The Medical Home
Medical Home Initiatives for Children With Special Needs Project Advisory Committee
Pediatrics 2002;110;184-186

This information is current as of October 23, 2006

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http://www.pediatrics.org/cgi/content/full/110/1/184
The USPSTF concludes that there is moderate certainty that the net benefit of screening all newborn infants for hearing loss is moderate.

**CLINICAL CONSIDERATIONS**

**Patient Population Under Consideration**

The patient population considered here includes all newborn infants.

**TABLE 1** What the USPSTF Grades Mean and Suggestions for Practice

<table>
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<tr>
<th>Grade</th>
<th>Grade Definitions</th>
<th>Suggestions for Practice</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>The USPSTF recommends the service. There is high certainty that the net benefit is substantial.</td>
<td>Offer/provide this service.</td>
</tr>
<tr>
<td>B</td>
<td>The USPSTF recommends the service. There is high certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.</td>
<td>Offer/provide this service.</td>
</tr>
<tr>
<td>C</td>
<td>The USPSTF recommends against routinely providing the service. There may be considerations that support providing the service in an individual patient. There is moderate or high certainty that the net benefit is small.</td>
<td>Offer/provide this service only if there are other considerations in support of the offering/providing the service in an individual patient.</td>
</tr>
<tr>
<td>D</td>
<td>The USPSTF recommends against the service. There is moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.</td>
<td>Discourage the use of this service.</td>
</tr>
<tr>
<td>I statement</td>
<td>The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of the service. Evidence is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.</td>
<td>Read “Clinical Considerations” in the USPSTF Recommendation Statement. If offered, patients should understand the uncertainty about the balance of benefits and harms.</td>
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Assessment of Risk
Risk factors associated with a higher incidence of permanent bilateral congenital hearing loss include NICU admission for ≥2 days, several congenital syndromes, family history of hereditary childhood sensorineural hearing loss, craniofacial abnormalities, and certain congenital infections. However, ~50% of infants with permanent bilateral congenital hearing loss do not have any known risk factors.

Screening Tests
Screening programs should be conducted by using a 1- or 2-step validated protocol. A frequently used protocol requires a 2-step screening process, which includes otoacoustic emissions (OAEs) followed by auditory brainstem response (ABR) in those who failed the first test. Equipment should be well maintained, staff should be thoroughly trained, and quality-control programs should be in place to reduce avoidable false-positive test results. Programs should develop protocols to ensure that infants with positive screening-test results receive appropriate audiolgic evaluation and follow-up after discharge. Newborns delivered at home, birthing centers, or hospitals without hearing screening facilities should have some mechanism for referral for newborn hearing screening, including tracking of follow-up.

TREATMENT
Early intervention services for hearing-impaired infants should be designed to meet the individualized needs of the infant and family, including acquisition of communicative competence, social skills, emotional well-being, and positive self-esteem. Early intervention includes evaluation for amplification or sensory devices, surgical and medical evaluation, and communication assessment and therapy. In recent years, cochlear implants have become more available for appropriate candidates; this surgery is usually considered in those with severe-to-profound hearing loss only after inadequate response to hearing aids.

Screening Intervals
All infants should have hearing screening before 1 month of age. Those infants who do not pass the newborn screening should undergo audiologic and medical evaluation before 3 months of age for confirmatory testing. Because of the elevated risk of hearing loss in infants with risk indicators, an expert panel has made a 2000 recommendation that these children should undergo periodic monitoring for 3 years.1

OTHER CONSIDERATIONS
Implementation
Thirty-nine US states have enacted legislation related to universal newborn hearing screening (UNHS). These laws differ with respect to whether screening is mandated or encouraged, how results are reported, and how screening is funded.

Research Needs/Gaps
Additional studies detailing the correlation between childhood language scores and functional outcomes (eg, school attainment and social functioning) are needed.

