrument measures a characteristic that cannot be directly observed but is assumed to exist based on patterns in people's behaviour. Such a characteristic is known as a construct. By identifying the participants' perceptions of difficulty and confidence in certain NCI tasks, the researcher aimed at determining their self-perceived skills.

3.10.2. Validity of the research study

Although it is important to consider the reliability and validity of measuring instruments and the results they yield during research endeavours, the validity of the research process itself should also be considered. This includes the accuracy, meaningfulness and credibility of the entire research project (Leedy & Ormrod, 2010). It is important to describe the extent to which the research design is valid when conducting a study. When trustworthiness is not addressed, it may render research findings of no value (Struwig & Stead, 2001).

The results of the study should allow the researcher to draw meaningful and defensible conclusions, and therefore prove that the study itself was valid. Two issues will therefore be addressed, namely *internal* and *external validity*.

- **Internal validity**

This level of validity refers to the extent to which the design of the study and the data it yields, allows the researcher to draw precise conclusions about the relationship within the data (Leedy & Ormrod, 2010). During the design of the questionnaire that was used to determine the needs of the participants, internal validity had to be considered carefully. Sometimes, when participants are aware of what is being measured, they may change their responses to fit the categories being measured. This is known as the *Hawthorne effect* (Leedy & Ormrod, 2010). It is important that the researcher has confidence that the conclusions drawn are merited from the data collected (Leedy & Ormrod, 2010), and that the researcher can safely eliminate other possible explanations for the results that are observed (Leedy & Ormrod, 2010). In this study, the Hawthorne effect was limited by avoiding leading questions. In addition, the participants' actual knowledge was not tested – their perceptions and opinions were investigated.

In some instances quantitative and qualitative data were collected on the same topic, thereby giving the participants the opportunity to explain their perceptions in writing. Data triangulation increased the internal validity of the questionnaire as in-depth data could be collected (Delpont & Fouché, 2011).

- **External validity**

External validity refers to the extent to which the results of the study can apply to situations beyond the study itself – therefore whether the product of the research (in this case the training needs) can be used in other contexts (Leedy & Ormrod, 2010). Two strategies were employed in this study:

1. The first way in which external validity was addressed, was by attempting to obtain a **representative sample** of the population under consideration (Leedy & Ormrod, 2010). The actual sample that was achieved was, however, only 73 participants. The sample was therefore not representative, and generalisation of results was not possible. Only trends were therefore identified.
2. The questionnaire was completed by professionals working in the fields of audiology and/or speech-language therapy at the time of data collection. The research was therefore conducted in a **real-life setting** (Leedy & Ormrod, 2010). This type of setting may be more valid because it gives results with wider applicability to other real-world contexts.

3.11. Conclusion

Based on literature on survey research, the methods described in this chapter provided reliable results to answer the research question. The method of data collection and analysis that was used was deemed suitable for the purposes of this study as it provided descriptive information. With the implementation of internal and external validity strategies to enhance the trustworthiness of this study, the results were considered accurate and the research procedures transparent so that the research can be used in further contexts to conduct similar studies (Leedy & Ormrod, 2010). Although the results may only indicate trends in NCI in South Africa as the sample was small, the research may lead to strategies for the development and expansion of NCI services.

3.12. Summary

Chapter 3 provided a description of the research's main aim, objectives and design. Selection of a descriptive survey within a quantitative research paradigm was justified. The ethical considerations, sample selection and description, material used for data collection, as well as the procedures used for data collection and analysis, were outlined. In addition, the reliability and validity of the survey and the validity of the entire research study were discussed and justified. The results obtained in the study and the discussion of the results will follow in Chapter 4.

Chapter 4

Results and discussion

CHAPTER AIM: The aim of this chapter is to present, describe, interpret and discuss the collected and processed data. The results are represented and described by means of tables and graphic presentations. The research aims as delineated in Chapter 3 were used to organise and interpret the results according to the initial orientations that were discussed in Chapters 1 and 2. Where appropriate, the findings were compared to existing research.

4.1. Introduction

NCI has been defined as services provided by audiologists and speech-language therapists, which are designed to improve communication, support oral feeding and treat feeding difficulties of an infant in the perinatal period (SASLHA, 2011b). While the mothers are still available, the speech-language therapist needs to assist with feeding difficulties, mother-infant attachment and reciprocal communication interaction (SASLHA, 2011b). The paediatric audiologist needs to reduce noise levels in the NICU to protect neonates' hearing (SASLHA, 2011c), conduct a screening hearing evaluation within the first month of life (JCIH, 2007; SASLHA, 2011c) and train parents to create the appropriate auditory environment that will facilitate listening and language development (Vouloumanos & Werker, 2007). While these role descriptions are clearly defined and justified as EBP in HPCSA (2007) and SASLHA (2011b) guideline documents, it is not clear to which extent these recommendations are included in undergraduate training and services provided by audiologists and speech-language therapists in South Africa. These professionals' skills and needs are therefore not well described in current literature.

The main aim of this study was to describe the self-perceived skills and needs of South African audiologists and speech-language therapists regarding NCI. This aim was realised by using an online survey which explored the 73 participating South African audiologists' and speech-language therapists' self-perceived skills and needs in the provision of NCI. The descriptive results are presented according to the objectives that were delineated to achieve the main aim of the study.

4.2. NCI undergraduate training of participants

In Section A of the web-based electronic questionnaire used in the current study, the participants provided information regarding their tertiary training. They were asked to report on whether they completed a module in ECI, whether this module contained information about NCI, or whether another module contained such information. Figures 1 to 3 represent their answers.

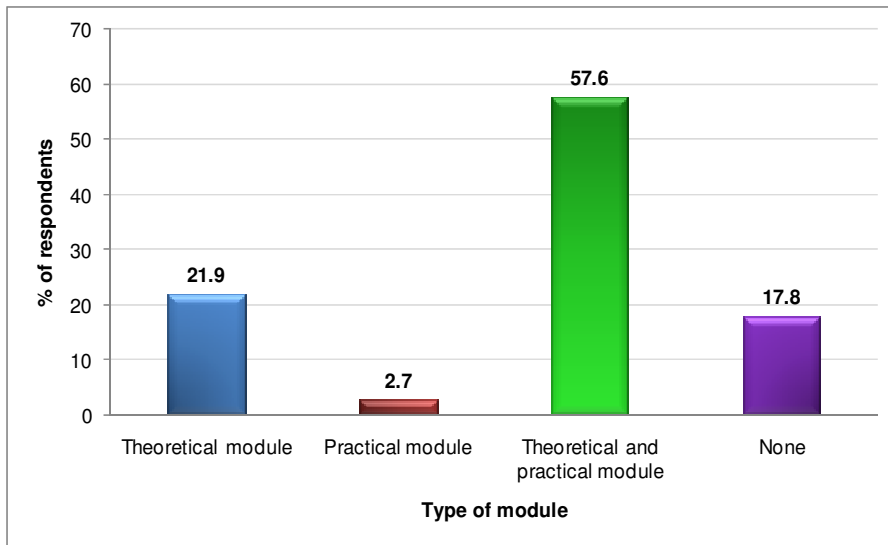


Figure 1: Module in ECI (n=73)

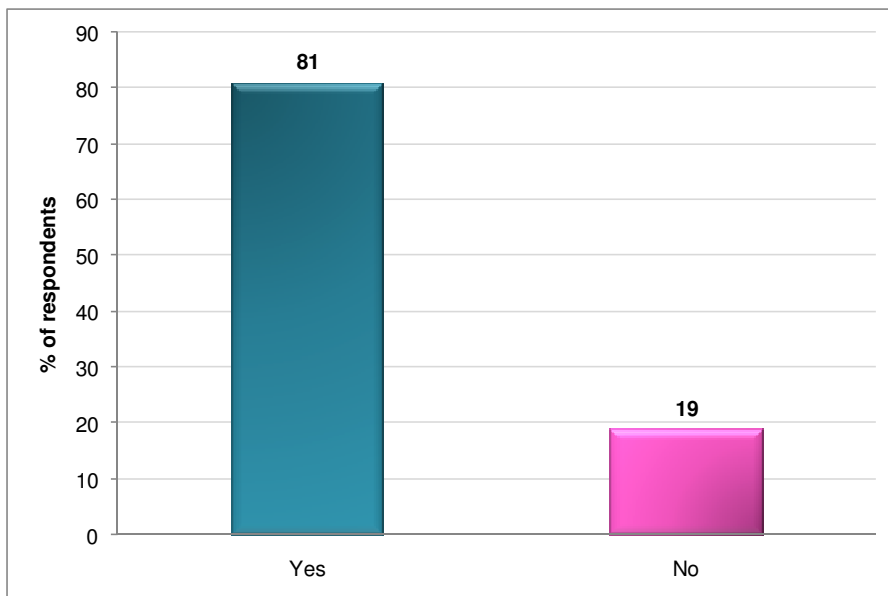


Figure 2: NCI included in ECI module (n=58)

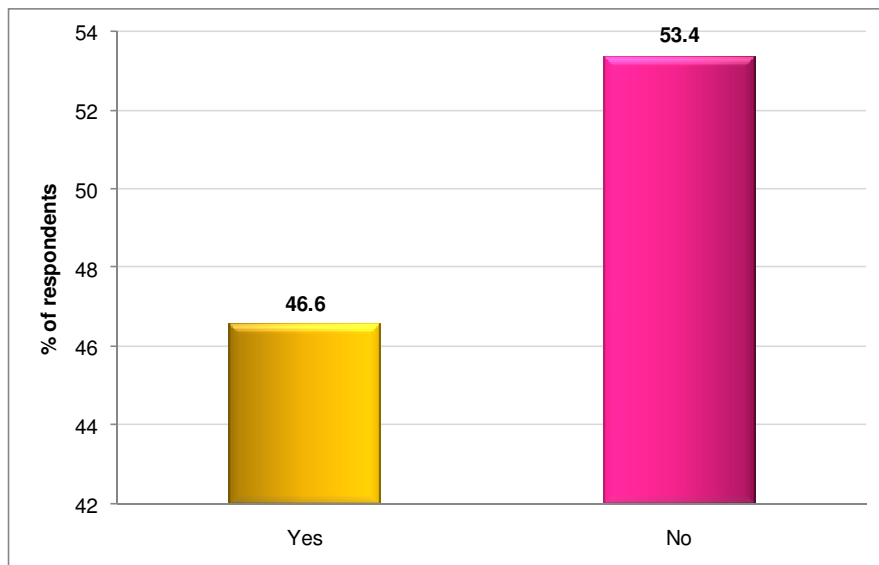


Figure 3: Any other module which included NCI (n=73)

From Figure 1 above it is clear that about 18% of the participants received no undergraduate training in ECI. A large percentage of participants (i.e. 81%) indicated that their ECI module included information on NCI (Figure 2), and that it was a theoretical and practical module (58%). The amount of information that was included regarding NCI is, however, unknown. The majority of participants furthermore reported that no other module included NCI (Figure 3). It is concerning that 18% of the participants in this study received no ECI training (Figure 1). ECI and NCI are, to a great extent, preventative interventions which could minimise or even prevent future difficulties. The importance of early experience and the increased malleability of early development form the foundation of ECI services, and these services are firmly established in many countries across the world (Guralnick, 2011).

In a study conducted by Strasheim (2009), the participants were similar to the participants in this study. The majority of the participants in Strasheim's study attributed their perceptions of competence to their undergraduate training, and a small percentage attributed their competence to their postgraduate training. Academic qualifications, especially on a postgraduate level, are often research-based and theoretical. The author concluded that formal academic qualifications did not appear to be an optimal strategy to improve clinical competence in NCI (Strasheim, 2009).

4.3. Perceived levels of difficulty in NCI areas

The participants' self-perceived levels of difficulty in the provision of NCI were obtained from Section C of the questionnaire, specifically questions 26, 28, 30 and 32. The responses obtained from these questions are presented in the following order:

Firstly, the descriptive percentages of each question are given and discussed, namely:

- Perceived levels of difficulty in multiple feeding intervention strategies.
- Perceived levels of difficulty in multiple communication intervention strategies.
- Perceived levels of difficulty in multiple hearing intervention strategies.
- Perceived levels of difficulty in general neonatal intervention tasks.

Secondly, a summary of the mean scores and standard deviation for each NCI area as a whole is given, thus the general scores for feeding intervention, communication intervention, neonatal hearing intervention and general neonatal intervention tasks. These scores are then interpreted and discussed.

Thirdly, a qualitative description of the areas of greatest difficulty is given. The data for this description were obtained from questions 35 and 36 in Section C: "What do you struggle with in NCI? Please motivate your answer". The themes that emerged in the data are described, and direct quotations from the participants' answers representing each theme are given and analysed critically.

4.3.1. Descriptive percentages

In the following figures of difficulty levels, all numbers correspond with the numbered questions of the questionnaire as presented in Appendix E. In the descriptive sections, the percentages for "Agree" and "Strongly agree" are combined, as well as the percentages for "Disagree" and "Strongly disagree".

4.3.1.1. Perceived levels of difficulty in multiple feeding intervention strategies

Figure 4 illustrates the results of the responses for each sub-option of question 26 on the provision of feeding intervention.

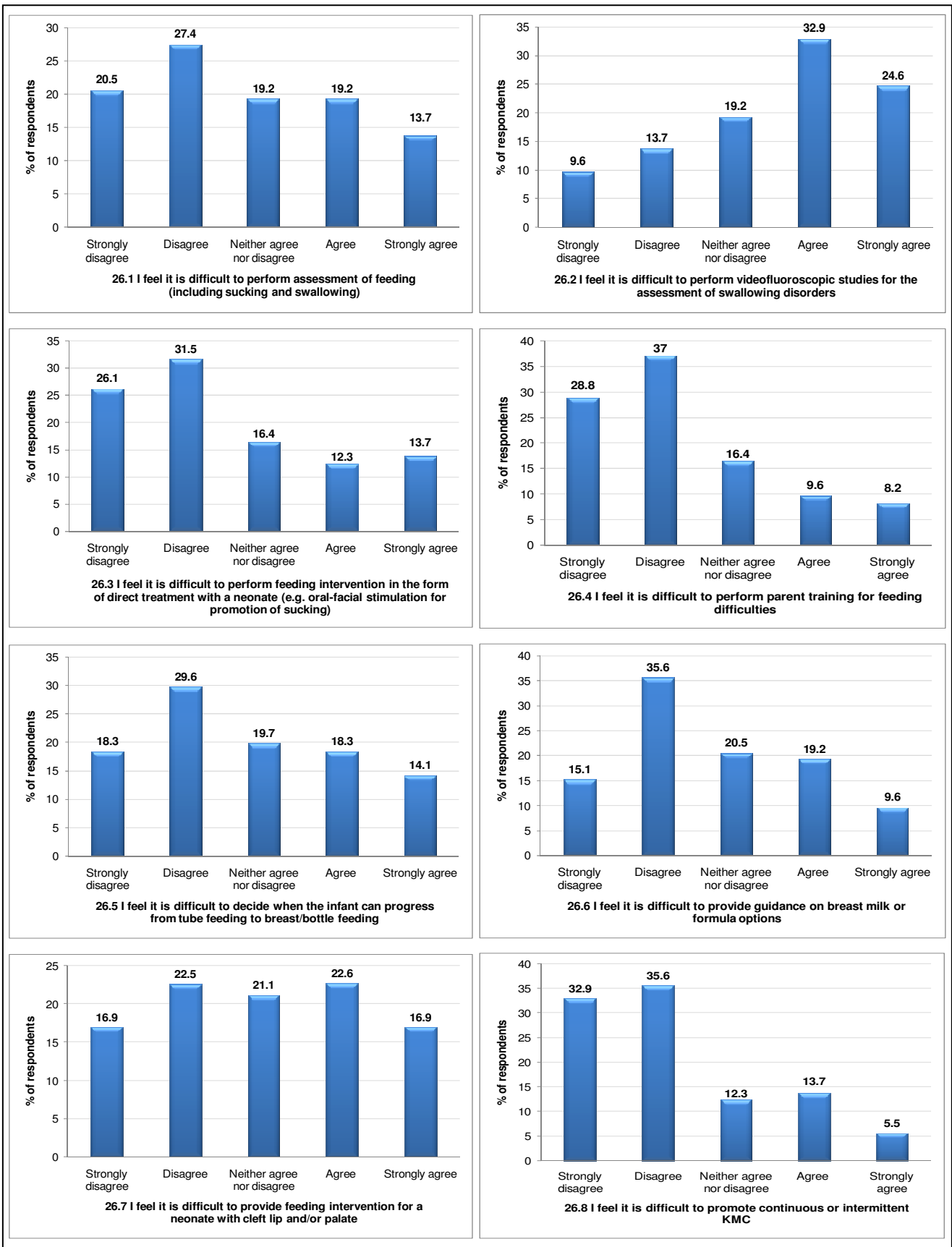


Figure 4: Perceived levels of difficulty in feeding intervention strategies

Upon visual inspection of the above results, it appears that the strategy of greatest difficulty was the performance of videofluoroscopic studies for the assessment of swallowing disorders (58% agreed that this was difficult). The strategy of providing feeding intervention for a neonate with cleft lip and/or palate yielded mixed results, with some participants agreeing that it is difficult (39%) and the same amount of participants indicating that it is not difficult (39%). The other strategies were not deemed difficult by the majority of the participants. This is positive and indicates that there is a potentially high level of skills among the participants in this study to provide feeding intervention. The strategies that were deemed difficult could then potentially form part of future training programmes.

4.3.1.2. Perceived levels of difficulty in multiple communication intervention strategies

Figure 5 illustrates the results of the responses for each sub-option of question 28 on the provision of communication intervention.

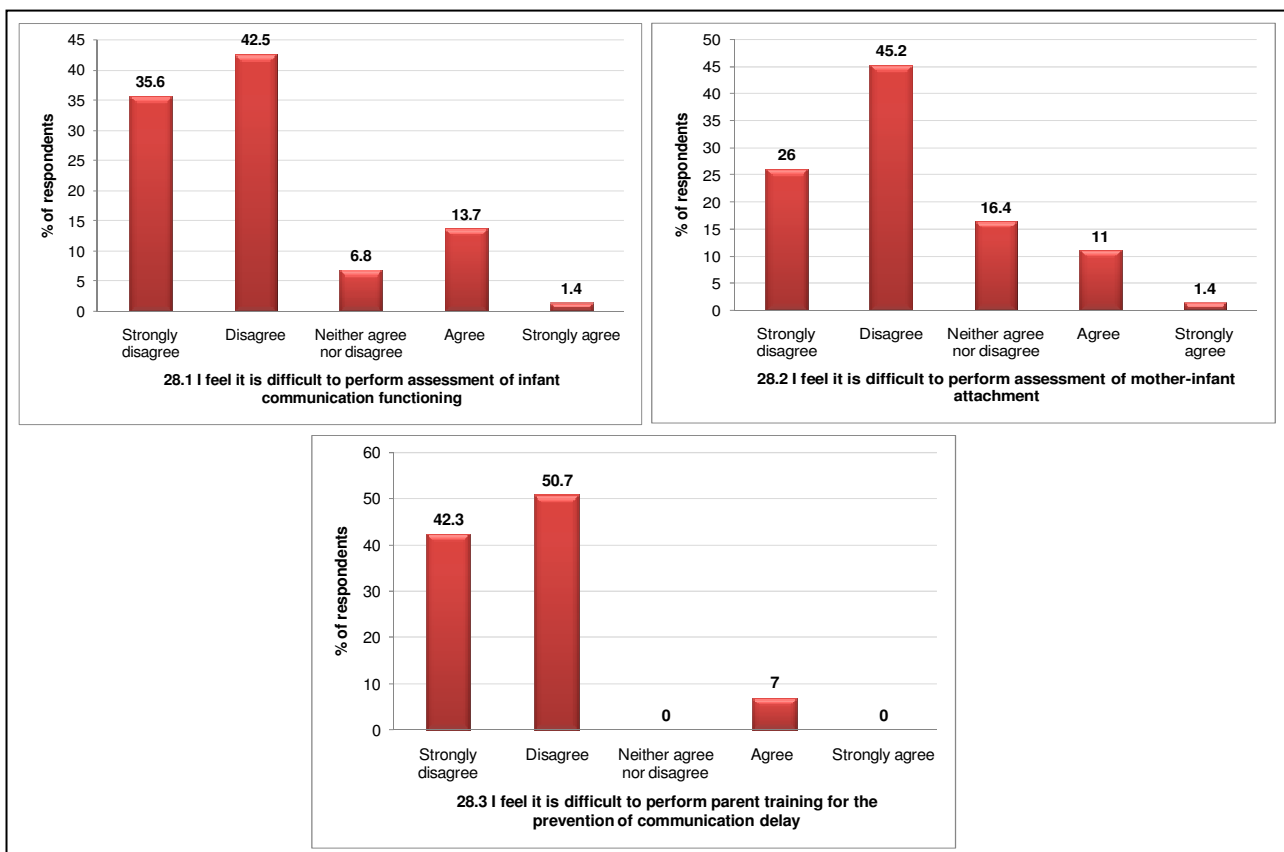


Figure 5: Perceived levels of difficulty in communication intervention strategies

It is clear from the results above that the majority of the participants did not experience difficulty with any of the strategies that were listed as part of communication intervention. In fact, there was only a slight percentage of participants who agreed that assessment of infant communication functioning (15%), assessment of mother-infant attachment (12%) and parent training for the prevention of communication delay (7%) were difficult.

