CASE REPORT

Assessing School Readiness in a Child with Hearing Loss: Cognitive and Educational Considerations

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ABSTRACT

Severe bilateral sensorineural hearing loss (SNHL) though rare in young children, is a common cause of permanent hearing loss that can hinder overall development. We present a 5-year-old Malay girl diagnosed with SNHL at 2, now using cochlear implant and hearing aids, referred for cognitive assessment to guide parents' school placement decisions. Due to speech and verbal limitations, non-verbal, performance-based cognitive tests were administered. Results from the Seguin Form Board Test, Gesell, Binet and Bender-Gestalt Test, and Wechsler Nonverbal Scale of Ability revealed age-appropriate visuomotor and spatial reasoning, with an estimated IQ between 87 and 103 (34th percentile), indicating average cognitive functioning. Educational and rehabilitation considerations are discussed, leading to conclusion that addresses parents' primary question. Overall, results suggest that she is cognitively prepared for mainstream school, provided appropriate support services are available. This case highlights the importance of culturally, linguistically appropriate assessment in educational planning for children with hearing loss.
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INTRODUCTION

Paediatric hearing loss has profound implications for speech, language, cognitive development, and social integration. Sensorineural hearing loss (SNHL), resulting from damage along the auditory pathway from the cochlea to the brainstem, is a leading cause of permanent childhood hearing impairment. Early-onset SNHL can disrupt auditory skill development and delay language and social acquisition, with long-term effects on academic performance and emotional well-being (1). Early diagnosis and timely intervention, including hearing aids or cochlear implantation, are therefore critical to reduce these risks. Cochlear implants, which electrically stimulate the auditory nerve, have been associated with improvements in communication, cognition, and school participation; however, these benefits depend heavily on structured rehabilitation, speech–language therapy, and appropriate educational planning (2).

School readiness is a key concern for children with SNHL and encompasses cognitive functioning, language competence, behavioral regulation, and social-emotional skills. Due to delayed auditory and language input, children with hearing loss may face challenges in meeting conventional readiness benchmarks and often require individualized educational support. This case highlights the importance of cognitive assessment in evaluating school readiness in a child with bilateral SNHL following cochlear implantation within the Malaysian context. It underscores the complexity of mainstream school placement decisions and the need for a multidisciplinary approach to ensure educational suitability, effective integration, and long-term developmental success (2).

CASE REPORT

A 5-year-7-month-old Malay girl, Isabelle (pseudonym), was referred for an intellectual functioning assessment to guide school placement decisions. Diagnosed with bilateral severe SNHL at the age of two, she received hearing aids in both ears by age three and underwent left cochlear implantation at four. She currently uses a cochlear implant in her left ear and a hearing aid in her right ear, with regular audiological follow-up.

Prenatal, antenatal and developmental histories were uneventful except for speech delay. Her early motor milestones were normal, began walking at 13 months but speech delay became evident by 18 months. Al-

though she started babbling with words like 'mama', 'buya', 'nak' and 'tokdok', her speech regressed shortly after, prompting evaluation and diagnosis of SNHL. Despite hearing difficulties, her behavioral, cognitive, and social development were reported as appropriate.

Isabelle attends a mainstream Islamic kindergarten full-time and appears well-adjusted socially and academically. She enjoys school, interacts well with peers, and is regarded positively by teachers. However, her speech remains largely incomprehensible and unintelligible to teachers and peers.

Psychological Assessment

Clinical Observation. Isabelle was attentive, socially engaged, and cooperative during assessment. She was cooperative and followed instructions well, mainly interacted using gestures and limited verbalizations. Her speech was often unclear, but she demonstrated good understanding and compliance.

Seguin Form Board Test (SFBT). This culture-fair, performance-based screening indicated a mental age consistent with her chronological age (5 years), reflecting average visuomotor coordination and spatial skills.

Gessel, Binet and Bender-Gestalt Test (BGT). In this non-verbal perceptual-motor assessment, Isabelle demonstrated a developmental age of 7 years, with strengths in coping complex gemoetric designs, indicating strong visuomotor integration

Wechsler Nonverbal Scale of Ability (WNV). Designed for individuals with language limitations, the WNV uses pictorial instructions and requires non-verbal responses. The full scale IQ, based on the four-subtest version administered, was estimated to be 94, placing her at the 34th percentile and the 95% confidence interval ranged from 87 to 103. Isabelle's general cognitive ability falls within the average range of intellectual functioning, suggesting that she demonstrates intact general cognitive abilities comparable to peers of the same age.

Analysis of the individual subtests revealed a variable performance profile with no significant differences between subtests scores. Isabelle's strongest performance was on the Coding subtest (T-score = 60), which requires rapid eye-hand coordination, attention to visual detail, and efficient visuomotor integration. Her above-average score in this domain indicates strengths in processing speed and visuomotor coordination. In contrast, her lowest score was in Object Assembly (T-score = 42), a task that involves synthesizing visual-spatial information to form meaningful wholes. This relatively lower score may reflect some difficulty in part-whole integration or in organizing visual information under time constraints, though it remains within the low-average range and does not indicate significant impairment.

