

CHAPTER 6

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

The main aim of the current study was to determine the relevance of an assessment protocol, which was designed by the Pretoria Cochlear Implant Programme. The protocol was administered on children with cochlear implants in the transitional stage of language development, in an inclusive educational setting. Conclusions drawn from each sub-aim, including the implications of the results obtained will be discussed. This will be followed by the shortcomings and advantages of the current research. In the final section of this chapter, recommendations for further research will be discussed.

6.2 CONCLUSIONS AND IMPLICATIONS FOR CLINICAL PRACTISE

6.2.1 The type of information obtained from the protocol to determine if over- or under-evaluation is occurring

The literature regarding the vital areas of assessment in the paediatric cochlear implant population was critically examined, to ensure that all the essential areas for monitoring of progress in children with cochlear implants, is included in the proposed protocol. Auditory abilities, language skills, speech, voice, general development and parent-child interaction are the areas included in the protocol. Furthermore, research highlights the importance of including the parents and teachers in the assessment process. This was accomplished by requesting the parents and teachers to complete questionnaires pertaining to their children's use of audition and speech. Therefore, as all the vital areas of assessment are covered in the protocol, under-evaluation is not a concern. Some overlapping occurs with the MICS and Caregiver-Child Interaction, as well as with the Rossetti Infant-Toddler Language Scale, DAS (General Development) and Reynell Developmental Language Scale III. However, these assessments ensure that the crosscheck principle is being applied, and should not be seen as overlapping, but rather to ensure that

accurate information is being obtained from the assessment. Additionally, the DAS (General Development), Rossetti Infant-Toddler Language Scale and MICS were not age-appropriate for all the subjects, and therefore should only be used for younger children that are age-appropriate. The PALS gave an overview of the children's language developmental level and was used to select the subjects for this study. The other assessments included in the protocol are used to perform an in-depth assessment of the child's abilities on an annual basis to monitor progress. It is recommended that in-depth assessments occur on an annual basis only after to years of cochlear implant experience, to ensure that progress is closely monitored and to note developmental patterns of change. Intervention goals should also be changed accordingly (Tye-Murray, 2004: 751).

6.2.2 The type of information gained from the assessment protocol

The assessment results obtained for each child on all the procedures included in the protocol were used to critically evaluate and describe the type of information gained from the proposed assessment protocol.

After the administration and interpretation of the assessment protocol, it was clear that the protocol could be successfully administered on young children with cochlear implants, in the transitional stage of linguistic development. The information gained can be used effectively for future intervention planning and adaptations can be made where necessary. The background information questionnaire provided important information regarding the subject's family set-up, implant experience, previous hearing-aid use, culture group and languages spoken. This information is essential for intervention planning and possible prognostic predictions.

The audiograms provided essential information to (a) ensure that the device is functioning properly, and (b) that the subject's speech perception abilities in quiet and noisy conditions are tested. One of the ultimate goals of cochlear implantation is that the person should learn to listen and comprehend speech. The DAS (Auditory Communication) provided an indication of the subjects' listening abilities within their natural environments. For a young child who is implanted with a cochlear device, it takes time to achieve the level of listening for the

comprehension of speech. The language input he/she receives and the age of implantation plays a decisive role. The DAS (Auditory Communication) checklist provides information regarding the exact stage of auditory development of the child. In the current study, all the children were past the awareness of sound stage, and their scores indicated that they functioned on the discrimination skills stage where they were starting to comprehend speech. That was the motivation for using the children who functioned on the transitional stage of language development according to the PALS for this study. These results can provide information regarding the correlation with the PALS language level and possibly with the Reynell Developmental Language Scale III (Verbal Comprehension) results.

The teachers and parents contributed to the assessment by completing the MAIS and MUSS questionnaires, as they know the children best and are able to provide information regarding the children's use of audition and speech in the educational and home environments. Assessment of parent-child interaction allows for parent guidance to ensure that the child has an optimal environment in which speech, language and auditory acquisition can occur. Their language abilities and general development were assessed using the DAS (General Development), Rossetti Infant-Toddler Language Scale, PALS and Reynell Developmental Language Scale III (Verbal Comprehension). The SIR and VSA provided information regarding the subjects' speech and voice abilities. The Preschool Literacy Assessment compared the subjects' literacy skills to their hearing peers. The proposed protocol ensured that holistic assessments that can be repeated at specified intervals, or at least annually, are included.