DISCUSSION
Burden of Disease
The focus of UNHS programs is on congenital (as opposed to acquired or progressive) hearing loss that may not be detected in the newborn period. According to the 2000 statement from the Joint Committee on Infant Hearing (JCIH), hearing screening should identify infants at risk for specifically defined hearing loss that interferes with development. The targeted hearing loss for UNHS programs is permanent sensory or conductive hearing loss averaging 30 to 40 dB or more in the frequency region important for speech recognition (~500–4000 Hz).2 PCHL occurs in 1 to 3 per 1000 live births. The prevalence for PCHL is higher than for other conditions screened for in the newborn period. Children with hearing loss may have difficulty learning grammar, word order, idiomatic expressions, and other forms of verbal communication.2 Delayed language and speech, low educational attainment, increased behavior problems, de-
creased psychosocial well-being, and poor adaptive skills are all associated with hearing loss in children.\textsuperscript{1-3}

Risk factors associated with a higher incidence of PCHL include NICU admission for $>2$ days; syndromes associated with hearing loss, such as Usher syndrome and Waardenburg syndrome; family history of hereditary childhood hearing loss; craniofacial abnormalities; and congenital infections such as cytomegalovirus, toxoplasmosis, bacterial meningitis, syphilis, herpes, and rubella.\textsuperscript{1} However, $\sim50\%$ of infants with PCHL do not have any known risk factors.\textsuperscript{2,4,5} In studies that included data on ethnicity and socioeconomic status, there has been a higher incidence of PCHL among white American infants compared with infants in other, less well-represented minority groups regardless of the age at which the hearing loss was identified.\textsuperscript{2}

**Scope of Review**

The USPSTF examined the evidence for (1) the efficacy of UNHS in improving the initiation of treatment by 6 months of age for average- and high-risk infants compared with targeted screening, (2) the efficacy of treatment on language and communication outcomes if started before 6 months of age for those infants not identified by targeted screening, and (3) the harms of universal screening. There has been no direct evidence comparing targeted and universal screening programs in average- and high-risk infants.

**Accuracy of Screening Tests**

There are 2 approaches to screening newborns for hearing loss: UNHS of all newborns and targeted screening of high-risk newborns.\textsuperscript{2} All states that have hearing-screening programs use universal screening. Infants who do not pass the newborn screening tests are referred for confirmatory testing before a diagnosis of PCHL is made. Referral rates have been lower in programs staffed by screening programs use universal screening. Infants who were not screened.\textsuperscript{14}

The number of cases of PCHL referred before the age of 6 months for infants in the UNHS population was 19 times higher compared with that of the nonscreened infants. More children with true PCHL were referred to audiology services before 6 months of age if they were born during periods with UNHS, compared with children born during periods without screening. The odds ratio for early confirmation of hearing impairment before 10 months of age was 5.0 times greater for screened infants compared with nonscreened infants. The odds of initiating early management of hearing loss before 10 months of age was 8.0 times higher for screened infants compared with nonscreened infants.

For all infants involved in the aforementioned trial, an 8-year follow-up study was performed that followed infants with abnormal screening-test results at birth or later.\textsuperscript{4} The proportion of infants with true hearing impairment who were referred before 6 months of age was 74\% during periods with UNHS and 31\% during periods without UNHS. After adjustment for the severity of hearing impairment, UNHS was even more strongly correlated with referral before 6 months of age. One additional case of PCHL was referred before 6 months of age for every 1969 infants in the UNHS population.

A community-based retrospective cohort trial yielded good-quality evidence that those children with bilateral permanent hearing impairment who had early diagnostic confirmation before 9 months of age and those who had UNHS (compared with those who had no screening) had moderately higher receptive language scores at 8 years of age.\textsuperscript{6}

One fair-quality retrospective cohort study examined children from 7 to 8 years of age who were fitted with hearing aids for congenital hearing impairment by the age of 4.5 years. The study found that age at diagnosis did contribute significantly to variance on receptive vocabulary but did not for other language, speech, or reading measures.\textsuperscript{7} There is fair-quality evidence, based on a retrospective cohort study, that an earlier age at the time of enrollment into an early child hearing intervention program results in better outcomes for receptive and expressive language compared with those treated at a later age, after controlling for degree of hearing loss and degree of outcome impairment at program entry.\textsuperscript{8} A fair-quality retrospective cohort study that analyzed children enrolled for at least 6 months in a diagnostic early intervention program showed that children enrolled before 11 months of age had stronger vocabulary and reasoning skills than children enrolled at later ages, after adjustment for family involvement, degree of hearing loss, and nonverbal IQ.\textsuperscript{9}

