Exsys Case Study

Pediatric Auditory Diagnostics

Vanderbilt University

A diagnostic knowledge automation system named *AUDEX* was developed that can interpret infant auditory brainstem response (ABR) data. Identification of hearing loss in the pediatric population poses a difficult diagnostic challenge to the audiologist. Developmental age, gestational age, and chronological age are considered when interpreting test data used in the diagnoses. Also, adjustments must be made if an infant is premature or developmentally delayed. These considerations require a certain level of expertise in the domains of electrophysiological and behavioral pediatric testing.

The authoring of the knowledge automation system required a professional in the domain of audiology. The system user provides history information, absolute and interwave latency values, waveform threshold values, and tympanometric data. The diagnostic system then provides the user with the following information:

◆ Hearing sensitivity classification based on click or tone burst thresholds
◆ Type of hearing loss, (i.e.: conductive, sensorineural or mixed)
◆ Auditory brainstem status (i.e. normal or abnormal)
◆ Certainty factors associated with each of these conclusions
◆ The user is allowed to query about what rule it is trying to affirm and how it reached certain conclusions

Five certified audiologists with extensive experience in ABR measurement with young children were utilized for testing purposes. They were instructed to use the system after they completed ABR assessments and made diagnoses. Cases that included children between the ages of 34 weeks and 3 years of age who had a full range of degrees and types of hearing impairment were run. A total of 73 were analyzed and in the final evaluation, and the expert agreed with the computer diagnosis for 100% of the cases. The system also benefits in audiology training programs.