Moreover, the protocol included subjective assessments that can be administered in natural settings, as well as objective measurements that can be used for progress monitoring over time. Video analysis allows for repeated viewing and comparisons of the child's progress can be made during future assessments.

6.2.3 The duration for administering and interpreting the assessment protocol

Subsequent to the administration and interpretation of the proposed protocol, it was found that it took approximately four hours per subject. It is expected that this time duration will decrease as

the subjects become more comfortable with the “test situation” and the parents and teachers will know what type of information is expected from them during an assessment. Furthermore, after repeated interpretation of the same assessment protocol, the duration for interpretation will decrease. Therefore, it can be concluded that the administration of this protocol is time efficient and can be used effectively within the clinical setting of the Pretoria Cochlear Implant Programme.

6.2.4 Language and cultural barriers affecting the administration and interpretation of the assessment protocol

Following the administration and interpretation of the proposed protocol, it was evident that during the auditory ability assessment, no cultural barriers affected the results, however, linguistic barriers together with individual factors such as length of cochlear implantation experience, chronological age, mood and energy levels would have an understandable impact on the final outcome of the audiological results. The DAS (Auditory Communication), DAS (General Development), Rossetti Infant-Toddler Language Scale, PALS, VSA, SIR and Preschool Literacy Assessment were not directly affected by cultural or linguistic barriers, as the checklists were completed during observation of the subjects in their natural contexts at school and during teacher interviews. When rating the SIR, it is essential to take cultural aspects such as accents into account to ensure that accurate, unbiased scores are given.

During the administration of the Reynell Developmental Language Scale III, linguistic barriers can definitely affect the outcome of the results, which is typical when using standardised assessments on second language learners. Cultural and linguistic barriers did not affect the parent-child interaction assessment, as the checklist was completed during video analysis. Similarly, the MAIS and MUSS was not directly influenced by linguistic or cultural barriers, however, linguistic barriers can affect the end-result as teachers and parents are often expected to complete the questionnaires in their second language and currently the MAIS and MUSS are only available in English. It is therefore the clinician’s responsibility to ensure that the parents and teachers fully understand the contents of the questionnaires, or to make use of translated questionnaires, to ensure that any linguistic barriers are eliminated.

From the above discussion, it can be concluded that overall, cultural barriers did not affect the administration and interpretation of the proposed assessment protocol. On the other hand, linguistic barriers can have a larger impact on the outcome of the results obtained, as second language learners are expected to receive instructions, respond and process auditory information in their second language, which is more difficult than processing information in their first language. The clinician should therefore be aware of, and sensitive to, the cultural and linguistic barriers, and should make the necessary adaptations during the administration and interpretation of the protocol, ensuring that unbiased assessments do not occur.

6.2.5 The overall value of the assessment protocol

The proposed assessment protocol offers a framework with which to assess audition, language and communication in real-life situations. It is innovative in design and offers a structured approach to the behaviour of young children with a hearing loss. Although designed for use within a cochlear implant programme, it can be used with a range of children with a hearing loss, where information is required about their development in audition and speech production as well as aspects of communication and language development. The protocol also provides a means of monitoring development both in the short-term, looking in detail at small changes in behaviour; and in the long-term, looking at significant changes over time. This is an essential requirement when working with young cochlear implant users, as the long-term goals can only be accomplished once the short-term goals have been achieved. When difficulties or problems are identified, adjustments are made to the short-term goals in order to reach the long-term goal of functional spoken language and intelligible speech. The protocol is time-efficient and can be incorporated into standard practice and procedures. The assessment protocol includes observation in natural contexts and reports involving parents and teachers. This means it does not only depend on elicited behaviours, which can be very unreliable in young children. The Reynell Developmental Language Scales III (Verbal Comprehension) was included as a standardised measure in order to monitor progress in the long-term, and prepare the young cochlear implant users for more structured assessments. This is essential especially if the child is referred to a mainstream educational setting. Additionally, the clinicians needed to keep the

cultural and linguistic barriers in mind and were required to make the necessary adaptations when assessing second language learners.