**Potential Harms of Screening and Treatment**

Limited evidence is available about the harms of screening. A fair-quality retrospective cohort study showed no differences in anxiety and attitude toward infant scores for mothers of infants who passed and did not pass screening tests.\textsuperscript{10} There is fair evidence, based on a prospective cohort study, that there is no significant difference in the level of concern of mothers whose infants failed the first and second hearing-screening tests.\textsuperscript{2} One poor-quality case-control study examined infants who were at risk for hearing impairment, who failed a distraction stress test, or who were controls for the other 2 groups. Parent-reported concerns about language development, general development, and perceived vulnerability to ill health did not differ among the groups, and

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most negative emotions resolved after the child’s definitive hearing test.2

Evidence regarding the harms of treatment is also limited. The have been few immediate complications of surgery reported in case series and case reports of cochlear implant surgery in infants; however, an increased risk of meningitis that may persist for several years after implantation has been reported. Note that these case series reflect the use of a no-longer-manufactured cochlear implant. Furthermore, children with congenital cochlear abnormalities may have a predisposition to meningitis regardless of the use of cochlear implants. The overall complications of screening and treatment are estimated to be small.

Estimate of Magnitude of Net Benefit
There is good evidence that newborn hearing-screening testing is highly accurate and leads to earlier identification and treatment of infants with hearing loss. With regard to the yield of screening 10 000 newborns for hearing loss by using universal versus targeted screening, universal screening would yield 7 more cases diagnosed by 3 months of age (1 with risk factors and 6 without known risk factors). The number needed to screen to diagnose 1 case is 878 and 178 for UNHS and targeted screening programs, respectively. The number needed to screen to diagnose 1 additional case by 3 months of age is 1333 for UNHS.2

RECOMMENDATIONS OF OTHER GROUPS
The JCIH endorses early detection and intervention for infants with hearing loss through integrated, interdisciplinary state and national systems of UNHS, evaluation, and family-centered intervention. The JCIH 2000 position statement (and recently released 2007 statement) provides guidelines that include UNHS soon after birth, before hospital discharge, or before 1 month of age; diagnosis of hearing loss through audiologic and medical evaluation before 3 months of age; and intervention through interdisciplinary programs for infants with confirmed hearing loss before 6 months.11 The American Academy of Pediatrics Task Force on Newborn and Infant Hearing, the National Institute on Deafness and Other Communication Disorders, and the Centers for Disease Control and Prevention Early Hearing Detection and Intervention Program support the JCIH recommendations.12–14 The American Academy of Audiology Task Force on the Early Identification of Hearing Loss agrees that the use of support personnel in newborn hearing-screening programs is an appropriate and often necessary strategy for achieving universal detection of congenital hearing loss.15 The supervising audiologist should be experienced in both the development and maintenance of a UNHS program, including an understanding of technology options.

MEMBERS OF THE USPSTF
Members of the USPSTF at the time this recommendation was finalized were Ned Calonge, MD, MPH, USPSTF Chair (Colorado Department of Public Health and Environmental Health, Denver, CO); Diana B. Petitti, MD, MPH, USPSTF Vice-chair (Keck School of Medicine, University of Southern California, Sierras Madre, CA); Thomas G. DeWitt, MD (Children’s Hospital Medical Center, Cincinnati, OH); Leon Gordis, MD, MPH, DrPH (Johns Hopkins Bloomberg School of Public Health, Baltimore, MD); Kimberly D. Gregory, MD, MPH (Chaimd-Sinai Medical Center, Los Angeles, CA); Russell Harris, MD, MPH (University of North Carolina School of Medicine, Chapel Hill, NC); George Isham, MD, MS (HealthPartners, Minneapolis, MN); Michael L. LeFevre, MD, MSPH (University of Missouri School of Medicine, Columbia, MO); Carol Loveland-Cherry, PhD, RN (University of Michigan School of Nursing, Ann Arbor, MI); Lucy N. Marion, PhD, RN (Medical College of Georgia, Augusta, GA); Virginia A. Moyer, MD, MPH (University of Texas Health Science Center, Houston, TX); Judith K. Ockene, PhD (University of Massachusetts Medical School, Worcester, MA); George F. Sawaya, MD (University of California, San Francisco, CA); Albert L. Siu, MD, MSPH (Mount Sinai Medical Center, New York, NY); Steven M. Teutsch, MD, MPH (Merck & Company, Inc, West Point, PA); and Barbara P. Yawn, MD, MSPH, MSc (Olmsted Medical Center, Rochester, MN). For a list of current task force members, go to www.ahrq.gov/clinic/uspstfab.htm.