4.3.1.3. Perceived levels of difficulty in multiple hearing intervention strategies

Figure 6 illustrates the results of the responses for each sub-option of question 30 on the provision of neonatal hearing intervention.

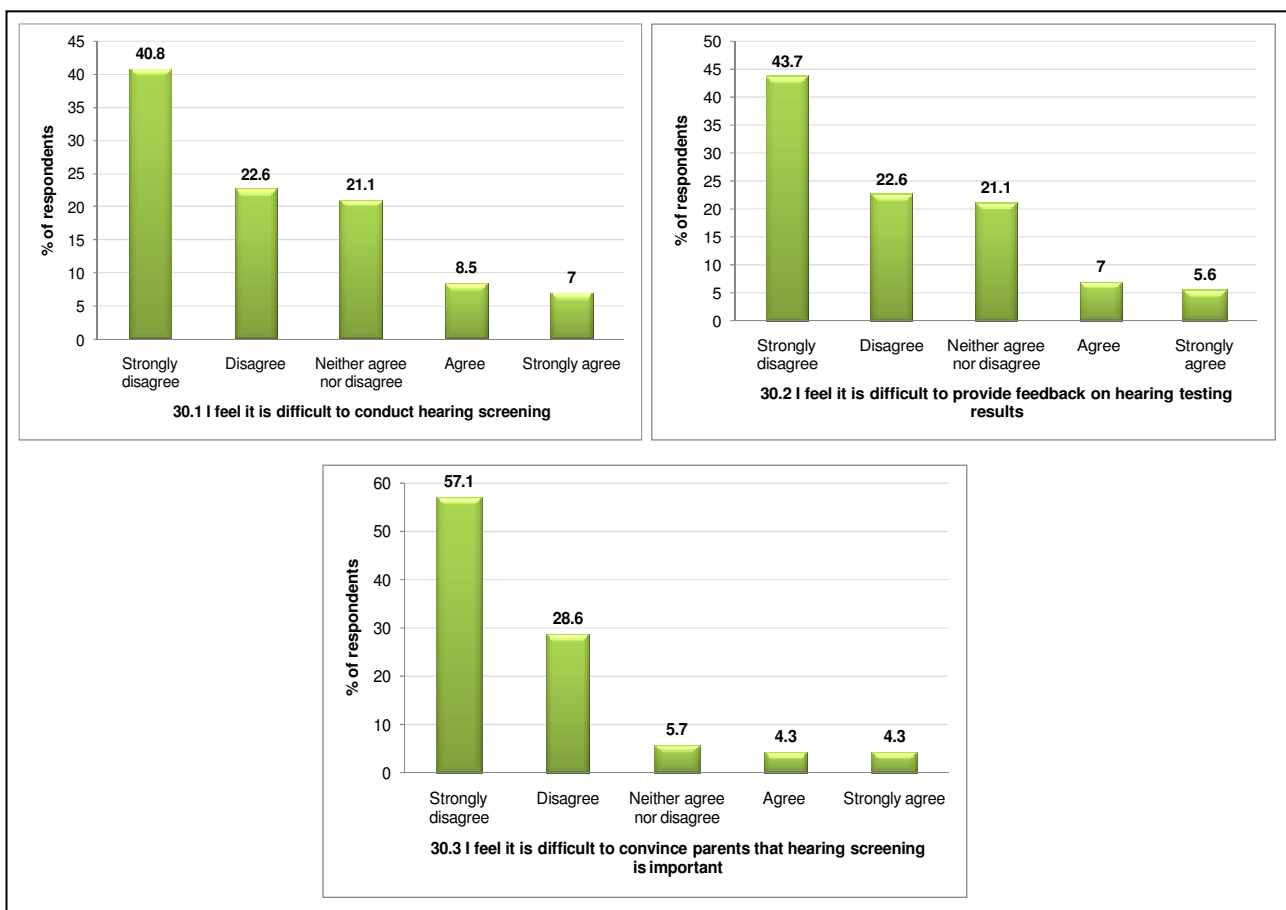


Figure 6: Perceived levels of difficulty in neonatal hearing intervention strategies

The results displayed in Figure 6 above indicate that between 40% and 60% of the participants strongly disagreed that these strategies in hearing intervention are difficult. A further 20 to 30% of participants indicated that they disagreed. Therefore neonatal hearing intervention appears to be one of the areas with the highest level of skill among the participants of this study.

4.3.1.4. Perceived levels of difficulty in general neonatal intervention tasks

Figure 7 illustrates the results of the responses for each sub-option of question 32 on general neonatal intervention tasks.

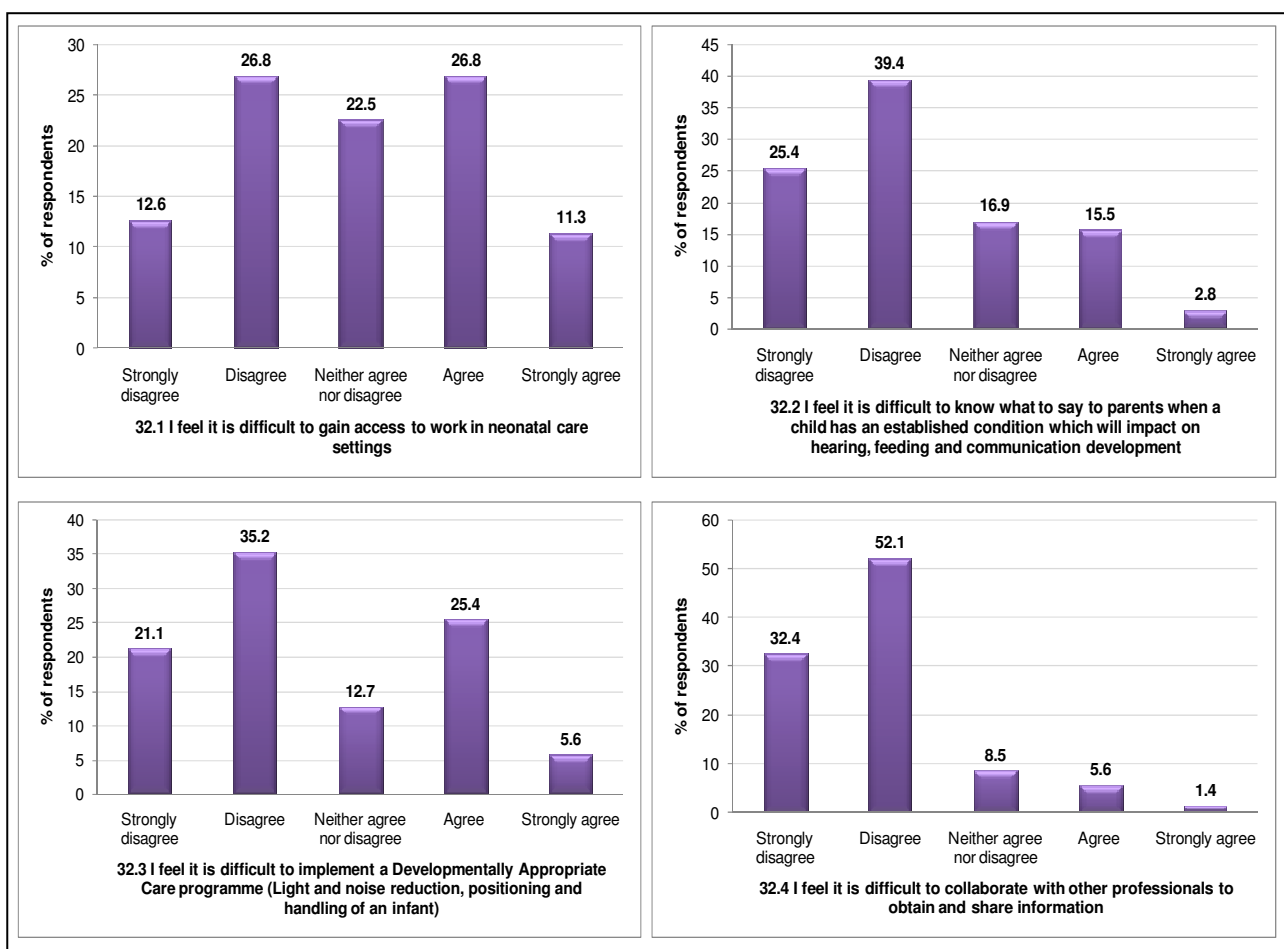


Figure 7: Perceived levels of difficulty in general neonatal intervention tasks (continued on next page)

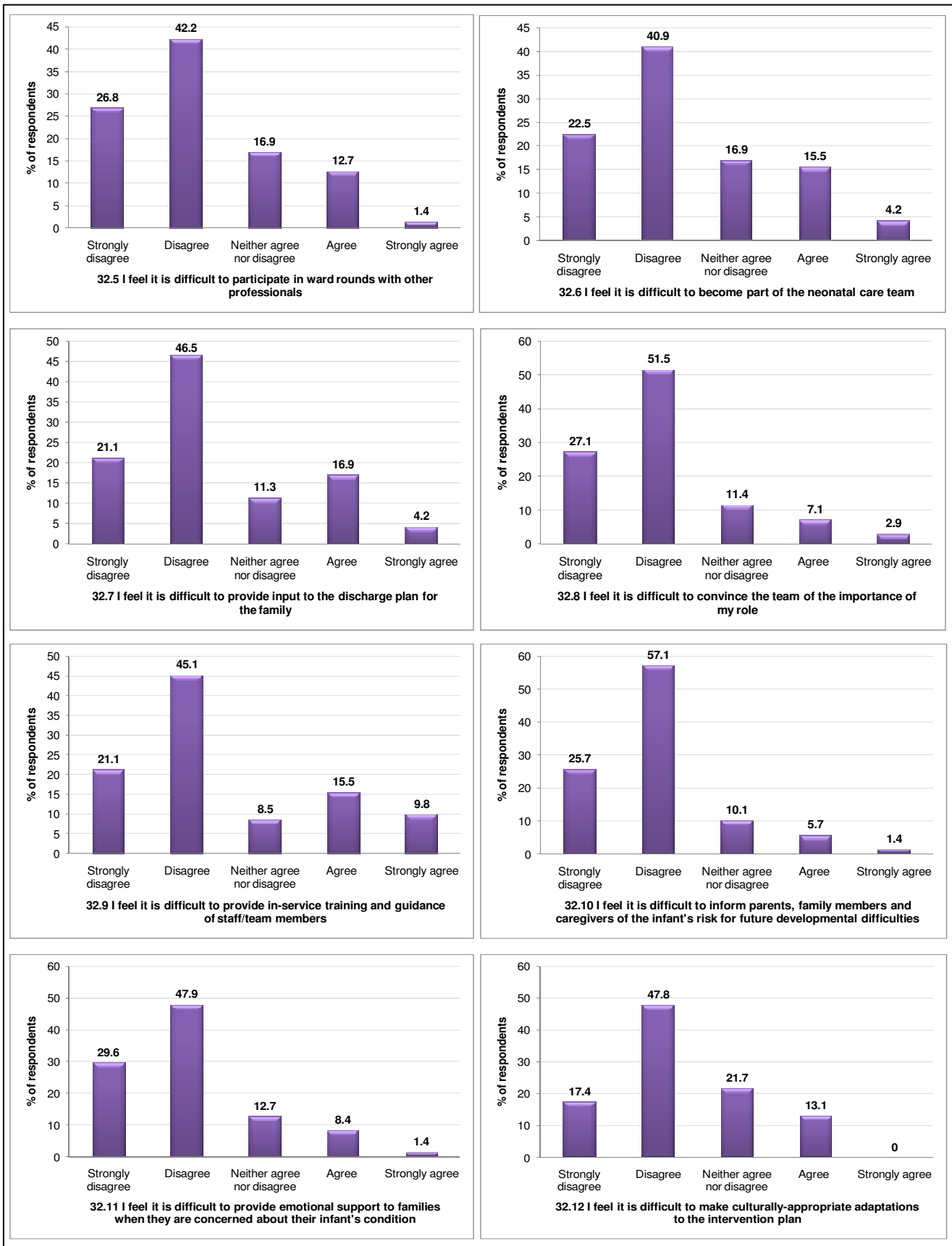


Figure 7: Perceived levels of difficulty in general neonatal intervention tasks (continued from previous page)

Figure 7 illustrates that the majority of the general intervention tasks were deemed not difficult by the participants. Mixed results were, however, obtained for question 32.1 regarding the ability to gain access to work in neonatal care settings. More or less the same percentage of the participants disagreed and agreed with the statement “*I feel it is difficult to gain access to work in neonatal care settings*” (39% disagreed and 38% agreed).

Speech-language therapists who work in provincial hospitals in South Africa often experience many barriers to providing family-centred early intervention services, such as a lack of community awareness of services, inadequate resources, limited trained interpreters and inadequate caregiver literacy (Strasheim et al., 2011). These factors may contribute to a difficulty in gaining access to work in neonatal care settings.

4.3.2. Summary: Perceived levels of difficulty

In order to gain a better understanding of the perceived levels of difficulty that were collected, it is necessary to determine overall scores for each NCI area as a whole.

Table 3 represents the participants’ perceived level of difficulty for specific areas of NCI. The data is represented here in terms of mean scores and standard deviations.

Table 3: Perceived level of difficulty in NCI areas (n=73)

	Area of difficulty	Mean	Standard deviation	Valid n
1	Difficulty of feeding intervention	2.73	1.02	73
2	Difficulty of communication intervention	1.98	0.85	73
3	Difficulty of neonatal hearing intervention	1.99	1.05	71
4	Difficulty of general neonatal intervention tasks	2.30	0.72	71

[1 = not difficult and 5 = very difficult]

According to the means presented in Table 3, it appears that the majority of the participants experienced communication intervention and neonatal hearing intervention as the least difficult areas (i.e. the mean is closer to 1), feeding intervention as a slightly difficult area and general neonatal intervention tasks as neither difficult nor easy.

Standard deviation, however, gives an estimate of the average variability of a set of data (Field, 2009). It is important to consider the distribution of responses, as the mean only provides one part of the result.

- *Difficulty of feeding intervention:* The standard deviation of 1.02 indicates that responses varied between 1.71 and 3.75. Responses in this area were therefore more distributed towards a high level of difficulty.
- *Difficulty of communication intervention:* The standard deviation of 0.85 indicates that responses varied between 1.13 and 2.83. Responses in this area were more distributed towards a low level of difficulty.
- *Difficulty of neonatal hearing intervention:* The standard deviation of 1.05 indicates that responses varied between 0.94 and 3.04. Responses in this area were more distributed towards a low level of difficulty.
- *Difficulty of general neonatal intervention tasks:* The standard deviation of 0.72 indicates that responses varied between 1.58 and 3.02. Responses in this area were closely distributed around the mean, indicating that these tasks were perceived as being neither difficult nor easy.

Communication and hearing intervention were therefore perceived as easier than feeding intervention and general tasks.

4.3.3. Qualitative results on levels of difficulty in NCI areas

The responses that were given in questions 35 and 36 in Section C of the questionnaire are analysed here in a qualitative manner to further describe the areas of NCI that the participants experience difficulty with.

Direct quotations from the following three groups of participants are colour-coded as follows: Red = qualified as audiologist [AU], green = qualified as speech-language therapist [ST], blue = qualified as speech-language therapist and audiologist [STA].

The following themes emerged in the participants' responses:

4.3.3.1. Theme 1: Feeding intervention

Feeding intervention as an area of difficulty came up repeatedly within the qualitative data. The following verbatim statements indicate some of the reasons for this perception:

AU: "I am only qualified in audiology and so would not be able to conduct feeding intervention."

ST: "I have sufficient knowledge. However, there are certain aspects of feeding management which I am unsure of."

ST: "It is difficult to ensure that the parents and sometimes the staff in the NICU understand why feeding needs to be done a certain way. Especially if a hospital is understaffed and there are a lot of shift changes among the nurses. It is also difficult to provide feeding intervention if parents are rarely present."

STA: "I did not receive undergraduate training in neonatal feeding and have not ever done any courses as I have not worked in this field."

STA: "Sometimes progress can be slow and parents don't always see the effects of your work straight away and therefore lose faith in what you are doing. It makes it harder for them to understand why they should follow your instructions."

STA: "Our training with regard to feeding intervention was almost non-existent ..."

It therefore appears that the participants attributed their difficulty with feeding intervention to insufficient training in the area, and also to limited support from other team members in neonatal settings. These include the parents, the most important members of the team.

4.3.3.2. Theme 2: Developmental care

Deeper insight into the nature of difficulties experienced by participants who wanted to implement developmental care was gained through the following statements:

ST: *“I often have difficulty getting the parents to understand the importance of the advice I impart to them. They often feel that they don’t need to talk to their baby because the baby ‘does not talk back’.”*

ST: *“Neonatal wards are, in my experience, not willing to change the way that they do things. They feel that they achieve success and don’t need to change.”*

ST: *“Our recommendations for developmental care are mostly ignored.”*

STA: *“No true developmentally appropriate environment despite training and intervention strategies provided and weekly caregiver training in developmental care.”*

STA: *“Although I know the principles of developmental care, it is very difficult to implement in the wards and difficult to get buy in from nursing staff.”*

It therefore becomes clear that although many of the participants have the required knowledge to implement developmental care strategies, they experience difficulty to motivate the rest of the neonatal team into action.

4.3.3.3. Theme 3: No areas of difficulty

Some participants, however, indicated that they did not experience difficulty with any of the different components of NCI. The following statements represent some of the reasons for this perception:

STA: *“I feel confident in most areas of work in NCI.”*

STA: *“I feel my training is adequate and I’ve always done this in a team that I trust.”*

The participants who did not experience difficulties in NCI areas were mostly dually qualified, and had completed a Master’s degree within the last ten years. It appears that their postgraduate qualifications led to increased self-confidence and an improved ability to work in a team. Improved collaboration skills could help the professional to overcome resistance to the implementation of developmental care.

4.3.3.4. Summary of qualitative results

The greatest areas of difficulty, according to the qualitative results, therefore appear to be feeding intervention and developmental care, and difficulty in motivating team members to sustain the implementation of various NCI strategies.

4.4. Perceived levels of confidence in NCI areas

The participants' self-perceived levels of confidence in the provision of NCI were obtained from Section C of the questionnaire, specifically questions 25, 27, 29 and 31. The responses obtained from these questions are presented in the following order:

Firstly, the descriptive percentages of each question are given and discussed, namely:

- Perceived levels of confidence in multiple feeding intervention strategies.
- Perceived levels of confidence in multiple communication intervention strategies.
- Perceived levels of confidence in multiple hearing intervention strategies.
- Perceived levels of confidence in general neonatal intervention tasks.

Secondly, a summary of the mean scores and standard deviation for each NCI area as a whole is given, thus the general scores for feeding intervention, communication intervention, neonatal hearing intervention and general neonatal intervention tasks. These scores are then interpreted and discussed.

Thirdly, a qualitative description of the areas of most success is given. The data for this description were obtained from questions 33 and 34 in Section C: "What has been your most successful role in NCI? Please motivate your answer". The themes that emerged in the data are described, and direct quotations from the participants' answers representing each theme are given and analysed critically.

4.4.1. Descriptive percentages

In the following figures of confidence levels, all numbers correspond with the numbered questions of the questionnaire as presented in Appendix E. In the descriptive sections, the percentages for “Agree” and “Strongly agree” are once again combined, as well as the percentages for “Disagree” and “Strongly disagree”.

4.4.1.1. Perceived levels of confidence in multiple feeding intervention strategies

Figure 8 illustrates the results of the responses for each sub-option of question 25 on the provision of feeding intervention.