The protocol is useful because it focuses on a child's strengths as well as weaknesses, thereby providing a comprehensive assessment as a basis for management. In addition to monitoring the child's development, it allows for the identification of additional problems and areas of difficulty as well as specific abilities and skills. This enables the clinician to determine appropriate intervention strategies, and to monitor them according to the observed progress. It also provides indications for other assessments or referrals necessary to explore developmental difficulties.

Clear information about cochlear implant users' progress is needed for a number of purposes. Information is provided to parents on which to base the decisions they make about the educational management of their child. The information obtained from the assessments included in the protocol provides clear, objective and accessible information on an individual child's development. As a more general resource, it provides both parents and professionals with information on large groups of children in terms of expected rate of progress as a basis for intervention planning for an individual child. This information may also help highlight areas in which progress does not meet expectations and which may need in-depth assessments or referrals to other professionals (e.g. ENT surgeons, Paediatricians and Occupational Therapists). For local professionals working with hearing impaired children, it is helpful to have a means to measure change. A strength of the protocol is the fact that its measures can be used in a variety of settings. Moreover, most of the measures are easily understood by non-professionals and can be translated into other languages. The data obtained from the protocol also contributes to the more general information required concerning the children's progress for audit and predictive purposes.

Some of the factors such as age, other disabilities and lack of available support services may not be amendable to change. Nevertheless, a systematic identification and documentation procedure, such as the proposed assessment protocol, may highlight the need for counselling and assist implant programme professionals to prioritize or target the intervention accordingly in order to reduce the sequel of such problems. Finally, the results obtained from the protocol may con-

tribute to the funding process of cochlear implants. Medical aids and insurance companies need evidence-based and up to date information for both current users and prospective users, as well as for future planning and allocation of resources. The protocol can be a neutral, yet sensitive way of promoting positive interdisciplinary collaboration and peer support with team discussions. “An important element of the rehabilitation programme is the monitoring of progress over a period of at least five years after implantation. This ensures adequate device performance, identifies problems and sets suitable expectations for parents and professionals local to the child. A wide range of tests is needed because the ages of children implanted are often low, and their linguistic status varies from preverbal through transitional to having functional language” (Lutman, et.al, 1996:49).

In summary, the assessment protocol has been shown to be innovative, time effective, user-friendly, informative and relevant for the assessment of young cochlear implant users in the transitional stage of language development in an inclusive educational setting.

6.3 SHORTCOMINGS OF THE CURRENT STUDY

As is the case with most research, shortcomings are commonly identified. The shortcomings of this current research are as follows:

Firstly, only eight subjects were used for this study; however, detailed and in-depth assessments resulted in large amounts of data for each subject. Secondly, the duration for the administration of the protocol was lengthy, especially the duration for the assessment of auditory abilities. The duration of the hearing assessments could have been considerably reduced if the researcher made use of the same assistant audiologist throughout the study, rather than asking the parents to assist with the conditioning of the children. Thirdly, the protocol was administered in absolutely ideal conditions with FM systems. These circumstances are not commonly found at other educational settings. Nevertheless, difficulties experienced by cochlear implant users in absolutely ideal settings were highlighted. Lastly, the background questionnaire, MAIS and MUSS assessments were only available in English at the time of the study. Some of the parents’ and teachers’ first languages were Afrikaans, Sotho and Sign Language. Consequently, the questionnaires were

completed in the parents' and teachers' second language, which could have affected the validity and reliability of the results, as the risk for misinterpretations increased. However, the researcher did assist the parents and teachers that did not fully understand the content of the questionnaires by explaining the content in their first language or by using simpler English language.