REFERENCES

www.ahrq.gov


Year 2007 Position Statement: Principles and Guidelines for Early Hearing
Detection and Intervention Programs
Joint Committee on Infant Hearing
Pediatrics 2007;120;898-921
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The American Academy of Pediatrics (AAP) believes that the medical care of infants, children, and adolescents ideally should be accessible, continuous, comprehensive, family centered, coordinated, and compassionate, and culturally effective. It should be delivered or directed by well-trained physicians who provide primary care and help to manage and facilitate essentially all aspects of pediatric care. The physician should be known to the child and family and should be able to develop a partnership of mutual responsibility and trust with them. These characteristics define the “medical home.” In contrast to care provided in a medical home, care provided through emergency departments, walk-in clinics, and other urgent-care facilities, though sometimes necessary, is more costly and often less effective. Although inadequate reimbursement for services offered in the medical home remains a very significant barrier to full implementation of this concept, reimbursement is not the subject of this statement. It deserves coverage in other AAP forums.

Physicians should seek to improve the effectiveness and efficiency of health care for all children and strive to attain a medical home for every child in their community. Although barriers such as geography, personnel constraints, practice patterns, and economic and social forces create challenges, the AAP believes that comprehensive health care for infants, children, and adolescents should encompass the following services:

1. Provision of family-centered care through developing a trusting partnership with families, respecting their diversity, and recognizing that they are the constant in a child’s life.
2. Sharing clear and unbiased information with the family about the child’s medical care and management and about the specialty and community services and organizations they can access.
3. Provision of primary care, including but not restricted to acute and chronic care and preventive services, including breastfeeding promotion and management, immunizations, growth and developmental assessments, appropriate screenings, health care supervision, and patient and parent counseling about health, nutrition, safety, parenting, and psychosocial issues.
4. Assurance that ambulatory and inpatient care for acute illnesses will be continuously available (24 hours a day, 7 days a week, 52 weeks a year).
5. Provision of care over an extended period of time to ensure continuity. Transitions, including those to other pediatric providers or into the adult health care system, should be planned and organized with the child and family.
6. Identification of the need for consultation and appropriate referral to pediatric medical subspecialists and surgical specialists. (In instances in which the child enters the medical system through a specialty clinic, identification of the need for primary pediatric consultation and referral is appropriate.) Primary, pediatric medical subspecialty, and surgical specialty care providers should collaborate to establish shared management plans in partnership with the child and family and to formulate a clear articulation of each other’s role.
7. Interaction with early intervention programs, schools, early childhood education and child care programs, and other public and private community agencies to be certain that the special needs of the child and family are addressed.
8. Provision of care coordination services in which the family, the physician, and other service providers work to implement a specific care plan as an organized team.
9. Maintenance of an accessible, comprehensive, central record that contains all pertinent information about the child, preserving confidentiality.
TABLE 1. Desirable Characteristics of a Medical Home

Accessible
Care is provided in the child’s or youth’s community.
All insurance, including Medicaid, is accepted.
Changes in insurance are accommodated.
Practice is accessible by public transportation, where available.
Families or youth are able to speak directly to the physician when needed.
The practice is physically accessible and meets Americans With Disabilities Act requirements.

Family centered
The medical home physician is known to the child or youth and family.
Mutual responsibility and trust exists between the patient and family and the medical home physician.
The family is recognized as the principal caregiver and center of strength and support for child.
Clear, unbiased, and complete information and options are shared on an ongoing basis with the family.
Families and youth are supported to play a central role in care coordination.
Families, youth, and physicians share responsibility in decision making.
The family is recognized as the expert in their child’s care, and youth are recognized as the experts in their own care.
Continuous
The same primary pediatric health care professionals are available from infancy through adolescence and young adulthood.
Assistance with transitions, in the form of developmentally appropriate health assessments and counseling, is available to the child or youth and family.
The medical home physician participates to the fullest extent allowed in care and discharge planning when the child is hospitalized or care is provided at another facility or by another provider.