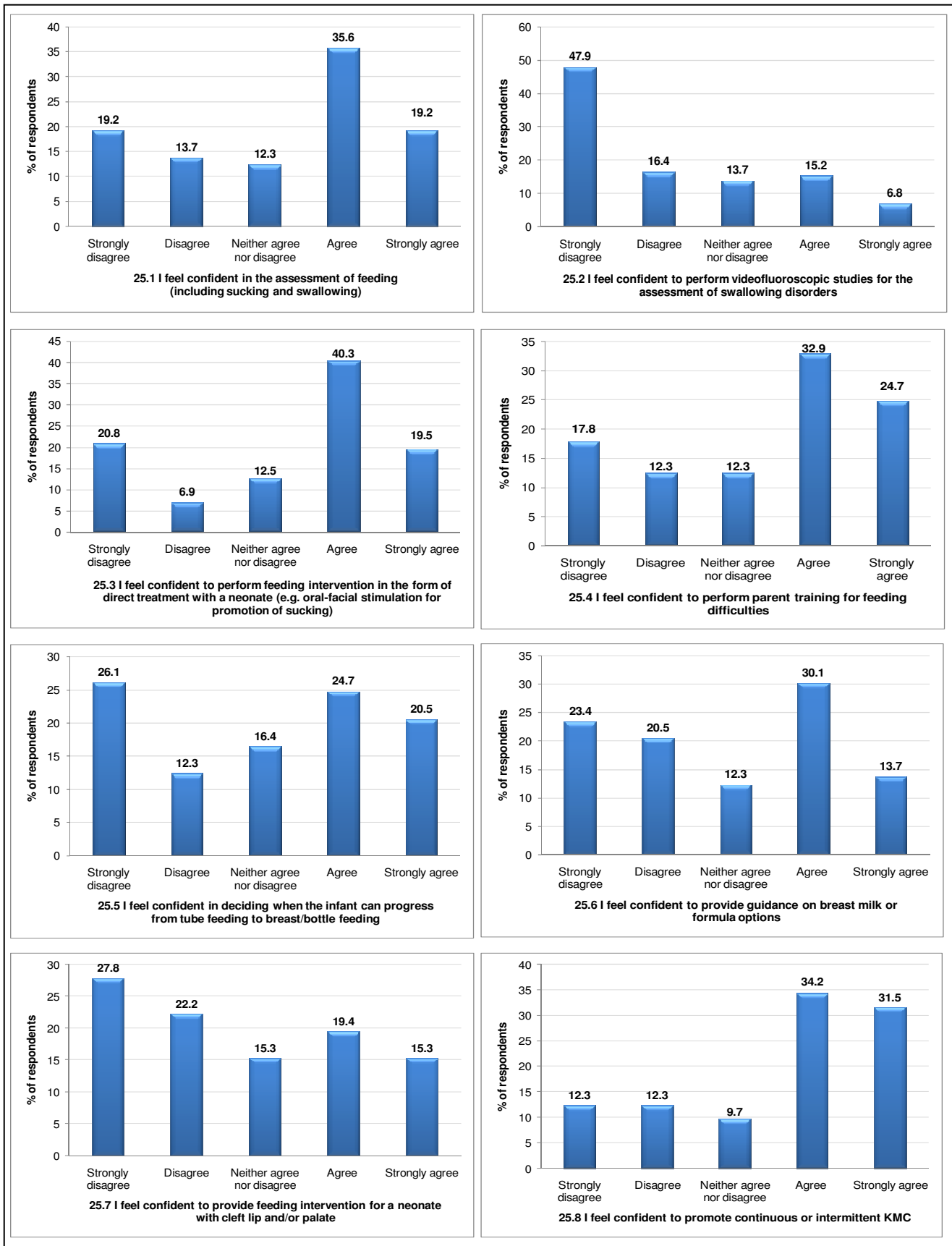


Figure 8: Perceived levels of confidence in feeding intervention strategies

The results represented in Figure 8 indicate a great variability in the confidence levels of the participants regarding feeding intervention. The majority of the participants experienced some level of confidence in terms of feeding assessment (55%), feeding intervention in the form of direct treatment of the neonate (60%), parent training for feeding difficulties (58%) and the promotion of KMC (66%). The majority did not, however, report confidence in the performance of videofluoroscopic studies (64%). This result corresponds well with the perceived levels of difficulty as described in Figure 4. There appears to be great variability in the perceived confidence levels to decide when an infant can progress from tube feeding to breast/bottle feeding, to provide guidance on breast milk or formula options and to provide feeding intervention for a neonate with cleft lip and/or palate.

4.4.1.2. Perceived levels of confidence in multiple communication intervention strategies

Figure 9 illustrates the results of the responses for each sub-option of question 27 on the provision of communication intervention.

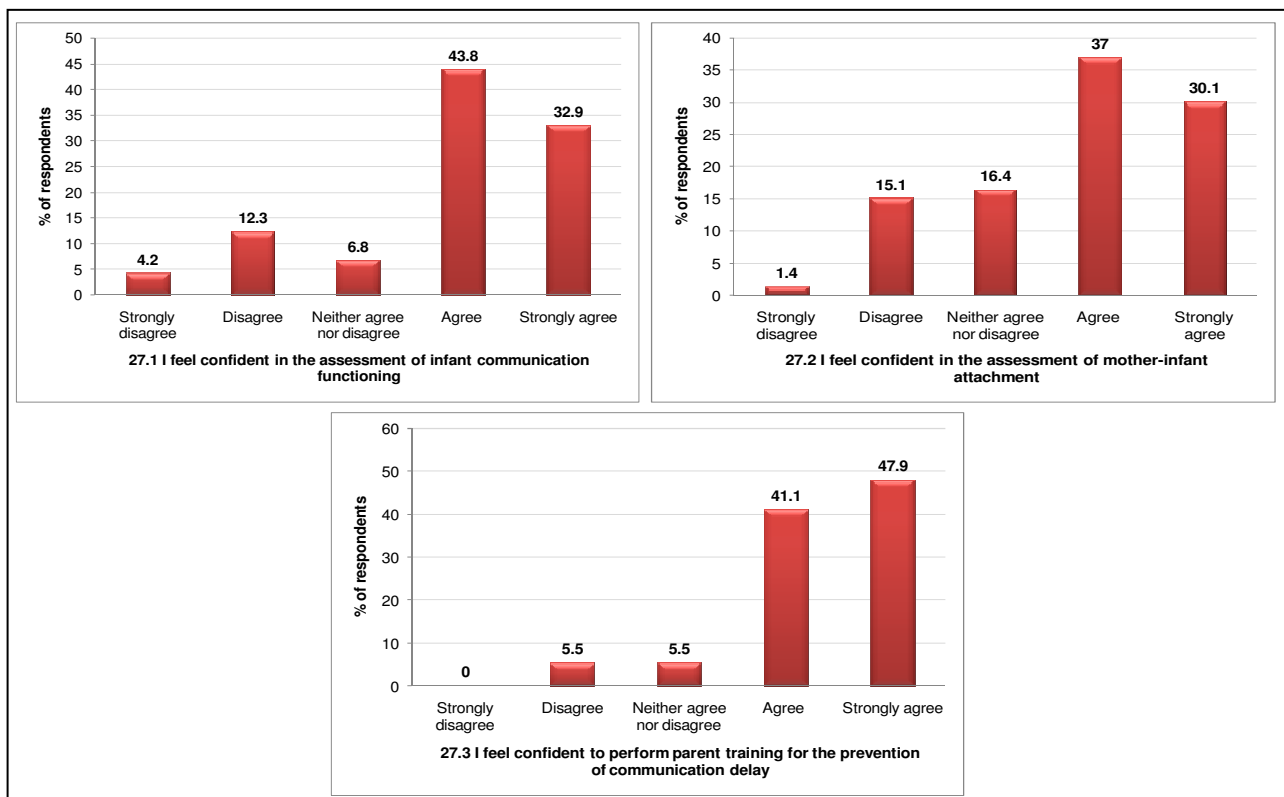


Figure 9: Perceived levels of confidence in communication intervention strategies

Figure 9 illustrates that the majority of the participants experience confidence in all three strategies that were listed as part of communication intervention. These strategies are: assessment of mother-infant attachment (67%), assessment of infant communication functioning (77%) and performing parent training for the prevention of a communication delay (89%). Once again, these results correspond well with those presented in Figure 5.

4.4.1.3. Perceived levels of confidence in multiple hearing intervention strategies

Figure 10 illustrates the results of the responses for each sub-option of question 29 on the provision of neonatal hearing intervention.

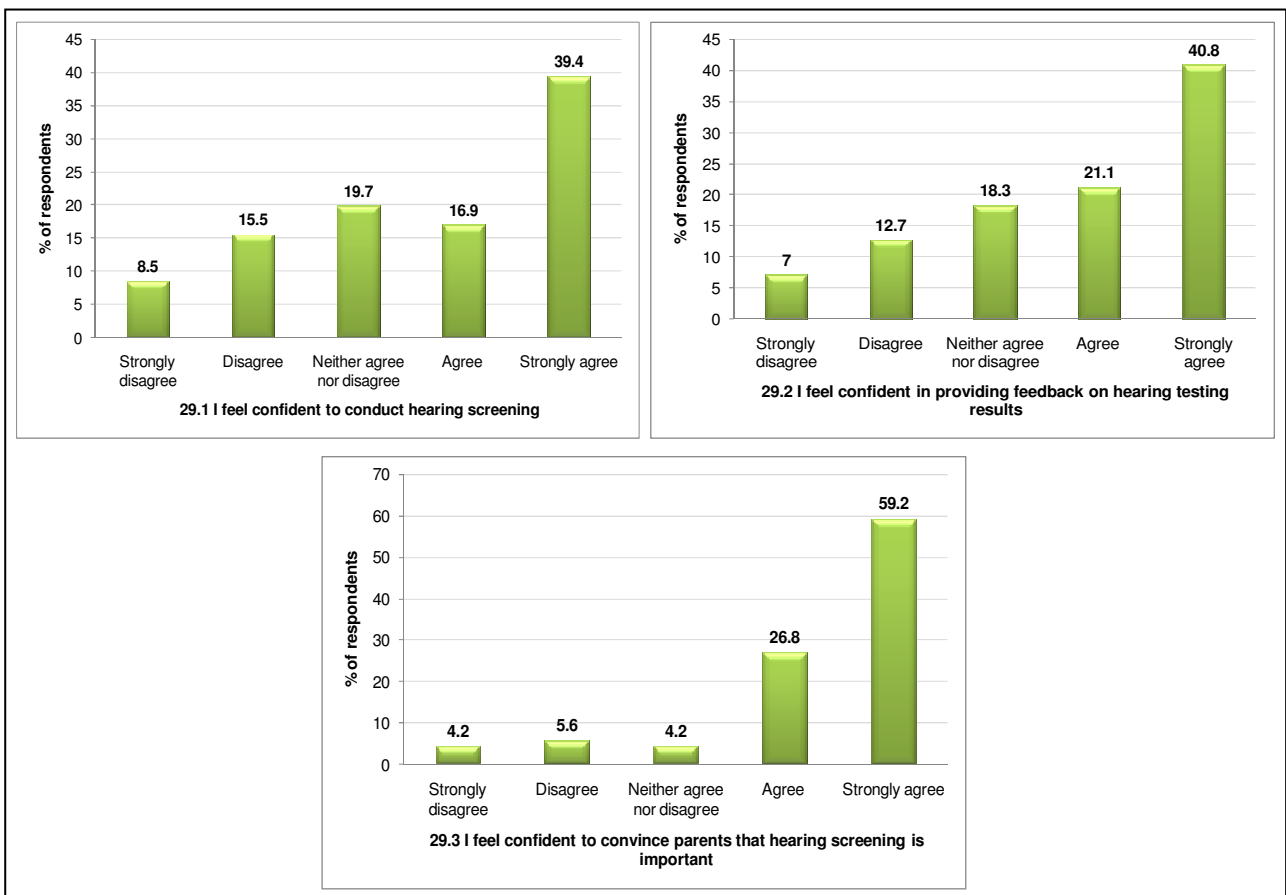


Figure 10: Perceived levels of confidence in neonatal hearing intervention strategies

According to Figure 10 the majority of the participants report a high level of confidence in all three strategies that were listed as part of neonatal hearing intervention. These strategies are: conducting hearing screening (56%), providing feedback on hearing testing results (62%) and convincing parents that hearing screening is important (86%). These results correspond well with those presented in Figure 6, implying that participants' perceptions were that they had knowledge and confidence to perform hearing screening in neonatal settings.

4.4.1.4. Perceived levels of confidence in general neonatal intervention tasks

Figure 11 illustrates the results of the responses for each sub-option of question 31 on general neonatal intervention tasks.

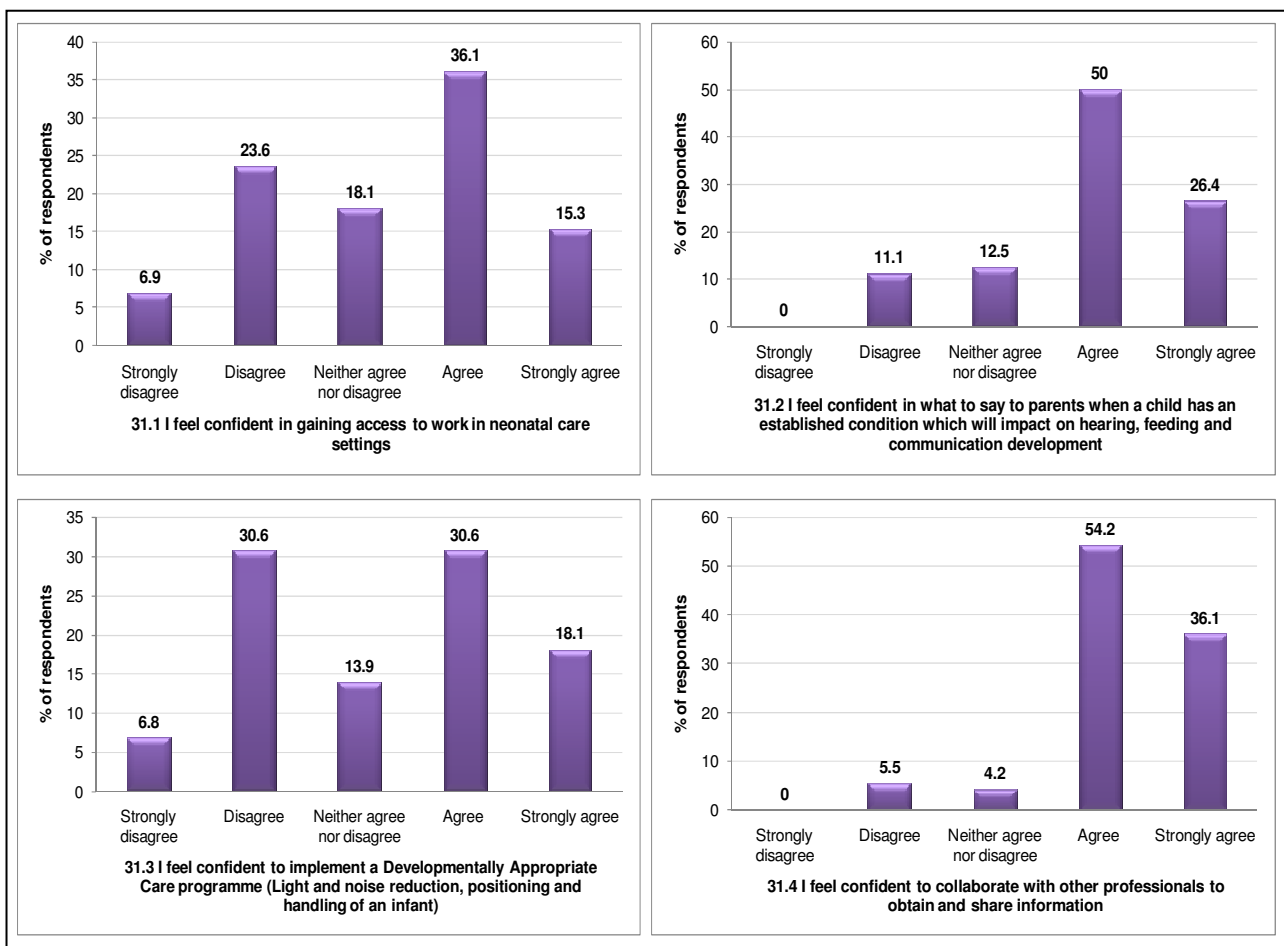


Figure 11: Perceived levels of confidence in general neonatal intervention tasks (continued on next page)

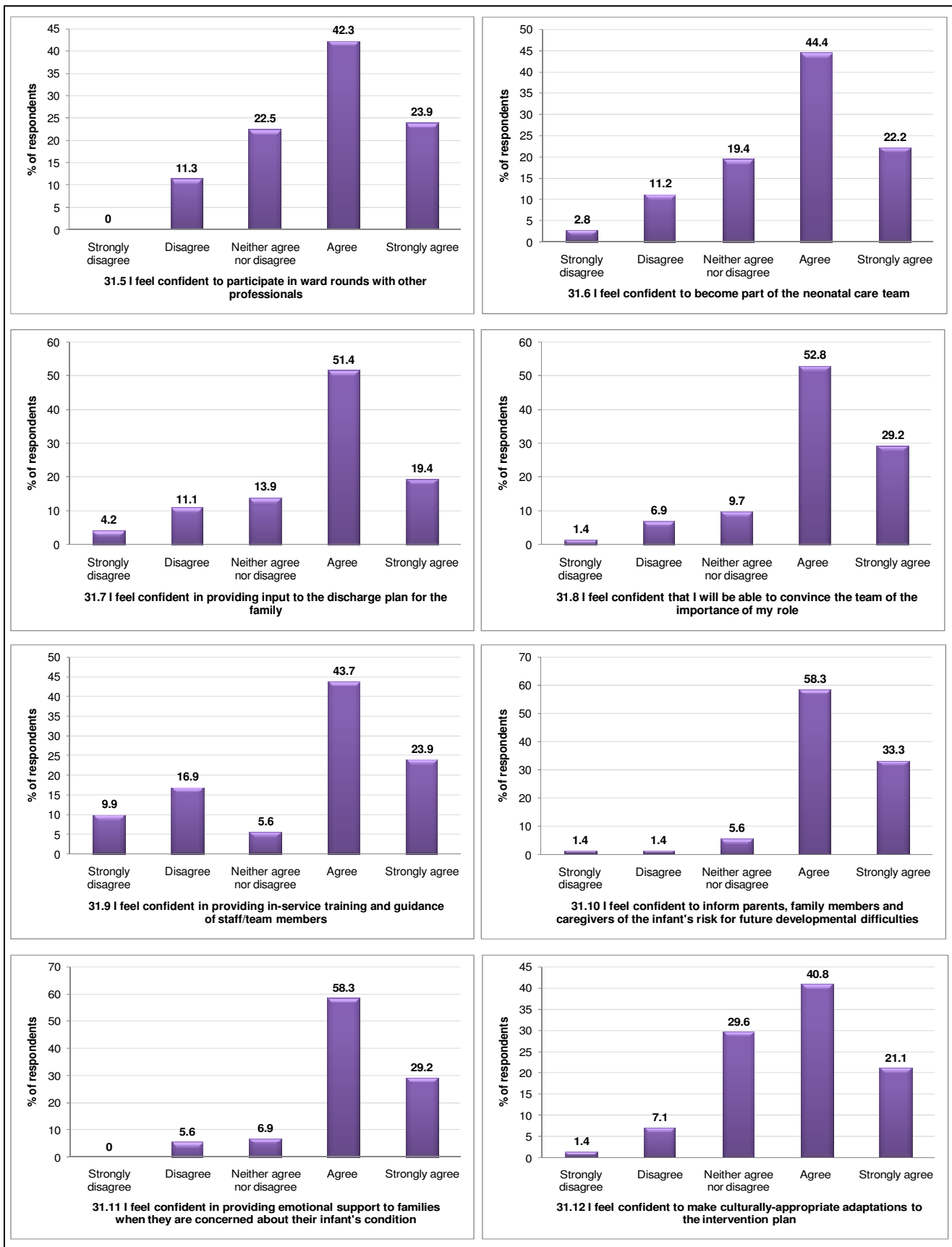


Figure 11: Perceived levels of confidence in general neonatal intervention tasks (continued from previous page)

Figure 11 illustrates that the participants experienced some level of confidence in the majority of the general intervention tasks. Mixed results were, however, obtained regarding the implementation of a developmentally appropriate care programme. 49% of the participants experienced confidence in this area, but 37% did not. This result reiterates the qualitative results described in 4.3.3.2.

Although the majority of the participants experienced confidence in gaining access to work in neonatal care settings (51%), a number of participants did not feel confident in this regard (30%). This finding confirms the results described in 4.3.1.4.

In addition, the majority of the participants reported some level of confidence in making culturally-appropriate adaptations to the intervention plan (62%). There was, however, a smaller yet important segment of participants who were unsure about their confidence levels in this regard (30%). Strasheim (2009) found similar results in this regard, with one participant stating that culturally appropriate tools were needed. The British/American tools that are often used are not always appropriate in the South African context.

4.4.2. Summary: Perceived levels of confidence in NCI areas

In order to gain a better understanding of the perceived levels of confidence, it is necessary to determine overall scores for each NCI area.

Table 4 represents the participants' perceived level of confidence in the provision of NCI.

Table 4: Perceived level of confidence in NCI areas (n=73)

	Area of confidence	Mean	Standard deviation	Valid n
1	Confidence in feeding intervention	3.03	1.17	73
2	Confidence in communication intervention	4.00	0.87	73
3	Confidence in neonatal hearing intervention	3.90	1.13	73
4	Confidence in general neonatal intervention tasks	3.79	0.65	72

[1 = not confident and 5 = very confident]

As depicted in Table 4 the means for each area of confidence suggest that participants experienced a high level of confidence in all areas. The mean scores, however, only provide one part of the result. Standard deviation clarifies the results, because it allows for the consideration of the distribution of responses.

- *Confidence in feeding intervention:* The standard deviation of 1.17 indicates that responses varied between 1.86 and 4.2. Responses in this area were more distributed towards a high level of confidence.
- *Confidence in communication intervention:* The standard deviation of 0.87 indicates that responses varied between 3.13 and 4.87. Responses in this area were only distributed within the range for a high level of confidence.
- *Confidence in neonatal hearing intervention:* The standard deviation of 1.13 indicates that responses varied between 2.77 and 5. Responses in this area were only distributed within the range for a high level of confidence.
- *Confidence in general neonatal intervention tasks:* The standard deviation of 0.65 indicates that responses varied between 3.14 and 4.44. Responses in this area were only distributed within the range for a high level of confidence.

Although all areas of confidence were distributed within the range for a high level of confidence, there was a smaller yet important segment of participants who rated their level of confidence in feeding intervention as “1” or “2”.

4.4.3. Qualitative results on levels of confidence in NCI areas

The responses that were given in questions 35 and 36 in Section C of the questionnaire are analysed here in a qualitative manner to further describe the areas of NCI that the participants experience difficulty with.

Direct quotations from the following three groups of participants are colour-coded as follows: Red = qualified as audiologist [AU], green = qualified as speech-language therapist [ST], blue = qualified as speech-language therapist and audiologist [STA].