6.4 ADVANTAGES OF THE CURRENT STUDY

This study is the first of its kind for the Pretoria Cochlear Implant Programme. By determining the relevance of the assessment protocol, the Pretoria Cochlear Implant Programme can start to collect outcome measures of all the children implanted within their programme and can develop a database using the same assessment protocol. Furthermore, the subjects included in this study received a complete auditory, speech and language assessment, whereby adaptations to their intervention programme can be made. These results were also made available to the Pretoria Cochlear Implant Programme, so that a database of outcome measures can be established. The outcome measures can be used for prognostic predictions for future cochlear implant candidates and for funding purposes. Moreover, the researcher selected a school representative of an inclusive educational setting with approximately twenty to twenty-five learners in a classroom. Ideal circumstances for auditory learning are provided at the school. The results of this study provided information regarding the advantages and disadvantages of the inclusive educational setting, as well as recommendations for possible solutions. Additionally, the protocol used ensured that different assessments were included to verify the results obtained. Finally, the heterogeneity of the cochlear implant population was continuously highlighted throughout the study. Therefore, direct comparisons between the subjects were impossible although certain outcome measures can be described qualitatively. The results of this study illustrated the importance of reporting individual scores, as reporting average scores across individuals does not specify the most critical information. The most important focus is the absolute level of performance for each child in order to monitor progress. The proposed protocol provides individual data that can be reported in scattergrams or bar graphs. After the administration and interpretation of the protocol, the results obtained can be used for reporting possible reasons for device failures. Professionals can also investigate and share information on the potential reasons

for poor performance in those children who appear to be “under-functioning”, as well as providing information on star implant users.

6.5 RECOMMENDATIONS FOR FUTURE RESEARCH

As in the case with all research, the methodology and findings lead to recommendations for further research in this field. The following specific recommendations apply to future research.

- ❖ Although the proposed assessment protocol appears to be a relevant method for assessing effective cochlear implantation, intervention strategies and for monitoring progress over time, more research is necessary to determine the current protocol’s sensitivity to longitudinal change.
- ❖ The background questionnaire, MAIS and MUSS are currently only available in English. This could result in misinterpretation for parents and teachers whose first language is not English. The translation of these questionnaires into Afrikaans and commonly used African languages would prevent any misinterpretation on the content included in the questionnaires.
- ❖ The assessment protocol used in this study was specifically designed for cochlear implant users in the transitional stage of language development. Assessment protocols for children in the pre-verbal and functional language stage need to be piloted in various educational settings in order to determine their relevance for use within the Pretoria Cochlear Implant Programme.
- ❖ In this study, the assessment protocol was administered on children in an inclusive educational setting. The current protocol can be applied to children in other educational settings, e.g. special schools for the hearing-impaired or within mainstream schools.
- ❖ Although all the assessments included in the protocol were proven to be relevant for use within an educational and clinical setting, further research could be done to possibly substitute certain assessments included in the current protocol, e.g. the value of using the LiP (Listening Progress) devised by the Nottingham Cochlear Implant Programme instead of using the DAS (Auditory Communication).

- ❖ Further research is needed to determine the value of using the proposed assessment protocol as part of the cochlear implant candidate selection procedure for the Pretoria Cochlear Implant Programme.
- ❖ Research regarding the effects of linguistic barriers can be investigated by providing questionnaires to parents firstly in English, and then in their first language to determine the effects of the linguistic barriers on the answers received from the questionnaires.

6.6 FINAL COMMENTS

In spite of the difficulties in designing appropriate assessments, with reported wide variation in individual outcomes following implantation, it is vital that paediatric implant programmes develop a sensitive and appropriate assessment battery for children of all ages in their care. The principle aim of implantation is to give auditory access to speech that was not possible with conventional hearing aids. The progress of each child must be monitored in the use of audition from the very earliest stages following implantation to assess benefit, monitor tuning and functioning of the device and to evaluate the effectiveness of the intervention programme. In addition to monitoring individual progress for clinical purposes, outcome measures are needed to respond to many questions being asked about cochlear implantation regarding selection criteria for candidates and the most effective forms of intervention. The controversy, which continues to surround paediatric cochlear implantation, can best be resolved by careful and objective documentation of progress and difficulties. **“In times of increasing financial accountability and scrutiny in health care services throughout the world, benefits arising from paediatric implantation must be quantified by consistent collection of outcome data on every implanted child”** (O’Donnoghue, 1992:655).