Comprehensive
Care is delivered or directed by a well-trained physician who is able to manage and facilitate essentially all aspects of care.
Ambulatory and inpatient care for ongoing and acute illnesses is ensured, 24 hours a day, 7 days a week, 52 weeks a year.
Preventive care is provided that includes immunizations, growth and development assessments, appropriate screenings, health care supervision, and patient and parent counseling about health, safety, nutrition, parenting, and psychosocial issues.
Preventive, primary, and tertiary care needs are addressed.
The physician advocates for the child, youth, and family in obtaining comprehensive care and shares responsibility for the care that is provided.
The child’s or youth’s and family’s medical, educational, developmental, psychosocial, and other service needs are identified and addressed.
Information is made available about private insurance and public resources, including Supplemental Security Income, Medicaid, the State Children’s Health Insurance Program, waivers, early intervention programs, and Title V State Programs for Children With Special Health Care Needs.
Extra time for an office visit is scheduled for children with special health care needs, when indicated.

Coordinated
A plan of care is developed by the physician, child or youth, and family and is shared with other providers, agencies, and organizations involved with the care of the patient.
Care among multiple providers is coordinated through the medical home.
A central record or database containing all pertinent medical information, including hospitalizations and specialty care, is maintained at the practice. The record is accessible, but confidentiality is preserved.
The medical home physician shares information among the child or youth, family, and consultant and provides specific reason for referral to appropriate pediatric medical subspecialists, surgical specialists, and mental health/developmental professionals.
Families are linked to family support groups, parent-to-parent groups, and other family resources.
When a child or youth is referred for a consultation or additional care, the medical home physician assists the child, youth, and family in communicating clinical issues.
The medical home physician participates in consultation with them and subspecialists, implements recommendations that are indicated and appropriate.
The plan of care is coordinated with educational and other community organizations to ensure that special health needs of the individual child are addressed.

Compassionate
Concern for the well-being of the child or youth and family is expressed and demonstrated in verbal and nonverbal interactions.
Efforts are made to understand and empathize with the feelings and perspectives of the family as well as the child or youth.
Culturally effective
The child’s or youth’s and family’s cultural background, including beliefs, rituals, and customs, are recognized, valued, respected, and incorporated into the care plan.
All efforts are made to ensure that the child or youth and family understand the results of the medical encounter and the care plan, including the provision of (para)professional translators or interpreters, as needed.

Written materials are provided in the family’s primary language.

Physicians should strive to provide these services and incorporate these values into the way they deliver care to all children. (Note: pediatricians, pediatric medical subspecialists, pediatric surgical specialists, and family practitioners are included in the definition of “physician.”)

10. Provision of developmentally appropriate and culturally competent health assessments and counseling to ensure successful transition to adult-oriented health care, work, and independence in a deliberate, coordinated way.

Medical care may be provided in various locations, such as physicians’ offices, hospital outpatient clinics, school-based and school-linked clinics, community health centers, and health department clinics.

Regardless of the venue in which the medical care is provided, to meet the definition of medical home, a designated physician must ensure that the aforementioned services are provided (see Table 1 for more details).

The need for an ongoing source of health care—ideally a medical home—for all children has been identified as a priority for child health policy reform at the national and local level. The US Department of
goals and objectives state that “all children with special health care needs will receive regular ongoing comprehensive care within a medical home” and multiple federal programs require that all children have access to an ongoing source of health care. In addition, the Future of Pediatric Education II goals and objectives state: “Pediatric medical education at all levels must be based on the health needs of children in the context of the family and community” and “all children should receive primary care services through a consistent ‘medical home.’” Over the next decade, with the collaboration of families, insurers, employers, government, medical educators, and other components of the health care system, the quality of life can be improved for all children through the care provided in a medical home.

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**REFERENCES**


*All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.*
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