The following themes emerged in the participants’ responses:

4.4.3.1. Theme 1: Hearing screening

30% of the participants indicated that their most successful role in NCI has been hearing screening. Statements such as the following indicate why:

AU: "I have screened hundreds of children and have been able to intervene early in cases where there is some measure of hearing loss."

AU: "I am constantly informing other disciplines and motivating for the importance of neonatal hearing screening. I have the support of the paediatricians and the nursing staff in our hospital."

ST: "Hearing screening has led to many babies with hearing loss or potential ear problems diagnosed very early on – leading to optimal prognoses."

STA: "I work in an Audiology setting with a well-established hearing screening program. We conduct screenings and follow-up tests on a daily basis."

STA: "This is the area where I probably had the most training and guidance. It was also fairly straight-forward (although that was many years ago and I am aware that there have been many advances in the field of Audiology since then)."

These statements are encouraging, as it confirms that successful hearing screening programmes are a reality in South Africa. Meyer et al. (2012: 702) states that "Newborn hearing screening should be considered standard of care for neonates". Although Meyer et al. (2012) found few established hearing screening programmes in South Africa, the participants who conduct hearing screening reported great satisfaction with their contribution. Hearing screening programmes should be managed optimally and maintained in order to make a difference in the lives of preterm infants.

4.4.3.2. Theme 2: Feeding intervention

Although feeding intervention was perceived as one of the more difficult areas in NCI (as discussed in 4.3.3.1), many participants also indicated that it has been their most successful role (27%). Statements such as the following were made:

ST: *“I work mostly with newborn feeding difficulties therefore I feel more confident with this area.”*

ST: *“I have developed successful skills in the area of feeding intervention. Especially with regards to the very low birth weight and premature babies. Once stabilized, I was able to intervene and get them sucking.”*

ST: *“I provide intervention in the following settings with neonates: post delivery wards (when babies are rooming in with moms), nursery high care and low care departments. In these roles I work with babies who are feeding non-orally, require other forms of oral feeding (such as bottle or syringe) and those who are NPO. In my experience I have transitioned babies to oral feeding, supported moms during this time (emotionally and with caring for their baby, completing therapy independently). This has allowed me to be more confident now in my practice with neonates.”*

ST: *“Providing feeding intervention to help the neonate pick up weight and become healthy enough for discharge.”*

STA: *“After a basic training course I have taught myself through research and hands on experience. I have achieved good results and good feedback from paediatricians. There is a huge need for further instruction and guidance. Also, Kangaroo care and parent training are an intrinsic part of feeding intervention.”*

Their statements clearly prove that these speech-language therapists have a sound understanding of the implications of feeding intervention. It appears that the majority of participants, who feel feeding intervention has been their most successful role, attribute their skills to experience and past success.

4.4.3.3. Theme 3: Parent training

An important segment of the participants felt that parent training has been their most successful role in NCI service provision. The following statements represent some of the reasons for this perception:

ST: *“A therapist cannot attend to every child all the time. By empowering parents to care for their children and provide therapeutic strategies appropriately, we allow them to take control of their child’s well-being.”*

ST: *“Parents are not always able to come for follow up regularly. Parent training gives them the skills to cope in the therapist’s absence.”*

ST: *“Parent training is less invasive and hands-on.”*

STA: *“I feel that the intervention we are able to give in the NICU is limited. Empowering caregivers is a way of ensuring that what we do carries over into the child’s real life and has the possibility to impact more than just one child. Parents often have access to more than one child and what we teach them can have a much more far reaching effect than what we did with that child in the hospital.”*

STA: *“It’s good to see how parents react positively to the information and training that has been given to them.”*

STA: *“All of the roles can only be achieved if the parents believe in the concept of NCI. Parent goals drive staff consistency in providing all the other interventions.”*

STA: *“Investing time with parent training is critical and has long term benefits.”*

It is clear that the participants, who experienced parent training as their most successful role, felt that this is the best way of impacting on a child’s life in the long-term. It appears that these participants understand that parents may be the most crucial members of the neonatal care team.

4.4.3.4. Summary of qualitative results

The areas of most success and confidence, according to the qualitative results, therefore appear to be hearing screening, feeding intervention and parent training. It furthermore seems that the participants mostly attributed their feeling of confidence to the amount of experience they have in these particular areas. While NCI may be an emerging area of practice in South Africa, it is encouraging that clinicians have confidence in their skills to perform different roles.

4.4.4. Integration of results: Difficulty and confidence levels

In summary, feeding intervention is the only area that was distributed towards a high level of difficulty (as seen in Table 3), as well as being the only area where some participants indicated a low level of confidence (as seen in Table 4). The lowest levels of confidence were experienced in the performance of videofluoroscopic studies for the assessment of swallowing disorders, the provision of feeding intervention for a neonate with cleft lip and/or palate, the provision of guidance on breast milk or formula options and the decision on when an infant can progress from tube feeding to breast/bottle feeding. Feeding intervention was therefore the most dominant area of difficulty across all the results.

Most participants furthermore indicated that they mostly experienced high levels of confidence and low levels of difficulty in terms of communication intervention, neonatal hearing intervention and general neonatal intervention tasks.

A recent study from Brazil emphasised the demand for speech-language intervention in the neonatal unit of a teaching hospital, especially among newborns with oral feeding difficulties (Monti et al., 2013). The findings indicated that early care by a speech-language therapist when the infant is still in the intensive care unit contributed to faster progress in terms of feeding, which led to earlier discharge from the hospital (Monti et al., 2013). Although the need for feeding intervention is recognised, it appears that many neonatal services in Brazil did not have a “speech and hearing therapist” on staff, and the physicians often neglected to refer this risk population for early speech-language therapy before introducing oral feeding (Monti et al., 2013). Without an evaluation by a speech-language therapist before oral feeding is initiated, safe, efficient feeding may be at risk, which could have adverse consequences on the clinical stability of the infant (Monti et al., 2013).

According to Strasheim (2009), who described the perceptions of 41 South African speech-language therapists and/or audiologists regarding their role in neonatal nurseries, the majority of participants were the only speech-language therapist working in the hospital. With such large case loads and limited time, they were often not involved in discharge planning and planning of follow-up services.

Strasheim (2009) furthermore reported that 53% of her participants indicated that they only “sometimes” felt competent to work in neonatal nurseries. The uncertainty displayed by the participants in the current study in terms of feeding intervention therefore agrees with the findings of Strasheim (2009), and it appears that the situation has not changed since that study was conducted.

To further investigate the participants’ self-perceived skills, their most successful roles in NCI and their areas of difficulty were determined. Table 5 represents the frequency distribution of the 73 participants’ responses.

Table 5: Most successful role in NCI versus areas of difficulty (n=73)

Question	Category	Frequency	(%)
Most successful role in NCI (2 missing values)	Hearing screening	21	29.6%
	Feeding intervention	19	26.8%
	Kangaroo Mother Care (KMC)	4	5.6%
	Parent training	14	19.7%
	Developmental care	3	4.2%
	Other	10	14.1%
	TOTAL	71	100%
NCI areas of difficulty (12 missing values)	Hearing screening	8	13.1%
	Feeding intervention	28	45.9%
	Kangaroo Mother Care (KMC)	4	6.6%
	Parent training	2	3.3%
	Developmental care	8	13.1%
	Other	11	18.0%
	TOTAL	61	100%

In Table 5 it is clear that the areas of most successful intervention for some participants were also the areas that other participants experienced most difficulty with. These results could once again relate to the varied ECI and NCI training of the participants (see Table 2 and Figures 1 to 3).

The majority of participants indicated that their most successful roles in NCI have been hearing screening, feeding intervention and parent training, but that they find feeding intervention difficult. These results are in agreement with the results as displayed in Tables 3 and 4.

- **Hearing screening**

In Chapter 3 of this dissertation an overview of the participant characteristics were provided (see Table 3). The majority of participants were dually qualified in Audiology and Speech-language therapy (i.e. 61.6%). According to the guidelines for hearing screening as prescribed by SASLHA (2011c) both audiologists and speech-language therapists are trained in and may conduct hearing screening. It can therefore be concluded that the majority of the participants in this study have experience in this area of NCI, and can therefore deem hearing screening to be one of their most successful roles.

- **Feeding intervention**

Although many participants (27%) indicated that feeding intervention was their most successful role, a greater number of participants (46%) indicated that they experienced difficulty with feeding intervention (see Table 5). The reason why it is often seen as the most successful role for speech-language therapists may be because feeding intervention may have the most significant impact on a neonate's life and progress (Arvedson & Brodsky, 2002; SASLHA, 2011a).

However, the fact that the majority of participants indicated that they experienced difficulty with feeding intervention is expected, because feeding intervention remains the most complex area of NCI (Arvedson & Brodsky, 2002). A preterm infant's difficulties with optimal feeding can influence parent-infant interaction negatively and prolong hospitalisation (Garber, 2013). These challenges become even greater when complications such as chronic lung disease and gastro-oesophageal reflux problems are present (Garber, 2013). As integral members of the NICU team, speech-language therapists' focus on oral feeding facilitation is vital to the overall developmental care that is provided in the NICU (Arvedson et al., 2010).

- **Parent training**

The number of participants (20%) who indicated that parent training during NCI was one of their most successful roles was far greater than those who reported that they experienced difficulty with it (3%). Parent training, in general, is an intervention strategy that forms part of all areas of audiology and speech-language therapy service provision, whether during assessment, intervention and/or follow-up. Both

fields recognise the crucial role that parents play in the development of their children. Interventions that are implemented by trained parents can be effective in facilitating expressive language development (ASHA, 2008).

Parent training can reduce parental stress, because increasing knowledge of their preterm infant's condition can strengthen their sense of parenting (Matricardi, Agostino, Fedeli & Montirosso, 2012). Teaching parents how to implement natural intervention strategies may be an effective strategy for promoting learning and the use of new communication skills in everyday social situations (ASHA, 2008).

Research by Miedel and Reynolds (2000) also suggests that parental involvement in early intervention has an important influence on short- and long-term benefits for children. Parental support programmes may also reduce the length of stay in the NICU, and parent training has also been linked with improved cerebral white matter development in preterm infants (Matricardi et al., 2012).

Another observation from Table 5 is that a small number of participants (6%) indicated that KMC was their most successful role, and the same number of participants indicated that they experienced difficulty with it. As KMC has been identified as the ideal entry point for the provision of NCI services, it is concerning that only 6% of the participants recognised KMC as one of their most successful roles. Kritzinger and Louw (2003) reported that their students at the University of Pretoria had a great deal of previous exposure to KMC in a theoretical module, and that they had seen its application with preterm infants.

Statements by the participants regarding KMC illustrate why some regard this as a successful role, while others experience difficulty with it:

STA: "I have very little exposure to this."

STA: "I feel confident about my skills to provide information and guidance to parents about KMC."

KMC is an evidence-based, well-established developmental care strategy for all newborns. It has been more than 35 years since Edgar Rey Sanabria responded to the high rate of morbidity and mortality among low birth weight/preterm newborns in Bogotá, Colombia, with guidelines that have become known as "kangaroo mother

care” (Rodgers, 2013). In South Africa there are multiple KMC sites in almost every province, and low-cost KMC models are employed for lower levels in the health system (Shrivastava, Shrivastava & Ramasamy, 2013). South African speech-language therapists should therefore be familiar with KMC and know their role in the intervention technique.

The variety of perceptions described thus far may be a reflection of the great diversity in undergraduate ECI and NCI training programmes (as described in 4.2.). According to Table 2 in Chapter 3, five universities were represented in the participants’ undergraduate training, and it appears that there is no uniformity in ECI training.

4.5. Needs of the participants regarding NCI

The participants’ needs regarding NCI were obtained from Section C of the questionnaire, specifically questions 39 to 42. The responses that were obtained from these questions are presented in the following order:

Firstly, the descriptive percentages of question 39 are given and discussed. In this question participants indicated which areas of NCI they needed more information on and for which they would like to learn skills.

Secondly, a qualitative description of the participants’ areas of need in terms of knowledge, as well as the techniques/skills that they wanted more information on, is given. The data for this description were obtained from questions 40 to 42 in Section C of the questionnaire. The themes that emerged in the data are described, and direct quotations from the participants’ answers representing each theme are given and analysed critically.

4.5.1. Descriptive percentages

Figure 12 presents the frequency distribution of the participants’ areas of need regarding NCI. The data collected from question 39 in Section C of the questionnaire were used to compile this graphical representation.

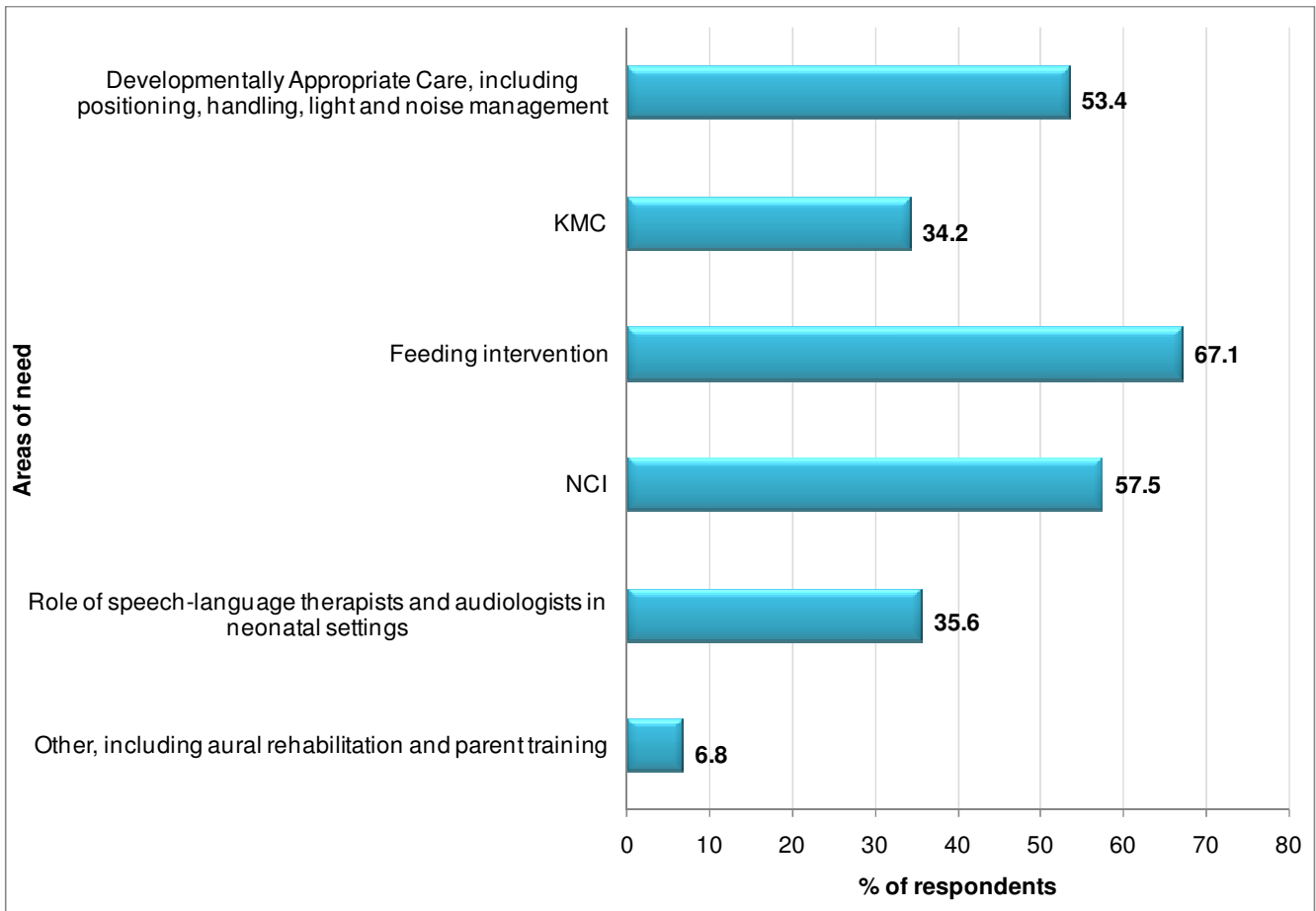


Figure 12: Needs with regard to NCI (n=73)

Figure 12 reveals that the majority of participants (67%) needed information and/or training in feeding intervention, a fact which once again confirms the previous results. Further training needs that were listed ranging from greatest need to lowest need included NCI, developmentally appropriate care, the role of the speech-language therapist and audiologist, and finally KMC. Other training needs were listed, such as aural rehabilitation and parent training, but at a relatively low frequency. NCI is clearly still a new strategy that needs to expand, but this expansion should start with appropriate training of audiologists and speech-language therapists in NCI.

4.5.2. Qualitative results on needs

The responses that were given in questions 40 to 42 in Section C of the questionnaire were analysed qualitatively to further describe the needs of the participants regarding NCI.

The following themes emerged in the participants' responses:

4.5.2.1. Theme 1: Feeding intervention

Upon analysis of the responses obtained from questions 40 and 41 in Section C of the questionnaire, feeding intervention was once again the dominant area of need. Comments such as the following were made:

ST: "My greatest need is to assist mothers emotionally when their baby is not sucking at all. I find that the mothers often get very frustrated. It's important to impart the facts about their baby's feeding and expectations for development. I also think that speech-language therapists should be trained to insert the feeding tubes."

ST: "I need information on: different methods of feeding if breastfeeding or bottle feeding is not appropriate, methods on how to help with feeding with limited resources and limited staff members that are on board with feeding intervention."

STA: "Assessment of feeding; practical training in the use of videofluoroscopic examination; intervention techniques for specific feeding difficulties."

The participants also mentioned that they need information and training in oral stimulation, transitioning from tube feeding to breast/bottle feeding, how to improve swallowing in newborns, assessment of suck-swallow-breathe synchrony, eliciting sucking and also how to provide feeding intervention for special populations. The needs in terms of feeding intervention were clearly diverse.

4.5.2.2. Theme 2: Practical training

Many participants indicated that they have a need to learn different NCI strategies in a practical way, and attributed their lack of practical exposure to their undergraduate training. The following comments illustrate this:

ST: "How to provide intervention practically. We received a lot of theory in our degree but not enough practical exposure. I learnt most of my knowledge through hands on experience in my community service year."

ST: “More emphasis needs to be placed on actual practical experience in our undergraduate degree, combining what we learn theoretically with practical experience.”

STA: “Universities need to standardise their training and ensure practicals are done.”

STA: “I would like practical application of the theory.”

There is clearly a great need for more practical training in NCI. These comments confirm the variability in the participants’ ECI and NCI training that was noted in Figures 1 to 3 (see 4.2.).

4.5.2.3. Theme 3: Management of NCI programmes

A few participants also indicated a need for information on how to manage and maintain NCI programmes in the hospital setting. These comments were given:

STA: “Ways to get hospitals to be open to introducing hearing screening programs and to possibly include payment for these services in hospital newborn birth packages.”

STA: “How to implement a training programme or conduct intervention specifically targeting the nursing staff in the NICUs of public hospitals, and to gain their trust and respect. I find this extremely challenging. And then how to sustain such projects/training programmes in this context.”

These issues are important to the success of NCI services. Without proper management and maintenance these programmes may not be implemented optimally.

4.5.2.4. Theme 4: Research

Some statements were also made regarding further research in NCI, such as the following:

ST: “I would like information on how to design different research studies for my students to determine the effect of different neonatal interventions in South African hospitals.”

STA: “More South African research is needed to convince professionals about benefits of early intervention.”

NCI is currently receiving a large amount of attention in clinical and academic settings, which should help to increase the number of research studies in this field (Kritzinger & Van Rooyen, 2014; McInroy & Kritzinger, 2005; Strasheim, 2009).

4.5.2.5. Summary of qualitative results in NCI areas of need

The greatest areas of need, according to the qualitative results, therefore appear to be feeding intervention, practical training, management of NCI programmes and more South African research in the field. Other aspects that were listed include, but are not limited to, KMC, developmental care, counselling of families, positioning and handling of infants, managing cleft palate cases and the scope of practice of audiologists and speech-language therapists. The variety in the participants’ needs partly reflects the diversity in their practical training and exposure to different NCI activities. The following results will provide some reasons for the participants’ responses.

4.6. Significant associations and correlations between participant characteristics and self-perceived skills

Associations and correlations between the independent variables (i.e. professional qualification, current profession, year in which the participants qualified and their years of clinical experience) and the dependent variables (i.e. difficulty and confidence levels) were investigated.

Table 6 presents the *p*-values for the Monte Carlo significance test.

Table 6: Associations between the participants' professional qualifications and their current field of practice (Monte Carlo significance)

	Professional qualification	Current profession
Difficulty levels		
Difficulty of feeding intervention	0.667	0.516
Difficulty of communication intervention	0.010*	0.122
Difficulty of neonatal hearing intervention	0.000*	0.000*
Difficulty of general neonatal intervention tasks	0.227	0.299
Confidence levels		
Confidence in feeding intervention	0.059	0.032*
Confidence in communication intervention	0.018*	0.174
Confidence in neonatal hearing intervention	0.000*	0.000*
Confidence in general neonatal intervention tasks	0.531	0.707

* significant associations: $p \leq 0.05$

According to Table 6 there was a significant association between the participants' current profession and their confidence in the provision of feeding intervention and neonatal hearing intervention. This is as expected, as speech-language therapists perform feeding intervention, and audiologists perform neonatal hearing intervention. These significant associations therefore confirm the known roles of audiologists and speech-language therapists.

