INTRODUCTION

Children with cochlear implants (CIs) demonstrate better speech recognition in noise with the use of a Frequency Modulated (FM) system on one or both sides relative to conditions with no FM system (Schalock & Thibodeau, 2006). Use of personal Dynamic FM systems, which adjust the gain of a receiver relative to the ambient noise, provides better speech recognition in noise for cochlear implant recipients when compared to performance with traditional, fixed gain FM systems (Wolfe et al., 2009). However, possible drawbacks to personal FM systems include channel interference and privacy concerns. An alternative is digital radio technology, which provides sound without transmission noise, signal loss, or time lag. In addition, transmission of the signal is encrypted so it is secure against eavesdropping which is not the case with analog transmission.

OBJECTIVES

Examine the signal-to-noise ratio (SNR) loss in children with cochlear implants (CIs) with and without the use of an ear level digital radio receiver. Determine if there are any relationships between SNR and pure tone average (PTA), speech recognition threshold (SRT), percent correct on single words in quiet, and/or device characteristics.

PARTICIPANTS

Eighteen children with CIs between the ages of five and 15 years participated in the study. Fifteen children are bilateral CI users and three are unilateral CI implant and hearing aid users. The children all attended the River School and participated in an inclusion classroom. A master’s level educator and a full-time speech language pathologist staff the classroom using a co-teaching model.

EXPERIMENT PROTOCOL

- Otoscopy, tympanometry, electrode impedances, microphone listening check
- Speech-Recognition Threshold (SRT) - Aided soundfield thresholds using narrow band noise (NBN)
- Pure Tone Average (PTA) at 50, 1k, 2k Hz
- 25 monosyllabic words in quiet at 60 dB SPL
- 16 speech in noise sentences without receiver
- 16 speech in noise sentences with receiver on first implanted ear

RESULTS

Children demonstrated better speech recognition in noise with the use of a digital audio receiver coupled to the one CI relative to no digital audio input. A dependent samples t-test revealed that the SNR was significantly better with the receiver than without the receiver: No Receiver (mean = 6.85, SD = 4.97), t(18) = 9.72, p < .001. Improvements in SNR were detected across all subjects and SNRs were reduced by as much as 15 dB.

REFERENCES


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