On the Matrices subtest (T-score = 43), which measures abstract visual reasoning and non-verbal problem-solving, Isabelle's performance also falls slightly below the average range. This suggests that while her reasoning skills are functional, they may be less efficient when abstract visual patterns require analysis and pattern completion. Her performance in Recognition (T-score = 45), which measures visual memory and attention to detail, fell within the average range, supporting functional visual discrimination and memory abilities.

Overall, Isabelle's cognitive profile reflects average general non-verbal ability, with strengths in processing speed and visuomotor integration, and relative weaknesses in tasks that demand spatial synthesis and abstract pattern reasoning. These results are consistent with a functional, though uneven, cognitive profile and support the need for targeted support in more complex visual-spatial tasks. The breakdown of Isabelle's scores obtained in WNV is illustrated in Table I.

Table I: Wechsler Nonverbal Scale of Ability (WNV) Results

Subtest	T-Score	Interpretation
Matrices	43	Slightly below average non-verbal reasoning and visual pattern recognition abilities
Coding	60	Above-average processing speed, attention, and visuomotor coordination.
Object Assembly	42	Low-average part-whole integration and visual-spatial synthesis under time limits.
Recognition	45	Average visual memory and visual discrimination skills.

Sum of T-Scores	Full Scale Score (FSIQ)	Percentile Rank	95% Confidence Interval	Category
190	94	34	87 – 103	Average

DISCUSSION

A girl with SNHL, successfully intervened with hearing aids and cochlear implantation, demonstrated age-appropriate social and emotional development but continued to experience speech intelligibility issues. She was referred for an intellectual assessment to facilitate parents' decision in determining suitable school placement. Administering a comprehensive intellectual assessment comprising both verbal and non-verbal domains would likely underestimate her abilities due to the known speech delay. Employing non-verbal testing, the outcome revealed consistent results indicative of an average cognitive ability, suggesting comparable learning capacity to peers. However, does average cognitive ability alone indicate that mainstream education is her best option?

Following Malaysia's ratification of the UN Convention on the Rights of Persons with Disabilities (CRPD), efforts to integrate children with disabilities into mainstream schools have increased. The national goal to enroll 75% of children with disabilities into inclusive education by 2025 is laudable but presents challenges for children with hearing loss, especially in Malaysia's multilingual

context where Malay, English, Mandarin and Tamil are widely used, Arabic in selected schools too [3].

Children with hearing loss often rely on multiple communication strategies, including speech, lip reading, and sign language. Although official systems like the Hand Code of Malay and Malaysian Sign Language exist, these are not widely taught in mainstream settings, limiting access to effective communication. Additionally, special education-trained teachers are often concentrated in designated schools, posing challenges for successful inclusion [4].

Malaysia's Ministry of Health has provided cochlear implants since the mid-1990s, greatly improving access to spoken language for children with profound hearing loss and this child was one of the fortunate recipients. Early intervention - through consistent device use and speech therapy - has been shown to support development and increase potential for mainstream education [5]. However, school readiness is more than cognitive ability; it requires functional listening, social skills, and basic communication competence, including the ability to engage in turn-taking and interpret social cues.

Even with average intelligence, many children with hearing impairments still require Individualized Education Plans (IEPs) to support their learning needs. Unfortunately, most mainstream teachers are not equipped to address the specific language development needs of these students. The integration of rehabilitation plans in the mainstream school via inclusive education is an opportunity to unleash these children greatest potential. Inclusivity via the Special Education Integration Programme (SEIP) attempt to bridge this gap by offering partial or full inclusion depending on individual needs. It has been implemented by Malaysia Ministry of Education at different levels and this integrated approach allow access to mainstream education while ensuring that essential support services are in place [3].

Additionally, parents and educators must be vigilant in maintaining hearing devices. Malfunctioning equipment can compromise learning, and early detection of issues is crucial to minimize disruption. Continued speech and language support is also necessary throughout the school years. For children like Isabelle, the most supportive option may be placement in a mainstream school within an integrated program, supported by regular follow-ups with audiologists and speech-language therapists. Ultimately, success depends on a collaborative effort that includes educators, healthcare professionals, and parents working together to monitor progress and support development.

Given all the factors, the best option for children like Isabelle is a mainstream school with integrated programme i.e. SEIP. As it is evident that technology alone is not sufficient for linguistic, cognitive, and educational development, children with audiology devices and amplifications should be monitored through consistent follow-ups with multidisciplinary professionals including audiology and speech therapist. In addition to that, parents' awareness and commitment are essential to optimize children's psychosocial wellbeing.

All in all, parental roles are beyond making decisions about school placement. Rather they advocate for children's social, emotional and language development, that involve acceptance and patience as language development, academic progress, and most importantly children' overall well-being takes time.

CONCLUSION

Cognitive assessment alone cannot determine school placement for children with SNHL. While Isabelle's average cognitive abilities suggest potential for mainstream education, she may require extensive support to thrive in it. Her case illustrates the need for comprehensive assessments and integrated educational support. A mainstream school with SEIP provisions offers a balanced solution - combining inclusion with tailored rehabilitation, making mainstream placement feasible and beneficial when accompanied by structured rehabilitation, teacher preparedness, and parental commitment, aligning with Malaysia's inclusive education goals and promotes equitable access to education. Collaboration between educators, health professionals, and families is essential to optimize developmental outcomes for children with hearing impairments.

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