The Monte Carlo significance test furthermore revealed that both confidence and difficulty levels in communication intervention and neonatal hearing intervention were significantly associated with the participants' professional qualification. These two areas are also specific to the roles of the speech-language therapist and audiologist respectively.

In Table 7 the significant correlations between the dependent variables (confidence and difficulty levels) and the ordinal independent variable are presented in terms of the Pearson's r -values with the corresponding p -values.

Table 7: Correlations between year of qualification and years of clinical experience (Pearson's correlation coefficient)

	When qualified		Years of clinical experience	
Difficulty levels				
Difficulty of feeding intervention	-0.330	0.005*	-0.335	0.004*
Difficulty of communication intervention	-0.324	0.006*	-0.210	0.075
Difficulty of neonatal hearing intervention	-0.079	0.519	-0.078	0.516
Difficulty of general neonatal intervention tasks	-0.303	0.012*	-0.296	0.012*
Confidence levels	Pearson's <i>r</i>	<i>p</i>-value	Pearson's <i>r</i>	<i>p</i>-value
Confidence in feeding intervention	0.383	0.001*	0.377	0.001*
Confidence in communication intervention	0.282	0.018*	0.327	0.005*
Confidence in neonatal hearing intervention	0.092	0.456	0.131	0.276
Confidence in general neonatal intervention tasks	0.277	0.021*	0.454	0.000*

* significant correlations: $p \leq 0.05$

According to Table 7 there was a positive correlation between the participants' confidence levels in all areas, and the year in which the participants qualified as well as their years of clinical experience. There was, on the other hand, a negative correlation between the difficulty levels in all areas, and the year in which the participants qualified as well as their years of clinical experience. To determine whether these correlations were significant, the p -value was considered.

The correlations between the independent variables and each area of difficulty and confidence are discussed in the following section, with an indication of whether the correlations are significant or not significant. The effect sizes are also considered to determine whether the influence of the independent variable on the dependent variable is small, medium or large (Field, 2009).

- **Difficulty of feeding intervention**

Both independent variables in Table 7 were negatively related to the participants' difficulty levels in feeding intervention. The significance value for each independent variable was below 0.05, indicating a significant correlation. This means that difficulty of feeding intervention was significantly and negatively influenced by the year in which the participants qualified as well as their years of clinical experience. Recently qualified clinicians therefore appear to report less difficulty in feeding intervention. An

increase in years of clinical experience appears to correlate with a perception of less difficulty in this area. For both independent variables, the effect sizes of these correlations are medium (i.e. close to 0.3). These variables therefore have a medium influence on whether the participants reported a perception of difficulty in feeding intervention.

- **Difficulty of communication intervention**

Both independent variables in Table 7 were negatively related to the participants' difficulty levels in communication intervention. When looking at the *p*-values, only the significance value for the independent variable of year when the participants qualified was below 0.05, indicating a significant correlation. Difficulty of communication intervention is therefore significantly influenced by the year when the participants qualified, but not their years of clinical experience. The results mean that recently qualified clinicians experienced less difficulty in this area. The effect size for this correlation is also medium, reflecting a medium influence on whether the participants reported a perception of difficulty in communication intervention.

- **Difficulty of neonatal hearing intervention**

Although both independent variables in Table 7 were negatively related to the participants' difficulty levels in neonatal hearing intervention, there were no significance values below 0.05, and therefore no statistically significant correlations. Difficulty of neonatal hearing intervention is therefore not significantly influenced by the year in which the participants qualified, nor their years of clinical experience.

- **Difficulty of general neonatal intervention tasks**

Both independent variables in Table 7 were negatively related to the participants' difficulty levels in general neonatal intervention tasks. The significance value for each independent variable was below 0.05, indicating a significant correlation. This means that difficulty of general neonatal intervention tasks was significantly and negatively influenced by the year in which the participants qualified as well as their years of clinical experience. Therefore, recently qualified participants reported less difficulty with general neonatal intervention tasks, while those with more clinical experience were more likely to report less difficulty in this area. Once again, the effect sizes for these correlations are medium, indicating a medium influence.

- **Confidence in feeding intervention**

Both independent variables in Table 7 were positively related to the participants' confidence levels in feeding intervention. The significance value for each independent variable was below 0.05, indicating a significant correlation. This means that confidence in feeding intervention was significantly and positively influenced by the year in which the participants qualified as well as their years of clinical experience. More clinical experience therefore correlated with a perception of greater confidence in feeding intervention. This positive correlation can also be seen between the year in which the participant qualified and the level of confidence in feeding intervention. Recently qualified therapists therefore reported a greater level of confidence in terms of feeding intervention. The effect sizes for these correlations are medium, reflecting a medium influence on whether the participants reported a perception of confidence in communication intervention. It therefore appears that training in feeding intervention prepared the participants better in recent years than in the past.

- **Confidence in communication intervention**

Both independent variables in Table 7 were positively related to the participants' confidence levels in communication intervention. The significance value for each independent variable was below 0.05, indicating a significant correlation. This means that confidence in communication intervention was significantly and positively influenced by the year in which the participants qualified as well as their years of clinical experience. Recently qualified and more experienced participants reported a higher level of confidence in communication intervention. The effect sizes are medium, indicating a medium influence on whether the participants reported confidence in communication intervention. Again the results indicate that recent training seems to prepare participants better than older training.

- **Confidence in neonatal hearing intervention**

Although both independent variables in Table 7 were positively related to the participants' confidence levels in neonatal hearing intervention, there were no significance values below 0.05, and therefore no statistically significant correlations. Confidence in neonatal hearing intervention is therefore not significantly influenced by the year in which the participants qualified, nor their years of clinical experience.

- **Confidence in general neonatal intervention tasks**

Both independent variables in Table 7 were positively related to the participants' confidence levels in general neonatal intervention tasks. The significance value for each independent variable was below 0.05, indicating a significant correlation. This means that confidence in general neonatal intervention tasks was significantly and positively influenced by the year in which the participants qualified as well as their years of clinical experience. Recently qualified and more experienced participants reported a higher level of confidence in general neonatal intervention tasks. The effect size of the correlation between year of qualification and reported confidence in general tasks is medium. The year of qualification therefore had a medium influence on whether the participant reported confidence in this area. The effect size of the correlation between years of clinical experience and reported confidence in general tasks is, however, large (i.e. close to 0.5). The participants' clinical experience therefore had a large influence on whether a high level of confidence in general tasks was reported.

In summary, recently qualified audiologists and speech-language therapists and those with a number of years of experience were more likely to be confident in feeding intervention, communication intervention and general neonatal intervention tasks. More recently qualified professionals and those with a number of years of experience were also more likely to report less difficulty in feeding intervention, communication intervention and general neonatal intervention tasks.

Difficulty and confidence levels in the area of neonatal hearing intervention were not, however, influenced by years of clinical experience or the year in which the participants qualified.

Recently qualified participants appeared to rely on experience and undergraduate training. It also appears that recent training prepared participants better than training in the past.

4.7. Conclusion

The results indicated that the participating South African audiologists and speech-language therapists experienced the most difficulty in the provision of feeding intervention, and also displayed the least confidence in feeding intervention. Most

participants experienced high levels of confidence and low levels of difficulty in terms of communication intervention, neonatal hearing intervention and general neonatal intervention tasks.

Research from Brazil indicated that preterm infants are often not referred early enough for feeding intervention (Monti et al., 2013), and South African research indicated that speech-language therapists working in neonatal nurseries often have such a large case load that they are many times not involved in discharge planning and planning of follow-up services (Strasheim, 2009).

The results from this study furthermore indicated that there is no uniform training in ECI or NCI in South Africa. The participants' training needs, ranging from greatest need to lowest need, included feeding intervention, NCI, developmentally appropriate care, the role of the speech-language therapist and audiologist, and KMC.

The information gained from the results of this study may be of use in the development of NCI training programmes to ensure evidence-based NCI services in South Africa.

4.8. Summary

The aim of Chapter 4 was to present, describe, interpret and discuss the processed data. The results were organised according to the research objectives as delineated in Chapter 3. The participants' training in ECI and their training in NCI were presented visually in the form of bar graphs in order to confirm the lack of uniform training in these fields. Descriptive statistics were used to describe the 73 participating audiologists' and speech-language therapists' self-perceived skills in NCI. This was done by presenting their perceived levels of difficulty and confidence in various NCI areas, and interpreting the results through mean and standard deviation scores, and qualitative analysis. These results were then discussed referring to relevant international and local research.

In addition, the participants' most successful roles in NCI and their areas of difficulty were described. A summarised graph of the results obtained through a variety of questions relating to the participants' needs, were given, to discover the greatest training needs.

Lastly, inferential statistics were used to determine and present the significant associations and correlations between certain nominal and ordinal independent variables, such as professional qualification and years of clinical experience. This was done in an attempt to explain and better understand the participants' self-perceived confidence and difficulty levels in NCI.

In the next chapter, the conclusions of the study, a critical evaluation of the study including the strengths and limitations, recommendations for future research and the clinical application in the field of early intervention will be discussed.

Chapter 5

Conclusion and recommendations

CHAPTER AIM: This chapter provides the final conclusions of the entire study. It clarifies the clinical and research implications of the results, outlines future strategies, presents the limitations of the current study and indicates the recommendations for future research in NCI.

5.1. Introduction

In order to save lives and prevent disability resulting from preterm birth, a wide range of evidence-based care techniques are available, ranging from simple care such as warmth and breastfeeding up to full intensive care (WHO, 2012). As members of the NICU team, the audiologist and speech-language therapist should actively engage in searching for techniques that are evidence-based and implementing those techniques to their full capacity (SASLHA, 2011b).

With the high prevalence of at-risk infants born in South Africa, mostly due to low birth weight, preterm birth, HIV/AIDS and continuous poverty across the country, it is important to implement effective NCI programmes (Kritzinger & Van Rooyen, 2014). The opportunity to start intervention in the neonatal period should not be missed – especially when not all primary and secondary health care facilities provide early intervention services (Kritzinger & Van Rooyen, 2014). Audiologists and speech-language therapists should therefore use a KMC ward as entry point, and provide and promote family-centred developmental care in a transdisciplinary manner, as this will improve the efficacy of NCI implementation (SASHLA, 2011b).

The current research was conducted to describe the self-perceived skills and training needs of South African audiologists and speech-language therapists with regards to NCI. Professionals working in public and private settings participated in the study, and although the sample was not large enough to be representative, the self-perceived skills and needs of a variety of different South African audiologists and speech-language therapists could be described comprehensively based on the research data that were collected.

5.2. Conclusions of results

The following conclusions were made based on the results obtained:

5.2.1. Conclusions regarding the participants' undergraduate training in NCI

Data regarding the participants' undergraduate training in ECI and NCI were collected in order to gain an understanding of the initial knowledge and skills that were acquired by the participants during their tertiary training. The results indicated that the majority of the participants learnt about NCI during their theoretical and practical ECI module. In contrast, it was alarming to note that a significant minority of the participants did not receive ECI training during their undergraduate studies. This finding confirms that attention should be given to the importance of CPD after the completion of undergraduate training. Professional development may ensure that audiologists and speech-language therapists have the knowledge and skills needed to support the development and learning of preterm infants (Snyder, Hemmeter, Meeker, Kinder, Pasia & McLaughlin, 2012).

NCI and ECI training should not rely on CPD activities only. Universities in the country should also strengthen their early intervention course work, since early intervention is a preventative strategy that cannot be ignored. As a result of early brain plasticity and maturation, early intervention, including NCI, has the potential to be the most effective intervention strategy in speech-language pathology (Dubois, Dehaene-Lambertz, Kulikova, Poupon, Hùppi & Hertz-Pannier, 2014).

5.2.2. Conclusions regarding the participants' self-perceived NCI skills

The participants' self-perceived skills in the following areas of NCI were investigated: feeding intervention, communication intervention, neonatal hearing intervention and general neonatal intervention tasks. The general tasks included many aspects of collaborative strategies in neonatal settings. The results indicated that the participants experienced the highest level of difficulty and lowest level of confidence in feeding intervention, which was confirmed in the qualitative results. The other areas mostly corresponded with high levels of confidence and low levels of difficulty, indicating a higher level of self-perceived skills in those areas.

The participating professionals therefore perceived their skills in feeding intervention as most deficient. The qualitative results furthermore revealed difficulty in implementing developmental care.

It was also found that the participants' current profession and their professional qualification (i.e. Audiology or Speech-language therapy) significantly influenced their skills in the provision of feeding intervention, communication intervention and neonatal hearing intervention. This result confirms that these areas are some of the discipline-specific areas of NCI – feeding and communication intervention are specific to the speech-language therapist's role, and neonatal hearing intervention is specific to the audiologist's role.

The more recently qualified participants and those with more clinical experience reported greater confidence in their skills to provide feeding intervention, communication intervention and general neonatal intervention tasks. These professionals were also more likely to report less difficulty in these three intervention areas. The participants' self-perceived skills in neonatal hearing intervention were, however, not influenced by their years of clinical experience or the year in which they qualified.

The participating audiologists and speech-language therapists perceived hearing screening and parent training as their most successful roles in the provision of NCI. Although the participants did not indicate that they experienced difficulty with KMC, some participants did not recognise KMC as one of their successful roles. As KMC is the recommended entry point for the implementation of NCI programmes, South African speech-language therapists need to be familiar with KMC and know their role in it.

The qualitative results also revealed that some of the participants experienced feeding intervention as one of their most successful roles. This perception was attributed to the fact that they had experience in the field, and experienced intervention success in the past. Recently qualified clinicians and those with extensive experience tended to view feeding intervention in a positive light.

5.2.3. Conclusions regarding the participants' self-perceived NCI needs

The participating audiologists' and speech-language therapists' self-perceived needs in NCI provision were investigated. The results indicated that the following areas, ranging from greatest need to lowest need, were perceived as the areas of need:

- Feeding intervention.
- NCI.
- Developmentally appropriate care.
- The role of the audiologist and speech-language therapist in the NICU.
- KMC.

These identified areas are all important components of NCI service provision, and summarise the essence of NCI. The qualitative results furthermore exposed a particular need for practical training in all areas of NCI. In addition, a small yet important segment of the participants experienced a need for information regarding the management of NCI programmes in their various work settings. A need for more South African research in this area was also revealed, with some participants requiring information on how to develop appropriate research studies to investigate the benefits of various NCI strategies. This finding is positive, as it shows willingness from the participants in the current study to learn more about NCI and to contribute to the development of this exciting area of early intervention.

Expansion of the field of NCI in South Africa should therefore start with appropriate training of audiologists and speech-language therapists, as well as with research for the promotion of EBP.

5.3. Clinical and theoretical implications

Based on the conclusions discussed above, the implications for clinical practice and training in NCI are described here.

5.3.1. Implications for clinical practice

- With the knowledge gained during the literature overview of NCI, as described in Chapter 2, it becomes clear that audiologists and speech-language therapists should use the KMC ward as entry point for the provision of NCI services.

- Professionals currently working in NCI need to develop an awareness of their role in KMC, and to develop their skills in the different areas of NCI services, particularly feeding intervention and developmental care. They should therefore participate in CPD activities that specifically include information on the practical application of different NCI activities. Professional development activities can facilitate learning experiences so that these interventionists may provide high-quality neonatal intervention services (Snyder et al., 2012).

5.3.2. Implications for training

- The undergraduate training curricula of different universities should be expanded to include theoretical and practical training in NCI. In this study a need for standardisation of the curricula of different training institutions in early intervention was also identified. Such standardisation would, however, depend on further research regarding undergraduate training in ECI and NCI.
- The results in this study clearly illustrated the variability in the current professionals' undergraduate training regarding ECI and NCI, indicating the importance of in-service training and CPD. In order to provide high-quality services to preterm infants and their families, the current professionals need to develop their skills in NCI through professional development courses. Reflective consultation should also be included in continuous professional development as it promotes reflective functioning and facilitates improved understanding of the impact of interactions with families during NCI service provision (Watson & Gatti, 2012). In this way professionals may gain a greater understanding of the preterm infant's needs as well as the family's needs, which will influence the choice between different interventions.

5.4. Critical evaluation of the study

For the researcher to reflect on whether the study achieved the main aim and objectives as stated initially, a critical review of the study is necessary. A discussion of the strengths and limitations of a study may guide future researchers so they may use and avoid certain aspects of the study. The appraisal should therefore reflect both the positive and negative facets of the study.

5.4.1. Strengths of the study

- The use of an online questionnaire eliminated the use of paper during data collection. The system used generated an automatic electronic computerised database which led to consistent scoring and the elimination of human errors. These factors can be seen as one of the strengths of the study, since it improved the quality of the data collected. As a result of the electronic submission of completed questionnaires, true anonymity of responses could also be assured.
- The study can be seen as an extension of the research conducted by Strasheim in 2009. By using a similar description of the field and the areas that may be included in NCI, consistency was achieved, which may lead to more rapid progress in this area of service provision.
- This study also emphasises the importance of combining the two research paradigms (quantitative and qualitative research) in order to achieve comprehensive results that may lead to better conclusions. In this study the quantitative data provided the descriptive percentages of the participants' perceptions, as well as the mean scores and standard deviations. This led to an improved understanding of the participants' self-perceived skills and needs. The qualitative data expanded on the quantitative data so that the reasons for the participants' perceptions could be described and understood. The reliability of results was increased as data triangulation could be achieved.

5.4.2. Limitations of the study

- In order to obtain a representative sample of the professionals registered at SASLHA and SAAA, the study aimed for a sample of 300 to 400 responses. This was not achieved, as only 73 responses were obtained. A representative sample was therefore not achieved, and generalisations could not be made.
- Analysis of the collected data revealed questions that were not included and which may have led to a better understanding of the collected data, such as more questions on demographics. Also, the use of more open-ended questions would have yielded more qualitative data which could be used to expand on the quantitative data. In this study the addition of qualitative data served to enrich the results.

- Some of the results could not be compared to other research studies, as there is currently a dearth of research on the self-perceived skills and needs of audiologists and speech-language therapist with regard to NCI. Strasheim (2009) recommended that these professionals' skills in NCI be researched, which led to the development of the current study. Similar studies should now be conducted with larger, more representative samples to further increase our knowledge regarding the skills of audiologists and speech-language therapists regarding NCI.

5.5. Recommendations for future research

Often throughout the process of conducting research, more questions than answers are found. The following recommendations for further research are therefore made:

- An investigation into the undergraduate training in ECI and NCI that is currently being given at South African universities. This should be conducted in an effort to standardise training in this essential area of early intervention.
- The development of one or more training programmes for qualified audiologists and speech-language therapists in NCI, so that they may become aware of their individual and collaborative scope of practice in neonatal settings. Such training programmes should provide theoretical information and practical training, so that audiologists and speech-language therapists may be enabled to apply the principles of NCI as a preventative strategy (SASLHA, 2011b).
- A similar study should be conducted, if possible with a larger sample. In this way generalisations can be made to further our understanding of the self-perceived skills and needs of South African audiologists and speech-language therapists. A survey every five years of NCI clinician needs and service provision could track the development of the area of practice in South Africa.
- Research into the benefits of different NCI strategies should be conducted in private and public health care facilities. This may improve EBP in NCI service delivery, and the findings may be used to advocate for NCI development in government and policy-making institutions.

5.6. Concluding comments

Throughout the last 35 years, advances in neonatal medicine have led to the survival of more preterm infants than ever before (WHO, 2012). The focus has therefore shifted from survival to providing in these infants' developmental needs, from as early as possible (Brown, 2009; Rossetti, 2001). The increased prevalence of at-risk infants born in South Africa necessitates the appropriate implementation of NCI programmes (Kritzinger & Van Rooyen, 2014). When audiologists and speech-language therapists engage in clinical and research endeavours, ECI and NCI services to preterm infants and their families will increase. In this manner NCI services to the high-risk paediatric population may reach the necessary standard of best practice (Rossetti, 2001).

As stated by one of the participants in this study:

"I am glad this issue has arisen, as there is indeed a great need in our field to be skilled and trained in this area. I feel strongly that the earlier we can intervene and assist babies with difficulties, the more we can prevent or limit the extent of the individual's difficulties."

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Appendix A: Ethical clearance



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

6 December 2013

Dear Prof Kritzinger

Project: Neonatal communication intervention in South Africa –
training needs and future strategies
Researcher: M Oppermann
Supervisor: Prof A Kritzinger
Department: Communication Pathology
Reference numbers: 25106717

I am pleased to be able to tell you that the above application was **approved** by the **Research Ethics Committee** on 5 December 2013. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

The Committee requests you to convey this approval to the researcher.

We wish you success with the project.

Sincerely

A handwritten signature in black ink, appearing to be 'KH', written over a horizontal line.

Prof Karen Harris
Acting Chair: Postgraduate Committee &
Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail:Karen.harris@up.ac.za

Appendix B: Informed consent from participants



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

Training needs of South African audiologists and speech-language therapists regarding neonatal communication intervention

Dear speech-language therapy and/or audiology colleague

You are hereby invited to participate in this online survey regarding your training needs with regards to neonatal communication intervention. This kind of intervention is audiology and speech-language therapy services to high-risk neonates (0 - 28 days), their mothers and families, which may include:

- hearing screening,
- feeding intervention,
- Kangaroo Mother Care (KMC),
- parent training, and
- other developmental care interventions.

In South Africa - and especially in state hospitals - audiologists and speech-language therapists have the unique opportunity to provide extensive information and training for appropriate infant stimulation to parents in the neonatal period. Mothers do not always return to follow-up clinics at the hospital where they gave birth, and they may live in areas where no early communication intervention services are available or accessible. Consequently, neonates who are at risk for health problems and developmental delay may not receive intervention timeously, or be treated as effectively as is necessary to minimise delays.

