

Should we recommend universal neonatal hearing screening?

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EVIDENCE-BASED ANSWER

Universal neonatal hearing screening leads to both earlier detection and earlier treatment of infants with hearing loss (strength of recommendation [SOR]: **A**, based on a systematic

review). Available evidence suggests early identification and intervention may improve language outcomes (SOR: **C**, based on retrospective cohort studies).

CLINICAL COMMENTARY

Despite lack of evidence, early intervention could aid future language skills

Despite the lack of hard outcomes data to support neonatal hearing screening, it seems reasonable that early intervention will aid future language skills. Hopefully, future evidence will support the

notion that early treatment leads to tangible school performance improvement. For most, however, the decision to universally screen neonates will be guided by state law rather than clinical evidence alone; 38 states currently have mandated screening programs with legislation pending in others.

■ Evidence summary

In the United States, approximately 5000 infants with moderate-to-profound hearing loss are born annually.¹ Affected children graduate high school averaging 4th-grade academic performance skills.² Efforts to reduce the impact on these children have focused on early diagnosis and treatment.

A systematic review gathered studies comparing universal hearing screening with selective screening.¹ Most included studies used a 2-stage universal screening protocol. Infants who failed initial testing were retested within 12 weeks. Testing methods included otoacoustic emissions (OAE) and auditory brainstem response (ABR). Infants who failed the second test were referred for audiological evaluation. Using these data, a hypothetical model was created, which found that 1441 newborns would need to be screened to diagnose 1 additional case of moderate-to-profound

permanent hearing loss before 10 months of age (at cost of 200 extra referrals for false-positives). Sensitivity and specificity of the hypothetical model's 2-stage screening was 85% and 97%, respectively. The estimated positive predictive value was 6.7%.^{1,3}

Individually, OAE and ABR accurately diagnose neonatal hearing loss. One multi-center cohort of 2995 infants measured test performance of OAE and ABR against the gold standard (visual reinforcement audiometry performed at 8–12 months).⁴ The authors used a receiver operating characteristics (ROC) curve to plot speech awareness thresholds for both tests. When middle-ear pathology and progressive hearing loss were excluded, the area under the ROC curves for ABR and OAE were 0.91 and 0.94, respectively, indication that both tests had excellent test accuracy (a perfect test would have an area under the curve of 1.0).

Strategies based on selective screening of high-risk infants fails to identify permanent hearing loss in many affected infants. In a cohort study of more than 10,000 infants, only 43% of infants with permanent hearing loss were identified with selective versus universal screening. Most affected infants would have been missed using risk-based criteria.⁵

Limited evidence suggests that early identification of infants with permanent hearing loss improves language skills. In a retrospective cohort study of 150 infants examining language outcomes, participants were grouped according to age at identification of hearing loss.⁶ All participants received comprehensive in-home language intervention services plus amplification devices.

Of the 85 children with normal cognitive ability, the mean receptive and expressive language quotients at 13 to 36 months were higher in the early-identified group vs the late-identified group (receptive language quotients, 79.6 vs 64.6, $P<.001$; expressive language quotients, 78.3 vs 63.1, $P<.001$). Total language quotient was also higher in the early group (language quotients, 79 vs 64; $P<.001$).

The conclusions were limited by multiple factors: retrospective study design, cohort selection drawn from different hospitals during different time periods, unblinded participant selection, and unblended outcome assessments. Other published studies have inconclusive outcome data. The Cochrane Collaboration published a systematic review in which no studies were found that fulfilled the inclusion criteria to evaluate the effectiveness of universal hearing screening.⁷

Recommendations from others

The Joint Committee on Infant Hearing recommended universal neonatal hearing screening during hospital birth admission in their Year 2000 Position Statement.⁸ For infants whose hearing is impaired on re-screening, the committee recommends audiology referral and medical evaluation to rule out associated conditions before

age 3 months. They further recommend interventional services begin before age 6 months for infants with confirmed hearing loss.

The US Preventive Services Task Force does not recommend for or against universal hearing screening, citing insufficient outcomes data.⁹ ■

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FAST TRACK

Evidence suggests that early intervention may improve language skills for infants with hearing loss