UCDAVIS HEALTH | CHILDREN'S HOSPITAL

Hearing Screening For Pediatric Kidney Transplant Recipients

I. PURPOSE

To outline the approach for hearing screening in pediatric patients following kidney transplantation

II. SETTING

Outpatient

III. POLICY

Pediatric kidney transplant recipients have risk factors for hearing loss including kidney dysfunction and ototoxic/neurotoxic drug exposure. Although kidney transplantation has been hypothesized to improve hearing function, this claim has not been substantiated by evidence. In fact, several studies suggest the contrary, with an increased prevalence of hearing loss in in children with kidney transplant (47-62%) compared to those with ESKD (29%)[1,2].

Changes in hearing can impact quality of life and lead to a wide range of downstream effects such as personal-social maladjustments, emotional difficulties, poor academic performance, and executive functioning[3]. In younger children, delayed detection in changes in hearing leads to permanent deficits and delayed development[4]. Early identification can lead to adequate support for language access.

DEFINITIONS
Hearing loss: "Any impairment in the ability to hear sounds at thresholds considered normal. For children, a pure tone threshold average of more than 15 dB at 500, 1000, 2000, and 4000 Hz is considered outside the normative range, with larger reductions in hearing levels classified by severity." [5]

IV. PROCEDURE

1) The AAP recommends that all **children should undergo a risk assessment for changes in hearing thresholds by utilizing objective and evidence-based risk factors for delayed-onset hearing changes.** All children, regardless of risk factors, should have their hearing screened in accord with the current Bright Futures/AAP "Recommendations for Preventive Pediatric Health Care." Hearing screening using age-appropriate methods is indicated when risk factors are identified or with caregiver concern. Although not specifically identified by the AAP report, kidney transplant recipients are at a significantly higher risk for changes in hearing than the general population, and therefore should undergo objective screening and referral to audiology if appropriate.

a. All patients should have a pre-transplant hearing evaluation within 1 year prior to receiving a renal transplant

b. Pediatric kidney transplant recipients <4 years of age being followed in pediatric nephrology clinic should be referred to audiology for hearing evaluation within 12 months following kidney transplantation

c. Pediatric kidney transplant recipients ≥4 years of age being followed in pediatric nephrology clinic should undergo hearing screening in nephrology clinic using pure tone audiometry within 12 months following kidney transplantation

    i. Patients who have developmental delay or other behavioral conditions who cannot cooperate with pure tone audiometry should be referred to audiology for Auditory Brain Response (ABR).

d. Repeat hearing screening annually in accordance with AAP recommendations.

e. If in-clinic pure tone audiometry screening is positive or unsuccessful, refer patient to audiology which offers further evaluation and management as follows:

    i. Evaluation:
        1. Comprehensive audiologic evaluation, typically consisting of pure tone air and bone conduction audiometry, speech audiometry, tympanometry with possible acoustic reflex assessment if needed for assessment of middle ear status, and otoacoustic emissions testing when indicated for assessment of cochlear outer hair cell function.
        2. Audiology will assess whether additional ENT evaluation is needed.
    ii. Management
        1. Evaluation for candidacy for hearing aids or other hearing assistance technology. Audiology clinic can dispense hearing aids as well as implantable hearing technology (both bone conduction implantable devices and cochlear implants).
        2. Referral to Early Start or other educational services. Provides ongoing support for children with hearing loss in collaboration with educational audiologist
        3. Follow up: A monitoring schedule would be established by the audiology team.

V. RESPONSIBILITY

Pediatric nephrologist

VI. REFERENCES

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2. Gulleroglu, K. *et al.* Hearing Status in Pediatric Renal Transplant Recipients. *Exp Clin Transplant* **13**, 324–328 (2015).

3. Bower, C. *et al.* Hearing Assessment in Infants, Children, and Adolescents: Recommendations Beyond Neonatal Screening. *Pediatrics* **152**, e2023063288 (2023).

4. Hall, W. C., Levin, L. L. & Anderson, M. L. Language deprivation syndrome: a possible neurodevelopmental disorder with sociocultural origins. *Soc Psychiatry Psychiatr Epidemiol* **52**, 761–776 (2017).

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VIII. REVIEWED DATE and REVIEW CYCLE

June 21, 2024
2 year review cycle

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