I am busy with my Masters research and would like to find out more about your practices and successes in neonatal communication intervention. The study is entitled "Neonatal communication intervention in South Africa - training needs and future strategies", and is currently being conducted in the Department of Communication Pathology at the University of Pretoria. The research study aims to describe the needs experienced by South African audiologists and speech-language therapists regarding training in neonatal communication intervention. Even though you may not currently be involved in neonatal work, you are still invited to participate, as your answers will be valuable to this research study.

It is believed that the information obtained from this study can be used to find ways to expand the field of neonatal communication intervention in South Africa. There is a need to build a secure and evidence-based neonatal intervention multidisciplinary approach in South Africa. The field should be established and expanded, and the different areas that form a part of this intervention strategy, needs to be described. Professional training and services should be applicable to the unique challenges and opportunities in South African hospitals. The results of this study can therefore ultimately contribute to the efficacy of this intervention approach provided by South Africa's professionals.

Participation in this study is voluntary and you may withdraw from the study at any time without negative consequences. All information will be treated as confidential and you participate in this study anonymously. Raw data will be accessible to the researcher and research supervisors only, and will be stored at the University of Pretoria in an electronic format for a period of 15 years for archiving purposes before being destroyed.

The results of the study will be documented in a journal article, and a dissertation will be freely available through the University of Pretoria Library electronic resources. It is believed that the results of the study may benefit the development of neonatal communication intervention in South Africa. An understanding of

the involved professionals' needs can be used in future during the development of a training programme to enhance transdisciplinary knowledge of neonatal services and team work. This may ultimately benefit the infants and their families.

This survey should take about 10 - 15 minutes to complete. You are welcome to contact the researcher by e-mail at neci2013.research@gmail.com should you have any queries or concerns regarding the completion of the online survey.

Kind regards

Mariëtte Oppermann
Masters student

Prof Alta Kritzinger
Supervisor

By ticking here, I consent to be a participant in this study.*

Please answer all the questions by marking the appropriate block/typing in an answer. Mark only ONE applicable answer unless indicated otherwise. Be sure to scroll down completely to the bottom of this page, as it contains the full questionnaire. You will not be able to complete the questionnaire if all required questions have not been completed.

Section A

1. What is your professional qualification?

- Audiology
- Speech-language therapy
- Audiology & Speech-language therapy

2. Please indicate the profession you currently practice

- Audiology
- Speech-language therapy
- Audiology & Speech-language therapy

3. What is your highest qualification?

- Bachelor's degree
- Master's degree
- Doctoral degree

4. Where did you obtain this qualification?

- Stellenbosch University
- University of Cape Town
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of the Witwatersrand, Johannesburg

Appendix C: Data storage form



Declaration for the storage of research data and/or documents

I/ We, the principal researcher(s) Mariëtte Oppermann

and supervisor(s) Prof A Kritzinger & Dr L Pottas

of the following study, titled Neonatal communication intervention in South Africa — training needs and future strategies

will be storing all the research data and/or documents referring to the above-mentioned study in the following

Department / Centre: Communication Pathology

We understand that the storage of the mentioned data and/or documents must be maintained for a minimum of 10 years from the commencement of this study.

Start date of study: 2013

Anticipated end date of study: 2015

Year until which data will be stored: 2025

Name of Principal Researcher(s)	Signature	Date
Mariëtte Oppermann		20/09/2013

Name of Supervisor(s)	Signature	Date
Prof A Kritzinger		26.09.2013
Dr L Pottas		

Name of Head of Department	Signature	Date
Prof B Vinck		1/10/2013

Appendix D: Permission from SASLHA and SAAA

Consent

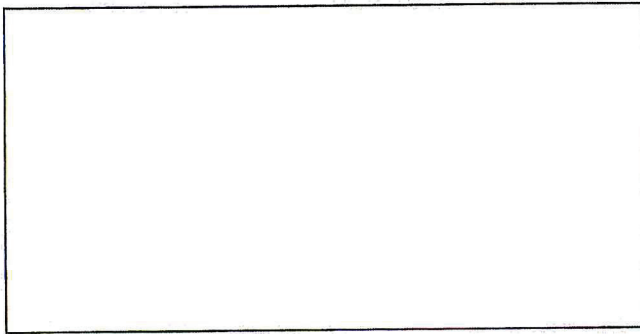
Permission is hereby granted to Mariëtte Oppermann to invite SASLHA members through the monthly newsletter as participants in this research study. The professionals will participate in the study on a voluntary basis and the data will be processed anonymously.

Signed: Knight

Position: OFFICE MANAGER SASLHA

Date: 12/06/2013

Official Stamp:



Please fax this permission slip to 012 661 7053.

Consent

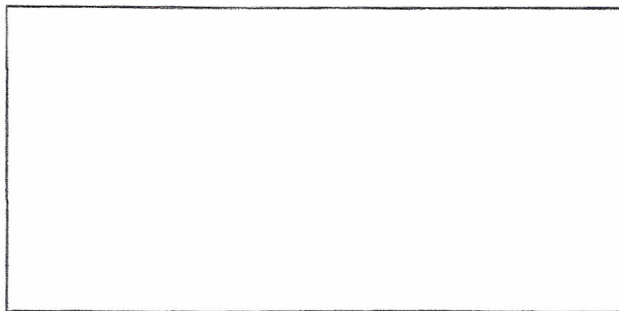
Permission is hereby granted to Mariëtte Oppermann to invite SAAA members through the monthly newsletter as participants in this research study. The professionals will participate in the study on a voluntary basis and the data will be processed anonymously.

Signed: 

Position: President Elect SAAA

Date: 15/08/2013

Official Stamp:



Please fax this permission slip to 012 661 7053.

Appendix E: Questionnaire

the involved professionals' needs can be used in future during the development of a training programme to enhance transdisciplinary knowledge of neonatal services and team work. This may ultimately benefit the infants and their families.

This survey should take about 10 - 15 minutes to complete. You are welcome to contact the researcher by e-mail at nci2013.research@gmail.com should you have any queries or concerns regarding the completion of the online survey.

Kind regards

Mariëtte Oppermann
Masters student

Prof Alta Kritzinger
Supervisor

By ticking here, I consent to be a participant in this study.*

Please answer all the questions by marking the appropriate block/typing in an answer. Mark only ONE applicable answer unless indicated otherwise. Be sure to scroll down completely to the bottom of this page, as it contains the full questionnaire. You will not be able to complete the questionnaire if all required questions have not been completed.

Section A

1. What is your professional qualification?

- Audiology
- Speech-language therapy
- Audiology & Speech-language therapy

2. Please indicate the profession you currently practice

- Audiology
- Speech-language therapy
- Audiology & Speech-language therapy

3. What is your highest qualification?

- Bachelor's degree
- Master's degree
- Doctoral degree

4. Where did you obtain this qualification?

- Stellenbosch University
- University of Cape Town
- University of KwaZulu-Natal
- University of Limpopo
- University of Pretoria
- University of the Witwatersrand, Johannesburg

Other:

4.1

5. In which year did you obtain this qualification?

5.1

6. In which province are you currently employed/practising?

- Eastern Cape
- Free State
- Gauteng
- KwaZulu-Natal
- Limpopo
- Mpumalanga
- Northern Cape
- Northwest
- Western Cape
- Other:

6.1

7. What are your current work contexts?

Please indicate all applicable contexts. You may select MORE THAN ONE option.

- Public sector
- Private sector
- Training institution
- Self-employed
- Working for an employer
- Other:

7.1

8. How many years of clinical experience do you have in the field of neonatal intervention?

- None
- 3 years or less
- 3 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- 20 + years

9. Did you complete a module on EARLY COMMUNICATION INTERVENTION during your undergraduate or postgraduate studies?

- Yes, a theory module
 - Yes, a practical module
 - Yes, a theory and practical module
 - No
-

10. Did the above-mentioned module include information on NEONATAL COMMUNICATION INTERVENTION?

- Yes
 - No
 - I answered "No" in the previous question
-

11. Did any other module include information on NEONATAL COMMUNICATION INTERVENTION?

- Yes
 - No
-

12. Are you familiar with neonatal communication intervention?

- Yes
 - No
-

13. If you are currently working in neonatal intervention, how did you prepare yourself?

- I did research on it (Internet and/or books)
 - I observed practically
 - I read through my university study notes
 - I did not really prepare myself
 - I do not work in neonatal intervention
-

14. If you are not currently working in neonatal intervention, please indicate your reasons.

- I do not feel that I have the required knowledge to work in this field
- I have the required knowledge, but my field of interest lies elsewhere
- I would like to work in neonatal intervention, but do not currently have the opportunity
- I have partial knowledge in the field, but would like to have more training before working in this field
- Other:

14.1

Section B

15. How often do you provide neonatal communication intervention in a week?

- 1 day per week
- 2 days per week
- 3 days per week
- 4 days per week
- 5 days per week
- Never

16. If you do not currently provide neonatal communication intervention, and selected "Never" in the previous question, have you provided this type of intervention in the past?

- Yes
- No

17. If "Yes" in Q16, when did you provide neonatal communication intervention?

- Community service year
- Other:

17.1

18. How long did you provide neonatal communication intervention?

- Less than 1 year
- 1 - 2 years
- 3 - 5 years
- More than 5 years

19. How essential do you deem neonatal communication intervention in your work setting?

- Not at all
- Somewhat/Limited
- Very much

20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?

	<----->		
Very knowledgeable	2 3 4		Not knowledgeable at all
<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>		<input type="radio"/>

21. Do you feel adequately PREPARED to provide neonatal communication intervention?

	<----->		
Very prepared	2 3 4		Not prepared at all
<input type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/>		<input type="radio"/>

22. Do you ENJOY providing neonatal communication intervention?

<----->

Enjoy a lot 2 3 4 Do not enjoy at all

● ● ● ● ●

23. Do you feel that you would BENEFIT from completing a training programme in neonatal communication intervention?

<----->

Would benefit a lot 2 3 4 Would not benefit at all

● ● ● ● ●

24. Please motivate your answer in the previous question.

24.1

Section C

25. Please indicate the extent to which you agree/disagree with the following statements regarding your confidence during the provision of feeding intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel confident in the assessment of feeding (including sucking and swallowing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel confident to perform videofluoroscopic studies for the assessment of swallowing disorders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel confident to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I feel confident to perform parent training for feeding difficulties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I feel confident in deciding when the infant can progress from tube feeding to breast/bottle feeding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I feel confident to provide guidance on breast milk or formula options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I feel confident to provide feeding intervention for a neonate with cleft lip and/or palate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I feel confident to promote continuous or intermittent Kangaroo Mother Care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Please indicate the extent to which you agree/disagree with the following statements regarding the difficulty in providing feeding intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel it is difficult to perform assessment of feeding (including sucking and swallowing)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel it is difficult to perform videofluoroscopic studies for the assessment of swallowing disorders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. I feel it is difficult to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I feel it is difficult to perform parent training for feeding difficulties	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I feel it is difficult to decide when the infant can progress from tube feeding to breast/bottle feeding	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I feel it is difficult to provide guidance on breast milk or formula options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I feel it is difficult to provide feeding intervention for a neonate with cleft lip and/or palate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I feel it is difficult to promote continuous or intermittent Kangaroo Mother Care	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. Please indicate the extent to which you agree/disagree with the following statements regarding your confidence during the provision of communication intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel confident in the assessment of infant communication functioning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel confident in the assessment of mother-infant attachment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel confident to perform parent training for the prevention of communication delay	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

28. Please indicate the extent to which you agree/disagree with the following statements regarding the difficulty in providing communication intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel it is difficult to perform assessment of infant communication functioning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel it is difficult to perform assessment of mother-infant attachment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel it is difficult to perform parent training for the prevention of communication delay	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. Please indicate the extent to which you agree/disagree with the following statements regarding your confidence during neonatal hearing intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel confident to conduct hearing screening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I feel confident in providing feedback on hearing testing results	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I feel confident to convince parents that hearing screening is important	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

30. Please indicate the extent to which you agree/disagree with the following statements regarding the difficulty in providing neonatal hearing intervention.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. I feel it is difficult to conduct hearing screening	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- | | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 2. I feel it is difficult to provide feedback on hearing testing results | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. I feel it is difficult to convince parents that hearing screening is important | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

31. Please indicate the extent to which you agree/disagree with the following statements regarding your confidence during the performance of these general tasks during Neonatal Communication Intervention.

- | | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| 1. I feel confident in gaining access to work in neonatal care settings | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. I feel confident in what to say to parents when a child has an established condition which will impact on hearing, feeding and communication development | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. I feel confident to implement a Developmentally Appropriate Care programme (Light and noise reduction, positioning and handling of an infant) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. I feel confident to collaborate with other professionals to obtain and share information | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. I feel confident to participate in ward rounds with other professionals | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 6. I feel confident to become part of the neonatal care team | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. I feel confident in providing input to the discharge plan for the family | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. I feel confident that I will be able to convince the team of the importance of my role | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. I feel confident in providing in-service training and guidance of staff/team members | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. I feel confident to inform parents, family members and caregivers of the infant's risk for future developmental difficulties | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. I feel confident in providing emotional support to families when they are concerned about their infant's condition | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. I feel confident to make culturally-appropriate adaptations to the intervention plan | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

32. Please indicate the extent to which you agree/disagree with the following statements regarding the difficulty of these general tasks during Neonatal Communication Intervention.

- | | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|--|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| 1. I feel it is difficult to gain access to work in neonatal care settings | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. I feel it is difficult to know what to say to parents when a child has an established condition which will impact on hearing, feeding and communication development | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. I feel it is difficult to implement a Developmentally Appropriate Care programme (Light and noise reduction, positioning and handling of an infant) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 4. I feel it is difficult to collaborate with other professionals to obtain and share information | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 5. I feel it is difficult to participate in ward rounds with other professionals | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- | | | | | | |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 6. I feel it is difficult to become part of the neonatal care team | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 7. I feel it is difficult to provide input to the discharge plan for the family | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 8. I feel it is difficult to convince the team of the importance of my role | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 9. I feel it is difficult to provide in-service training and guidance of staff/team members | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 10. I feel it is difficult to inform parents, family members and caregivers of the infant's risk for future developmental difficulties | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 11. I feel it is difficult to provide emotional support to families when they are concerned about their infant's condition | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 12. I feel it is difficult to make culturally-appropriate adaptations to the intervention plan | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

33. What has been your most successful role in neonatal communication intervention?

- Hearing screening
- Feeding intervention
- Kangaroo Mother Care (KMC)
- Parent training
- Developmental care
- Other:

33.1

34. Please motivate your answer in the previous question.

34.1

35. What do you struggle with in neonatal communication intervention?

- Hearing screening
- Feeding intervention
- Kangaroo Mother Care (KMC)
- Parent training
- Developmental care
- Other:

35.1

36. Please motivate your answer in the previous question.

36.1

37. Do you use culturally relevant instruments/materials/tools in your current work context?

- Yes
- No

38. There are limited resources available for neonatal communication intervention. List the assessment and intervention tools that you do use, and start with your most useful resource.

If you do not currently provide neonatal communication intervention, please type "0".

38.1

39. In which of the following areas would you like to get more information and learn skills?

Please indicate all applicable topics (You may select MORE THAN ONE option)

- Developmentally Appropriate Care (Positioning, handling, light and noise management)
- Kangaroo Mother Care (KMC)
- Feeding intervention
- Neonatal communication intervention
- Role of the speech-language therapist and audiologist in neonatal settings
- Other:

39.1

40. What are your greatest areas of need in terms of knowledge?

This question specifically relates to the field of neonatal communication intervention.

40.1

41. Please list the techniques/skills you would like more information on.

Again, specifically in the field of neonatal communication intervention

41.1

42. Please provide any additional comments regarding your needs in terms of neonatal communication intervention.

42.1

You have reached the end of this questionnaire. Thank you for your participation and thoughtful completion of all the questions.

If you would like to know the results of this research, you may send an e-mail to nci2013.research@gmail.com

Submit

Reset

Created by web questionnaire.

Appendix F: Sample of descriptive tables

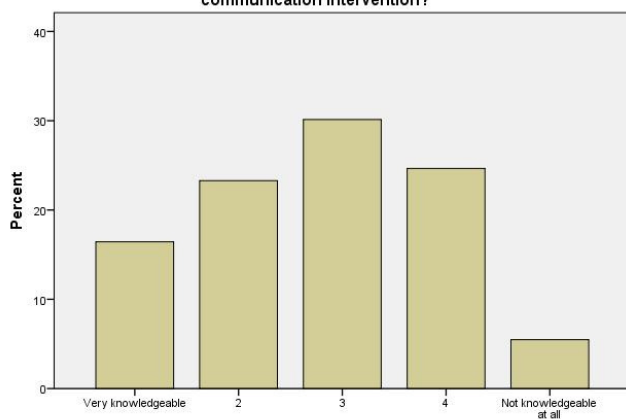
Frequencies

Statistics

	20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?	21. Do you feel adequately PREPARED to provide neonatal communication intervention?	22. Do you ENJOY providing neonatal communication intervention?	23. Do you feel that you would BENEFIT from completing a training programme in neonatal communication intervention?
N Valid	73	72	69	72
Missing	0	1	4	1
Mean	2.79	2.88	1.96	1.76
Std. Error of Mean	.135	.141	.151	.124
Median	3.00	3.00	1.00	1.00
Std. Deviation	1.154	1.198	1.254	1.055

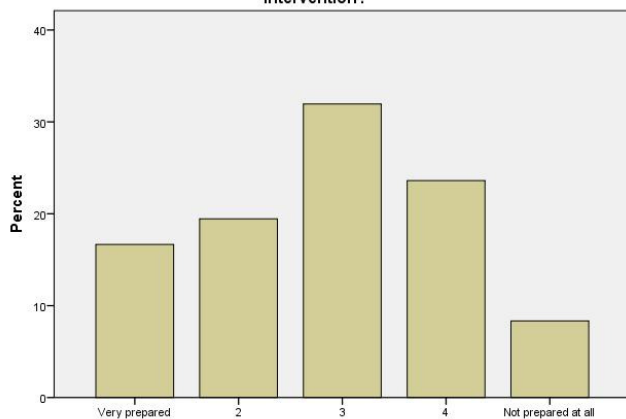
Bar Chart

20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?



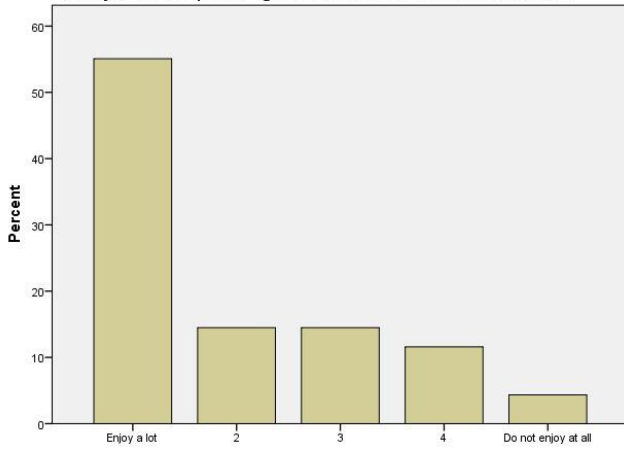
20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?

21. Do you feel adequately PREPARED to provide neonatal communication intervention?



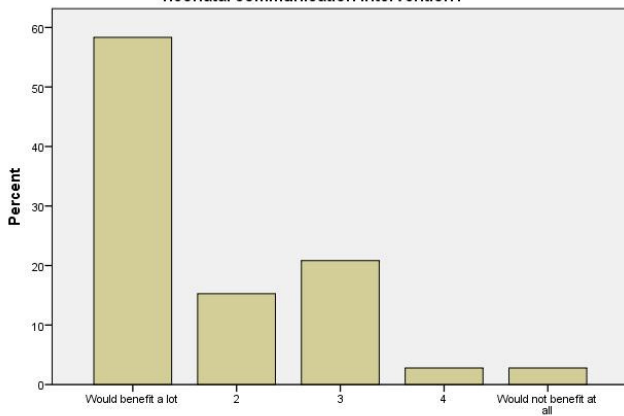
21. Do you feel adequately PREPARED to provide neonatal communication intervention?

22. Do you ENJOY providing neonatal communication intervention?



22. Do you ENJOY providing neonatal communication intervention?

23. Do you feel that you would BENEFIT from completing a training programme in neonatal communication intervention?



23. Do you feel that you would BENEFIT from completing a training programme in neonatal communication intervention?

Frequencies

Statistics

	25.1 I feel confident in the assessment of feeding (including sucking and swallowing)	25.2 I feel confident to perform videofluoroscopic studies for the assessment of swallowing disorders	25.3 I feel confident to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	25.4 I feel confident to perform parent training for feeding difficulties	25.5 I feel confident in deciding when the infant can progress from tube feeding to breast/bottle feeding	25.6 I feel confident to provide guidance on breast milk or formula options	25.7 I feel confident to provide feeding intervention for a neonate with cleft lip and/or palate	25.8 I feel confident to promote continuous or intermittent Kangaroo Mother Care
N	Valid 73 Missing 0	Valid 73 Missing 0	Valid 72 Missing 1	Valid 73 Missing 0	Valid 73 Missing 0	Valid 73 Missing 0	Valid 72 Missing 1	Valid 73 Missing 0
Mean	3.22	2.16	3.31	3.34	3.01	2.90	2.72	3.60
Std. Error of Mean	.166	.158	.167	.168	.176	.166	.170	.161
Median	4.00	2.00	4.00	4.00	3.00	3.00	2.50	4.00
Std. Deviation	1.417	1.354	1.421	1.436	1.505	1.416	1.446	1.372

Bar Chart

Appendix G: Sample of frequency tables

Frequency Table

1. What is your professional qualification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Audiology	7	9.6	9.6	9.6
	Speech-language therapy	21	28.8	28.8	38.4
	Audiology & Speech-language therapy	45	61.6	61.6	100.0
	Total	73	100.0	100.0	

2. Indicate the profession you currently practice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Audiology	15	20.5	20.5	20.5
	Speech-language therapy	42	57.5	57.5	78.1
	Audiology & Speech-language therapy	16	21.9	21.9	100.0
	Total	73	100.0	100.0	

3. What is your highest qualification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bachelor's degree	57	78.1	78.1	78.1
	Master's degree	12	16.4	16.4	94.5
	Doctoral degree	4	5.5	5.5	100.0
	Total	73	100.0	100.0	

4. Where did you obtain this qualification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stellenbosch University	9	12.3	12.3	12.3
	University of Cape Town	10	13.7	13.7	26.0
	University of KwaZulu-Natal	8	11.0	11.0	37.0
	University of Pretoria	31	42.5	42.5	79.5
	University of the Witwatersrand, Johannesburg	13	17.8	17.8	97.3
	Other	2	2.7	2.7	100.0
	Total	73	100.0	100.0	

5. In which year did you obtain this qualification?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1975	1	1.4	1.4	1.4
	1976	2	2.7	2.9	4.3
	1979	2	2.7	2.9	7.1
	1980	1	1.4	1.4	8.6
	1985	1	1.4	1.4	10.0

1989	1	1.4	1.4	11.4
1993	2	2.7	2.9	14.3
1994	4	5.5	5.7	20.0
1996	1	1.4	1.4	21.4
2000	3	4.1	4.3	25.7
2001	1	1.4	1.4	27.1
2004	3	4.1	4.3	31.4
2005	2	2.7	2.9	34.3
2006	5	6.8	7.1	41.4
2007	4	5.5	5.7	47.1
2008	6	8.2	8.6	55.7
2009	7	9.6	10.0	65.7
2010	7	9.6	10.0	75.7
2011	5	6.8	7.1	82.9
2012	6	8.2	8.6	91.4
2013	6	8.2	8.6	100.0
Total	70	95.9	100.0	
Missing System	3	4.1		
Total	73	100.0		

6. In which province are you currently employed/practising?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Eastern Cape	2	2.7	2.8	2.8
	Free State	1	1.4	1.4	4.2
	Gauteng	41	56.2	56.9	61.1
	KwaZulu-Natal	7	9.6	9.7	70.8
	Limpopo	1	1.4	1.4	72.2
	Mpumalanga	1	1.4	1.4	73.6
	Northwest	3	4.1	4.2	77.8
	Western Cape	14	19.2	19.4	97.2
	Other	2	2.7	2.8	100.0
	Total	72	98.6	100.0	
Missing System		1	1.4		
Total		73	100.0		

7.1 What are your current work context: Public sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	28	38.4	38.4	38.4
	No	45	61.6	61.6	100.0
	Total	73	100.0	100.0	

7.2 What are your current work context: Private sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	44	60.3	60.3	60.3
	No	29	39.7	39.7	100.0
	Total	73	100.0	100.0	

7.3 What are your current work context: Training institution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	23.3	23.3	23.3

No	56	76.7	76.7	100.0
Total	73	100.0	100.0	

7.4 What are your current work context: Self-employed

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	17	23.3	23.3	23.3
No	56	76.7	76.7	100.0
Total	73	100.0	100.0	

7.5 What are your current work context: Working for an employed

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	14	19.2	19.2	19.2
No	59	80.8	80.8	100.0
Total	73	100.0	100.0	

7.6 What are your current work context: Other

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	1	1.4	1.4	1.4
No	72	98.6	98.6	100.0
Total	73	100.0	100.0	

8. How many years of clinical experience do you have in the field of neonatal intervention?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid None	17	23.3	23.3	23.3
3 years or less	25	34.2	34.2	57.5
3 - 5 years	7	9.6	9.6	67.1
6 - 10 years	8	11.0	11.0	78.1
11 - 15 years	5	6.8	6.8	84.9
16 - 20 years	3	4.1	4.1	89.0
20 + years	8	11.0	11.0	100.0
Total	73	100.0	100.0	

8. How many years of clinical experience do you have in the field of neonatal intervention?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid None	17	23.3	23.3	23.3
3 years or less	25	34.2	34.2	57.5
More than 3 years	31	42.5	42.5	100.0
Total	73	100.0	100.0	

9. Did you complete a module on EARLY COMMUNICATION INTERVENTION during your undergraduate or postgraduate studies?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes, a theory module	16	21.9	21.9	21.9
Yes, a practical module	2	2.7	2.7	24.7
Yes, a theory and practical module	42	57.5	57.5	82.2
No	13	17.8	17.8	100.0
Total	73	100.0	100.0	

Appendix H: Reliability analysis

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	71	97.3
	Excluded ^a	2	2.7
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.926	8

Item Statistics

	Mean	Std. Deviation	N
25.1 I feel confident in the assessment of feeding (including sucking and swallowing)	3.28	1.385	71
25.2 I feel confident to perform videofluoroscopic studies for the assessment of swallowing disorders	2.20	1.359	71
25.3 I feel confident to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	3.34	1.404	71
25.4 I feel confident to perform parent training for feeding difficulties	3.41	1.400	71
25.5 I feel confident in deciding when the infant can progress from tube feeding to breast/bottle feeding	3.07	1.486	71
25.6 I feel confident to provide guidance on breast milk or formula options	2.96	1.398	71



25.7 I feel confident to provide feeding intervention for a neonate with cleft lip and/or palate	2.75	1.441	71
25.8 I feel confident to promote continuous or intermittent Kangaroo Mother Care	3.68	1.318	71

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
25.1 I feel confident in the assessment of feeding (including sucking and swallowing)	21.39	62.328	.841	.909
25.2 I feel confident to perform videofluoroscopic studies for the assessment of swallowing disorders	22.48	65.910	.675	.922
25.3 I feel confident to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	21.34	61.541	.869	.907
25.4 I feel confident to perform parent training for feeding difficulties	21.27	60.942	.904	.904
25.5 I feel confident in deciding when the infant can progress from tube feeding to breast/bottle feeding	21.61	60.071	.884	.905
25.6 I feel confident to provide guidance on breast milk or formula options	21.72	68.434	.530	.933
25.7 I feel confident to provide feeding intervention for a neonate with cleft lip and/or palate	21.93	64.352	.701	.920
25.8 I feel confident to promote continuous or intermittent Kangaroo Mother Care	21.00	68.000	.594	.928

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
24.68	82.651	9.091	8

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	70	95.9
	Excluded ^a	3	4.1
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.912	8

Item Statistics

	Mean	Std. Deviation	N
26.1 I feel it is difficult to perform assessment of feeding (including sucking and swallowing)	2.80	1.347	70
26.2 I feel it is difficult to perform videofluoroscopic studies for the assessment of swallowing disorders	3.54	1.247	70
26.3 I feel it is difficult to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	2.59	1.357	70
26.4 I feel it is difficult to perform parent training for feeding difficulties	2.36	1.228	70
26.5 I feel it is difficult to decide when the infant can progress from tube feeding to breast/bottle feeding	2.79	1.329	70
26.6 I feel it is difficult to provide guidance on breast milk or formula options	2.74	1.212	70
26.7 I feel it is difficult to provide feeding intervention for a neonate with cleft lip and/or palate	3.01	1.357	70
26.8 I feel it is difficult to promote continuous or intermittent Kangaroo Mother Care	2.27	1.215	70

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if	Corrected Item-Total	Cronbach's Alpha if Item



		Item Deleted	Correlation	Deleted
26.1 I feel it is difficult to perform assessment of feeding (including sucking and swallowing)	19.30	47.952	.850	.888
26.2 I feel it is difficult to perform videofluoroscopic studies for the assessment of swallowing disorders	18.56	52.917	.615	.908
26.3 I feel it is difficult to perform feeding intervention in the form of direct treatment with a neonate (e.g. oral facial stimulation for promotion of sucking)	19.51	48.804	.790	.893
26.4 I feel it is difficult to perform parent training for feeding difficulties	19.74	49.295	.860	.888
26.5 I feel it is difficult to decide when the infant can progress from tube feeding to breast/bottle feeding	19.31	48.566	.826	.890
26.6 I feel it is difficult to provide guidance on breast milk or formula options	19.36	53.682	.590	.910
26.7 I feel it is difficult to provide feeding intervention for a neonate with cleft lip and/or palate	19.09	50.659	.680	.903
26.8 I feel it is difficult to promote continuous or intermittent Kangaroo Mother Care	19.83	55.159	.498	.917

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
22.10	65.628	8.101	8

Reliability

Scale: ALL VARIABLES

Case Processing Summary

	N	%
a.		

a. Listwise deletion based on all variables in the procedure.

Cases	Valid	73	100.0
	Excluded ^a	0	.0
	Total	73	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.826	3

Item Statistics

	Mean	Std. Deviation	N
27.1 I feel confident in the assessment of infant communication functioning	3.89	1.125	73
27.2 I feel confident in the assessment of mother-infant attachment	3.79	1.080	73
27.3 I feel confident to perform parent training for the prevention of communication delay	4.32	.814	73

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
27.1 I feel confident in the assessment of infant communication functioning	8.11	3.099	.637	.820
27.2 I feel confident in the assessment of mother-infant attachment	8.21	2.999	.729	.714
27.3 I feel confident to perform parent training for the prevention of communication delay	7.68	3.885	.729	.749

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.00	6.889	2.625	3

Reliability

Scale: ALL VARIABLES

Appendix I: Sample of statistical cross-tabulations

	1. What is your professional qualification?			Total
	Audiology	Speech-language therapy	Audiology & Speech-language therapy	
15. How often do you provide neonatal communication intervention in a week?				
1 day per week	n 0	0	8	8
%	0.0%	0.0%	17.8%	11.0%
2 days per week	n 0	3	4	4
%	0.0%	14.3%	2.2%	5.5%
3 days per week	n 0	2	6	6
%	0.0%	9.5%	13.3%	11.0%
4 days per week	n 0	1	0	1
%	0.0%	4.8%	0.0%	1.4%
5 days per week	n 0	3	5	6
%	0.0%	14.3%	11.1%	11.0%
Never	n 7	12	25	44
%	100.0%	57.1%	55.6%	60.3%
Total	n 7	21	45	73
%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary								
	Valid			Missing			Total		
	N	Percent	Total	N	Percent	Total	N	Percent	Total
15. How often do you provide neonatal communication intervention in a week? * 1. What is your professional qualification?	73	100.0%	0	0.0%	73	100.0%			

	Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (1-sided)	99% Confidence Interval Lower Bound	Upper Bound
Pearson Chi-Square	15.732	10	.108	.120	.112	.128
Likelihood Ratio	19.429	10	.035	.028	.028	.037
Fisher's Exact Test	13.145		.129	.120	.138	
Linear-by-Linear Association	3.828	1	.050	.049	.044	.055
N of Valid Cases	73			.023	.019	.027

	1. What is your professional qualification?			Total
	Audiology	Speech-language therapy	Audiology & Speech-language therapy	
16. If you do not currently provide neonatal communication intervention, and selected "Never" in the previous question, have you provided this type of intervention in the past?				
Yes	n 5	10	16	31
%	71.4%	83.3%	64.0%	70.5%
No	n 2	2	9	13
%	28.6%	16.7%	36.0%	29.5%
Total	n 7	12	25	44
%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary								
	Valid			Missing			Total		
	N	Percent	Total	N	Percent	Total	N	Percent	Total
16. If you do not currently provide neonatal communication intervention, and selected "Never" in the previous question, have you provided this type of intervention in the past? * 1. What is your professional qualification?	44	60.3%	29	39.7%	73	100.0%			

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Lower Bound	Upper Bound	Sig.	Lower Bound	Upper Bound	Sig.
Pearson Chi-Square	1.460	2	.482	.490	.477	.503			
Likelihood Ratio	1.553	2	.460	.490	.477	.503			
Fisher's Exact Test	1.415		.490	.477	.503				
Linear-by-Linear Association	.539	1	.463	.521	.508	.534	.302	.291	.314
N of Valid Cases	44								

	1. What is your professional qualification?					
	Audiology	Speech-language therapy	Audiology & Speech-language therapy	Total		
17. If "Yes" in Q16, when did you provide neonatal communication intervention? * 1. What is your professional qualification?						
Community service year	n 4	6	5	15		
%	80.0%	75.0%	35.7%	55.6%		
Other	n 1	2	9	12		
%	20.0%	25.0%	64.3%	44.4%		
Total	n 5	8	14	27		
%	100.0%	100.0%	100.0%	100.0%		

	Case Processing Summary								
	Valid			Missing			Total		
	N	Percent	Total	N	Percent	Total	N	Percent	Total
17. If "Yes" in Q16, when did you provide neonatal communication intervention? * 1. What is your professional qualification?	27	37.0%	46	63.0%	73	100.0%			

	Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)	99% Confidence Interval Lower Bound	Upper Bound
Pearson Chi-Square	4.667	2	.097	.126	.117	.135
Likelihood Ratio	4.845	2	.089	.126	.117	.135
Fisher's Exact Test	4.345		.144	.135	.153	
Linear-by-Linear Association	3.900	1	.048	.083	.076	.090
N of Valid Cases	27				.039	.034

	1. What is your professional qualification?			Total
	Audiology	Speech-language therapy	Audiology & Speech-language therapy	
18. How long did you provide neonatal communication intervention?				
Less than 1 year	n 2	4	7	13
%	33.3%	30.8%	22.6%	26.0%
1 - 2 years	n 4	5	9	14
%	66.7%	38.5%	16.1%	28.0%
3 - 5 years	n 0	1	1	2
%	0.0%	7.7%	25.8%	18.0%
More than 5 years	n 0	3	3	6
%	0.0%	23.1%	35.5%	28.0%
Total	n 6	13	31	50
%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary								
	Valid			Missing			Total		
	N	Percent	Total	N	Percent	Total	N	Percent	Total
18. How long did you provide neonatal communication intervention? * 1. What is your professional qualification?	50	68.5%	23	31.5%	73	100.0%			

	Value	df	Chi-Square Tests				Sig.	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
			Asymp. Sig. (2-sided)	99% Confidence Interval		Lower Bound		Upper Bound			
				Lower Bound	Upper Bound						
Pearson Chi-Square	10.959	6	.090	.082	.097						
Likelihood Ratio	13.081	6	.042	.070	.084						
Fisher's Exact Test	9.684		.105	.097	.113						
Linear-by-Linear Association	5.084	1	.024	.026	.035	.015	.012	.012	.018		
N of Valid Cases	50										

19. How essential do you deem neonatal communication intervention in your work setting?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
Not at all	2	28.6%	2	14.0%
Somewhat/Limited	0	0.0%	3	18.6%
Very much	5	71.4%	16	67.4%
Total	7	100.0%	21	100.0%

19. How essential do you deem neonatal communication intervention in your work setting? * 1. What is your professional qualification?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
	71	97.3%	2	2.7%
			73	100.0%

	Value	df	Chi-Square Tests				Sig.	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
			Asymp. Sig. (2-sided)	99% Confidence Interval		Lower Bound		Upper Bound			
				Lower Bound	Upper Bound						
Pearson Chi-Square	2.881	4	.578	.603	.590	.615					
Likelihood Ratio	3.746	4	.441	.535	.522	.548					
Fisher's Exact Test	2.536		.623	.623	.611	.636					
Linear-by-Linear Association	.005	1	.946	1.000	1.000	1.000	.538	.523	.549		
N of Valid Cases	71										

20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
	3,00		82	1.33
			21	45
			73	

1. What is your professional qualification?	Ranks		Mean Rank	
	Audiology	Speech-language therapy	N	Mean Rank
	Audiology	Speech-language therapy	N	Mean Rank
			7	40.64
			21	36.19
			45	36.81
			73	

Test Statistics

20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
	2,556		2	.080
			880	.352
			879	.351
			895	

1. What is your professional qualification?	Ranks		Mean Rank	
	Audiology	Speech-language therapy	N	Mean Rank
	Audiology	Speech-language therapy	N	Mean Rank
			7	46.79
			21	39.24
			44	33.56
			72	

21. Do you feel adequately PREPARED to provide neonatal communication intervention?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
	3,443		3,05	8.9
			92	2.6
			21	6.1
			44	12.7
			72	

21. Do you feel adequately PREPARED to provide neonatal communication intervention?	Ranks		Mean Rank	
	Audiology	Speech-language therapy	N	Mean Rank
	Audiology	Speech-language therapy	N	Mean Rank
			7	46.79
			21	39.24
			44	33.56
			72	

1. What is your professional qualification?	Ranks		Mean Rank	
	Audiology	Speech-language therapy	N	Mean Rank
	Audiology	Speech-language therapy	N	Mean Rank
			7	48.36
			21	33.93
			41	33.27
			69	

22. Do you ENJOY providing neonatal communication intervention?	Cases		Total	
	Valid	Missing	N	Percent
	N	Percent	N	Percent
	2,771		1,86	6.7
			1,15	4.3
			21	7.7
			41	15.0
			69	

1. What is your professional qualification?	Ranks		Mean Rank	
	Audiology	Speech-language therapy	N	Mean Rank
	Audiology	Speech-language therapy	N	Mean Rank
			7	48.36
			21	33.93
			41	33.27
			69	

Chi-Square	4.202
df	2
Asymp. Sig.	.122
Monte Carlo Sig.	.126
	.117
	.135

1. What is your professional qualification?			
	Audiology	Speech-language therapy	Total
Mean	1.57	1.95	1.76
Standard Deviation	1.13	.86	1.05
Valid n	7	21	44

Ranks			
1. What is your professional qualification?	N	Mean Rank	
Audiology	7	32.14	
Speech-language therapy	21	42.24	
Audiology & Speech-language therapy	44	34.45	
Total	72		

Test Statistics			
23. Do you feel that you would BENEFIT from completing a training programme in neonatal communication intervention?	23.918	2	
Chi-Square		232	
df		227	
Asymp. Sig.		216	
Monte Carlo Sig.		238	

1. What is your professional qualification?			
	Audiology	Speech-language therapy	Total
Mean	2.07	3.32	3.03
Standard Deviation	1.17	.93	1.17
Valid n	7	21	45

Ranks			
1. What is your professional qualification?	N	Mean Rank	
Audiology	7	20.07	
Speech-language therapy	21	41.83	
Audiology & Speech-language therapy	45	37.28	
Total	73		

Test Statistics			
25. Confidence during the provision of feeding intervention	5.571	2	
Chi-Square		5.571	
df		2	

Asymp. Sig.	.062
Monte Carlo Sig.	.059
	.053
	.065

1. What is your professional qualification?			
	Audiology	Speech-language therapy	Total
Mean	3.04	2.66	2.72
Standard Deviation	.83	.95	1.02
Valid n	7	21	45

Ranks			
1. What is your professional qualification?	N	Mean Rank	
Audiology	7	43.93	
Speech-language therapy	21	35.74	
Audiology & Speech-language therapy	45	36.51	
Total	73		

Test Statistics			
26. Difficulty in providing feeding intervention	.846	2	
Chi-Square		.655	
df		.667	
Asymp. Sig.		.655	
Monte Carlo Sig.		.679	

1. What is your professional qualification?			
	Audiology	Speech-language therapy	Total
Mean	3.38	3.87	4.16
Standard Deviation	.83	.59	.87
Valid n	7	21	45

Ranks			
1. What is your professional qualification?	N	Mean Rank	
Audiology	7	22.00	
Speech-language therapy	21	31.31	
Audiology & Speech-language therapy	45	41.99	
Total	73		

Test Statistics			
27. Confidence during the provision of communication intervention	7.725	2	
Chi-Square		.021	
df		.018	
Asymp. Sig.		.014	
Monte Carlo Sig.		.021	

		1. What is your professional qualification?		
		Audiology	Speech-language therapy	Audiology & Speech-language therapy
28. Difficulty in providing communication intervention	Mean	2.48	2.25	1.78
	Standard Deviation	.81	.81	.83
	Valid n	7	21	45
	Total			73

		Ranks		
		1. What is your professional qualification?	N	Mean Rank
28. Difficulty in providing communication intervention	Audiology		7	49.57
	Speech-language therapy		21	44.88
	Audiology & Speech-language therapy		45	31.37
	Total		73	

		Test Statistics		
		28. Difficulty in providing communication intervention		
Chi-Square			8.804	2
df				.012
Asymp. Sig.			.010	.007
Monte Carlo Sig.			.007	.012
	[Sig. 95% Confidence Interval]	Lower Bound		
		Upper Bound		

		1. What is your professional qualification?		
		Audiology	Speech-language therapy	Audiology & Speech-language therapy
29. Confidence during neonatal hearing intervention	Mean	4.10	3.20	4.19
	Standard Deviation	1.55	.86	1.05
	Valid n	7	20	44
	Total			71

		Ranks		
		1. What is your professional qualification?	N	Mean Rank
29. Confidence during neonatal hearing intervention	Audiology		7	42.64
	Speech-language therapy		20	21.00
	Audiology & Speech-language therapy		44	41.76
	Total		71	

		Test Statistics		
		29. Confidence during neonatal hearing intervention		
Chi-Square			15.487	2
df				.000
Asymp. Sig.			.000	.000
Monte Carlo Sig.			.000	.001
	[Sig. 95% Confidence Interval]	Lower Bound		
		Upper Bound		

		1. What is your professional qualification?		
		Audiology	Speech-language therapy	Audiology & Speech-language therapy
30. Difficulty in providing neonatal hearing intervention	Mean	1.38	2.69	1.77
	Standard Deviation	.73	.92	1.00
	Valid n	7	20	44
	Total			71

		Ranks		
		1. What is your professional qualification?	N	Mean Rank
30. Difficulty in providing neonatal hearing intervention	Audiology		7	24.00
	Speech-language therapy		20	51.50
	Audiology & Speech-language therapy		44	30.86
	Total		71	

		Test Statistics		
		30. Difficulty in providing neonatal hearing intervention		
Chi-Square			17.215	2
df				.000
Asymp. Sig.			.000	.000
Monte Carlo Sig.			.000	.000
	[Sig. 95% Confidence Interval]	Lower Bound		
		Upper Bound		

		1. What is your professional qualification?		
		Audiology	Speech-language therapy	Audiology & Speech-language therapy
31. Confidence during the performance of general tasks during Neonatal Communication Intervention	Mean	3.74	3.66	3.79
	Standard Deviation	.38	.60	.70
	Valid n	7	21	44
	Total			72

		Ranks		
		1. What is your professional qualification?	N	Mean Rank
31. Confidence during the performance of general tasks during Neonatal Communication Intervention	Audiology		7	36.93
	Speech-language therapy		21	32.17
	Audiology & Speech-language therapy		44	38.50
	Total		72	

		Test Statistics		
		31. Confidence during the performance of general tasks during Neonatal Communication Intervention		
Chi-Square			1.310	2
df				.519
Asymp. Sig.			.519	.531
Monte Carlo Sig.			.531	.518
	[Sig. 95% Confidence Interval]	Lower Bound		
		Upper Bound		

		1. What is your professional qualification?		
		Audiology	Speech-language therapy	Audiology & Speech-language therapy
32. difficulty of these general tasks during Neonatal Communication Intervention	Mean	2.24	2.56	2.20
	Standard Deviation	.28	.82	.71
	Valid n	7	19	45
	Total			71

		Ranks		
		1. What is your professional qualification?	N	Mean Rank
32. difficulty of these general tasks during Neonatal Communication Intervention	Audiology		7	32.71
	Speech-language therapy		19	43.05

Communication Intervention	Audiology & Speech-language therapy	45	33.53
Total		71	

Test Statistics	
Chi-Square	32.046
df	2
Asymp. Sig.	.218
Monte Carlo Sig.	.227
99% Confidence Interval	Lower Bound Upper Bound
	.216 .237

	1. What is your professional qualification?		Audiology & Speech-language therapy		Total
	Audiology	Speech-language therapy	Audiology	Speech-language therapy	
33. What has been your most successful role in neonatal communication intervention?	n	7	2	12	21
	%	100.0%	9.5%	27.9%	29.6%
Feeding intervention	n	0	11	8	19
	%	0.0%	52.4%	18.6%	26.8%
Kangaroo Mother Care (KMC)	n	0	1	3	4
	%	0.0%	4.8%	7.0%	5.6%
Parent training	n	0	6	8	14
	%	0.0%	28.6%	18.6%	19.7%
Developmental care	n	0	0	3	3
	%	0.0%	0.0%	7.0%	4.2%
Other	n	0	1	9	10
	%	0.0%	4.8%	20.9%	14.1%
Total	n	7	21	43	71
	%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary		Cases		Total
	Valid	Missing	N	Percent	
33. What has been your most successful role in neonatal communication intervention? - 1. What is your professional qualification?	n	2	73	100.0%	
	%	97.3%			

	Chi-Square Tests		Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
	Value	df	Asymp. Sig. (2-sided)	99% Confidence Interval Lower Bound Upper Bound	Sig.	99% Confidence Interval Lower Bound Upper Bound
Pearson Chi-Square	31.194	10	.001	.000 .002	.002	
Likelihood Ratio	32.522	10	.000	.001 .001	.001	
Fisher's Exact Test	23.817		.002	.001 .001	.001	
Linear-by-Linear Association	8.287	1	.004	.004 .003	.006	.001 .003
N of Valid Cases	71					

	1. What is your professional qualification?		Audiology & Speech-language therapy		Total
	Audiology	Speech-language therapy	Audiology	Speech-language therapy	
35. What do you struggle with in neonatal communication intervention?	n	0	6	2	8
	%	0.0%	30.0%	5.9%	13.1%
Feeding intervention	n	5	5	18	28
	%	71.4%	25.0%	52.9%	45.9%

Kangaroo Mother Care (KMC)	n	0	1	3	4
	%	0.0%	5.0%	8.8%	6.6%
Parent training	n	1	1	0	2
	%	14.3%	5.0%	0.0%	3.3%
Developmental care	n	0	5	3	8
	%	0.0%	25.0%	8.8%	13.1%
Other	n	1	2	8	11
	%	14.3%	10.0%	23.5%	18.0%
Total	n	7	20	34	61
	%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary		Cases		Total
	Valid	Missing	N	Percent	
35. What do you struggle with in neonatal communication intervention? - 1. What is your professional qualification?	n	12	73	100.0%	
	%	83.6%			

	Chi-Square Tests		Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
	Value	df	Asymp. Sig. (2-sided)	99% Confidence Interval Lower Bound Upper Bound	Sig.	99% Confidence Interval Lower Bound Upper Bound
Pearson Chi-Square	19.457	10	.035	.037 .041	.041	
Likelihood Ratio	20.737	10	.023	.034 .029	.039	
Fisher's Exact Test	16.702		.031	.027 .035	.035	
Linear-by-Linear Association	.374	1	.541	.577 .564	.589	.281 .304
N of Valid Cases	61					

	Case Processing Summary		Cases		Total
	Valid	Missing	N	Percent	
37. Do you use culturally relevant instruments/materials/tools in your current work context? - 1. What is your professional qualification?	n	4	10	21	35
	%	57.1%	47.6%	48.8%	49.3%
No	n	3	11	22	36
	%	42.9%	52.4%	51.2%	50.7%
Total	n	7	21	43	71
	%	100.0%	100.0%	100.0%	100.0%

	Case Processing Summary		Cases		Total
	Valid	Missing	N	Percent	
37. Do you use culturally relevant instruments/materials/tools in your current work context? - 1. What is your professional qualification?	n	2	73	100.0%	
	%	97.3%			

	Chi-Square Tests		Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
	Value	df	Asymp. Sig. (2-sided)	99% Confidence Interval Lower Bound Upper Bound	Sig.	99% Confidence Interval Lower Bound Upper Bound
Pearson Chi-Square	.200	2	.905	1.000 1.000	1.000	
Likelihood Ratio	.200	2	.905	1.000 1.000	1.000	
Fisher's Exact Test	.279		1.000	1.000 1.000	1.000	
Linear-by-Linear Association	.069	1	.782	.860 .851	.869	.452 .478
N of Valid Cases	71					

		1. What is your professional qualification?				Total
		Audiology		Speech-language therapy		
		Yes	No	Yes	No	
39.1 In which of the following areas would you like to get more information and learn skills: Developmentally Appropriate Care * 1. What is your professional qualification?		n	n	n	n	n
		5	12	22	39	
		%	%	%	%	%
		71.4%	57.1%	48.9%	55.4%	
		n	n	n	n	n
		2	9	23	34	
		%	%	%	%	%
		28.6%	42.9%	51.1%	46.6%	
		n	n	n	n	n
		7	21	45	73	
		%	%	%	%	%
		100.0%	100.0%	100.0%	100.0%	

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
39.1 In which of the following areas would you like to get more information and learn skills: Developmentally Appropriate Care * 1. What is your professional qualification?	73	100.0%	0	0.0%	73	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
				Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pearson Chi-Square	1.401	2	.496	.494	.507		
Likelihood Ratio	1.438	2	.487	.494	.507		
Fisher's Exact Test	1.349		.528	.528	.515		
Linear-by-Linear Association	1.341	1	.247	.289	.311	.157	
N of Valid Cases	73					.176	

Case Processing Summary

		1. What is your professional qualification?				Total
		Audiology		Speech-language therapy		
		Yes	No	Yes	No	
39.2 In which of the following areas would you like to get more information and learn skills: Kangaroo Mother Care (KMC) * 1. What is your professional qualification?		n	n	n	n	n
		4	5	16	25	
		%	%	%	%	%
		57.1%	23.8%	35.6%	34.2%	
		n	n	n	n	n
		3	16	29	48	
		%	%	%	%	%
		42.9%	76.2%	64.4%	65.8%	
		n	n	n	n	n
		7	21	45	73	
		%	%	%	%	%
		100.0%	100.0%	100.0%	100.0%	

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
39.2 In which of the following areas would you like to get more information and learn skills: Kangaroo Mother Care (KMC) * 1. What is your professional qualification?	73	100.0%	0	0.0%	73	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
				Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pearson Chi-Square	2.680	2	.262	.268	.280		
Likelihood Ratio	2.641	2	.267	.268	.257		
Fisher's Exact Test	2.640		.268	.268	.257		
Linear-by-Linear Association	1.40	1	.709	.709	.697	.401	
N of Valid Cases	73					.427	

		1. What is your professional qualification?				Total
		Audiology		Speech-language therapy		
		Yes	No	Yes	No	
39.3 In which of the following areas would you like to get more information and learn skills: Feeding intervention * 1. What is your professional qualification?		n	n	n	n	n
		5	15	29	49	
		%	%	%	%	%
		71.4%	71.4%	64.4%	67.1%	
		n	n	n	n	n
		2	6	16	24	
		%	%	%	%	%
		28.6%	28.6%	35.6%	32.9%	
		n	n	n	n	n
		7	21	45	73	
		%	%	%	%	%
		100.0%	100.0%	100.0%	100.0%	

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
39.3 In which of the following areas would you like to get more information and learn skills: Feeding intervention * 1. What is your professional qualification?	73	100.0%	0	0.0%	73	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
				Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pearson Chi-Square	.382	2	.826	.922	.915	.929	
Likelihood Ratio	.385	2	.825	.922	.800	.821	
Fisher's Exact Test	.394		.922	.922	.915	.929	
Linear-by-Linear Association	.315	1	.575	.587	.574	.572	
N of Valid Cases	73					.347	

Case Processing Summary

		1. What is your professional qualification?				Total
		Audiology		Speech-language therapy		
		Yes	No	Yes	No	
39.4 In which of the following areas would you like to get more information and learn skills: Neonatal communication intervention * 1. What is your professional qualification?		n	n	n	n	n
		5	13	24	42	
		%	%	%	%	%
		71.4%	61.9%	53.3%	57.5%	
		n	n	n	n	n
		2	8	21	31	
		%	%	%	%	%
		28.6%	38.1%	46.7%	42.5%	
		n	n	n	n	n
		7	21	45	73	
		%	%	%	%	%
		100.0%	100.0%	100.0%	100.0%	

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
39.4 In which of the following areas would you like to get more information and learn skills: Neonatal communication intervention * 1. What is your professional qualification?	73	100.0%	0	0.0%	73	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
				Lower Bound	Upper Bound	Lower Bound	Upper Bound
Pearson Chi-Square	1.042	2	.594	.629	.617	.642	
Likelihood Ratio	1.067	2	.587	.591	.578	.603	
Fisher's Exact Test	.992		.629	.629	.617	.642	
Linear-by-Linear Association	1.027	1	.311	.373	.361	.386	
N of Valid Cases	73					.201	



		1. What is your professional qualification?					
		Audiology		Speech-language therapy		Total	
Yes	n	4	8	14	26		
	%	57.1%	38.1%	31.1%	35.6%		
No	n	3	13	31	47		
	%	42.9%	61.9%	68.9%	64.4%		
Total	n	7	21	45	73		
	%	100.0%	100.0%	100.0%	100.0%		

Case Processing Summary

	Cases			
	Valid	Missing	Total	Percent
39.5 in which of the following areas would you like to get more information like to get more information and learn skills: Role of speech-language therapist and audiologist * 1. What is your professional qualification?	n	0	73	100.0%

Chi-Square Tests

Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
			Sig.	99% Confidence Interval Lower Bound	Upper Bound	Sig.
Pearson Chi-Square	1.869	.177	.443	.430	.455	
Likelihood Ratio	1.802	.183	.506	.493	.519	
Fisher's Exact Test	1.933	.166	.353	.341	.366	
Linear-by-Linear Association	1.667	.199	.197	.197	.218	.129
N of Valid Cases	73					.147

		1. What is your professional qualification?					
		Audiology		Speech-language therapy		Total	
Yes	n	0	1	4	5		
	%	0.0%	4.8%	8.9%	6.8%		
No	n	7	20	41	68		
	%	100.0%	95.2%	91.1%	93.2%		
Total	n	7	21	45	73		
	%	100.0%	100.0%	100.0%	100.0%		

Case Processing Summary

	Cases			
	Valid	Missing	Total	Percent
39.6 in which of the following areas would you like to get more information and learn skills: Other * 1. What is your professional qualification?	n	0	73	100.0%

Chi-Square Tests

Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
			Sig.	99% Confidence Interval Lower Bound	Upper Bound	Sig.
Pearson Chi-Square	.952	.329	.621	.650	.674	
Likelihood Ratio	1.423	.233	.491	.556	.581	
Fisher's Exact Test	.459	.633	1.000	1.000	1.000	
Linear-by-Linear Association	.937	.333	.510	.497	.523	.275
N of Valid Cases	73					.298

Appendix J: Correlation table

		5. In which year did you obtain this qualification?	8. How many years of clinical experience do you have in the field of neonatal intervention?	15. How often do you provide neonatal communication intervention in a week?	18. How long did you provide neonatal communication intervention?	19. How essential do you deem neonatal communication intervention in your work setting?	20. Do you feel adequately KNOWLEDGEABLE in the provision of neonatal communication intervention?	21. Do you feel adequately PREPARED to provide neonatal communication intervention?	22. Do you ENJOY providing neonatal communication intervention?	23. Do you feel that you would BENEFIT from training a programme in neonatal communication intervention?	25. Confidence during the provision of feeding intervention?	26. Difficulty in providing feeding intervention?	27. Confidence during the provision of communication intervention?	28. Difficulty in providing communication intervention?	29. Confidence during neonatal hearing intervention?	30. Difficulty in providing neonatal hearing intervention?	31. Confidence during the performance of general tasks during Neonatal Communication Intervention?	32. Difficulty of these general tasks during Neonatal Communication Intervention?
Pearson Correlation		1	-.028	.187	-.111	.088	-.389	-.349	-.225	-.011	-.383	-.330	.282	-.324	.092	-.079	.277	-.303
Sig. (2-tailed)			.821	.122	.447	.473	.001	.003	.070	.929	.001	.005	.018	.006	.456	.519	.021	.012
N		70	70	70	70	69	69	69	66	69	70	70	70	70	70	68	68	68
Pearson Correlation		-.028	1	.333	.664	.301	-.411	-.480	-.358	-.129	-.377	-.335	.327	-.210	.131	-.078	.454	-.296
Sig. (2-tailed)				.004	.000	.011	.000	.000	.003	.281	.001	.004	.005	.075	.276	.516	.000	.012
N		70	73	73	50	71	73	72	69	72	73	73	73	73	71	71	72	71
Pearson Correlation		.127	.333	1	.361	.319	-.263	-.261	-.376	-.253	-.357	-.363	.116	-.152	.030	.002	.409	-.418
Sig. (2-tailed)			.004	.010	.010	.025	.027	.027	.001	.059	.002	.002	.327	.200	.804	.988	.000	.000
N		70	73	73	50	71	73	72	69	72	73	73	73	73	71	71	72	71
Pearson Correlation		-.111	.664	.361	1	.301	-.459	-.505	-.396	-.111	-.388	-.364	.356	-.244	.062	-.127	.455	-.217
Sig. (2-tailed)			.000	.010	.000	.033	.001	.000	.004	.450	.005	.009	.011	.088	.668	.381	.001	.133
N		49	50	50	50	50	50	49	.000	.450	.005	.009	.011	.088	.668	.381	.001	.133
Pearson Correlation		.088	.301	.319	.301	1	-.401	-.484	-.609	-.194	.344	-.225	.338	-.210	.013	.043	.359	-.266
Sig. (2-tailed)			.011	.007	.033	.001	.001	.000	.000	.108	.003	.009	.004	.078	.913	.724	.002	.027
N		69	71	71	50	71	71	70	68	70	71	71	71	71	69	69	70	69
Pearson Correlation		-.389	-.411	-.263	-.459	-.401	1	.887	.577	-.032	-.666	.496	-.527	.410	-.075	.162	-.683	.548
Sig. (2-tailed)			.000	.025	.001	.001	.000	.000	.000	.789	.000	.000	.000	.000	.532	.178	.000	.000
N		70	73	73	50	71	73	72	68	72	73	73	73	73	71	71	72	71
Pearson Correlation		-.349	-.480	-.261	-.505	-.464	.887	1	.635	.085	-.654	.455	-.536	.414	-.183	.183	-.668	.559
Sig. (2-tailed)			.000	.027	.000	.000	.000	.000	.000	.483	.000	.000	.000	.000	.129	.129	.000	.000
N		69	72	72	49	70	72	72	68	71	72	72	72	72	70	70	71	70
Pearson Correlation		-.225	-.358	-.376	-.396	-.609	.577	.635	1	.452	-.591	-.384	-.374	.269	.078	-.159	-.422	.301
Sig. (2-tailed)			.003	.001	.004	.000	.000	.000	.000	.000	.000	.001	.002	.026	.530	.198	.000	.013
N		66	69	69	50	68	69	68	69	68	69	69	69	69	67	67	68	67
Pearson Correlation		.011	-.129	-.223	-.111	-.194	-.032	.085	.452	1	-.150	-.172	-.049	-.100	-.028	-.084	-.015	-.039
Sig. (2-tailed)			.281	.059	.450	.108	.789	.483	.000	.207	.150	.150	.680	.404	.821	.491	.899	.748
N		69	72	72	49	70	72	71	68	72	72	72	72	72	70	70	71	70
Pearson Correlation		.383	.377	.357	.388	.344	-.666	-.654	-.591	-.150	.531	-.740	.531	-.396	-.011	-.063	.703	-.584
Sig. (2-tailed)			.001	.002	.005	.003	.000	.000	.000	.207	.000	.000	.000	.001	.926	.603	.000	.000
N		70	73	73	50	71	73	73	72	69	73	73	73	73	71	71	72	71
Pearson Correlation		-.330	-.335	-.363	-.364	-.225	.496	.455	.384	.172	-.740	1	-.409	.483	-.166	.239	-.563	.582
Sig. (2-tailed)			.005	.002	.009	.059	.000	.000	.001	.150	.000	.000	.000	.000	.167	.045	.000	.000
N		70	73	73	50	71	73	72	69	72	73	73	73	73	71	71	72	71
Pearson Correlation		.282	.327	.116	.356	.338	-.527	-.536	-.374	-.049	.531	-.409	1	-.820	.013	-.070	.455	-.294
Sig. (2-tailed)			.005	.327	.011	.004	.000	.000	.002	.680	.000	.000	.000	.000	.915	.562	.000	.013
N		70	73	73	50	71	73	72	69	72	73	73	73	73	71	71	72	71
Pearson Correlation		-.324	-.210	-.152	-.244	-.210	.410	.414	.269	-.100	-.396	-.483	-.820	1	-.106	.207	-.365	.360
Sig. (2-tailed)			.075	.200	.088	.078	.000	.000	.026	.404	.001	.000	.000	.381	.084	.002	.002	.002
N		70	73	73	50	71	73	73	72	69	73	73	73	73	71	71	72	71
Pearson Correlation		.092	.131	.030	.062	.013	-.075	-.183	-.078	-.028	-.011	-.166	.013	-.106	1	-.712	.226	-.333
Sig. (2-tailed)			.276	.804	.668	.913	.532	.129	.530	.821	.926	.167	.915	.381	.000	.000	.060	.005
N		68	71	71	50	69	71	71	70	67	71	71	71	71	71	71	70	69
Pearson Correlation		-.079	-.078	.002	-.127	.043	.162	.183	-.159	-.084	-.063	.239	-.070	.207	-.712	1	-.260	.365
Sig. (2-tailed)			.516	.988	.381	.724	.178	.129	.198	.491	.603	.045	.582	.084	.000	.000	.030	.002
N		68	71	71	50	69	71	71	70	67	71	71	71	71	71	71	70	69
Pearson Correlation		.277	.454	.409	.455	.359	-.683	-.688	-.422	-.015	-.703	-.583	.455	-.365	.226	-.260	1	-.843
Sig. (2-tailed)			.000	.000	.001	.002	.000	.000	.000	.889	.000	.000	.000	.002	.060	.030	.000	.000
N		69	72	72	49	70	72	71	68	71	72	72	72	72	70	70	72	70
Pearson Correlation		-.303	-.296	-.418	-.217	-.266	.548	.559	.301	-.039	-.584	-.582	-.294	-.360	-.333	.365	-.843	1
Sig. (2-tailed)			.012	.000	.133	.027	.000	.000	.013	.748	.000	.000	.013	.002	.005	.002	.000	.000
N		68	71	71	49	69	71	70	67	70	71	71	71	71	69	69	70	71