SPANISH ASSOCIATION OF PAEDIATRICS

CODEPEH 2014 recommendations for the early detection of delayed hearing loss

Faustino Núñez-Batalla, Carmen Jáudenes-Casaubón, José Miguel Sequi-Canet, Ana Vivanco-Allende, José Zubicaray-Ugarteche

* Servicio de Otorrinolaringología, Hospital Universitario Central de Asturias, Oviedo, Asturias, Spain
b Confederación Española de Familias de Personas Sordas (FIAPAS), Madrid, Spain
c Servicio de Pediatría, Hospital de Gandía, Gandía, Valencia, Spain
d Área de Gestión Clínica de Pediatría, Hospital Universitario Central de Asturias, Oviedo, Asturias, Spain
e Servicio de Otorrinolaringología Infantil, Complejo Hospitalario de Navarra, Pamplona, Navarra, Spain

Received 13 June 2015; accepted 6 July 2015
Available online 27 February 2016

KEYWORDS
Hearing loss
(congenital; late-onset);
Hearing Screening;
Childhood;
Child audiology;
Hearing aids;
Multidisciplinary;
Family

Abstract The latest scientific literature considers early diagnosis of deafness as key element to define the educational prognosis and inclusion of the deaf child, as advantage can be taken in the critical period of development (0–4 years).

Highly significant differences exist between those deaf persons who have been stimulated early and those who have received late or inappropriate intervention.

Early identification of late-onset disorders requires special attention and knowledge of all childcare professionals. Programs and additional actions beyond neonatal screening should be designed and planned in order to ensure that every child with a significant hearing loss is detected early.

For this purpose, the Committee for the Early Detection of Deafness (CODEPEH) would like to highlight the need for continuous monitoring on the hearing health of children. And, for this reason, CODEPEH drafts the recommendations included in the present document.

© 2015 Asociación Española de Pediatría. Published by Elsevier España, S.L.U. All rights reserved.


Previous presentation: This study was presented as "Recommendations CODEPEH 2014: early care and monitoring of hearing loss" at the VIII National Meeting of the Commission for the early detection of hearing loss; November 7 and 8, 2014; Las Palmas, Spain.

Corresponding author.
E-mail address: anaviall@hotmail.com (A. Vivanco-Allende).

2341-2879 © 2015 Asociación Española de Pediatría. Published by Elsevier España, S.L.U. All rights reserved.
PALABRAS CLAVE
Hipoacusia (congénita; Diferida); Audición; Cribado; Infancia; Audiología infantil; Audioprotésis; Interdisciplinariedad; Familia

Recomendaciones CODEPEH 2014 para la detección precoz de la hipoacusia diferida

Resumen La literatura científica más reciente señala el diagnóstico precoz de la sordera como elemento fundamental para definir el pronóstico educativo y de inclusión del niño sordo, pues permite aprovechar el periodo crítico de su desarrollo (0-4 años).

Existen diferencias altamente significativas entre las personas sordas estimuladas tempranamente y las que han recibido esta atención específica de forma más tardía y/o inadecuada.

La identificación temprana de los trastornos diferidos requiere de una especial atención y conocimientos entre todos los profesionales que atienden a los niños durante su infancia. Se trata de diseñar programas y de planificar acciones adicionales más allá del cribado neonatal para asegurar que todos los niños con una hipoacusia significativa sean detectados pronto.

Con este propósito, la Comisión para la Detección Precoz de la Hipoacusia (CODEPEH) quiere poner de relieve la necesidad de un seguimiento continuado sobre la salud auditiva de los niños.

Y establece para ello las recomendaciones contenidas en el presente Documento.

© 2015 Asociación Española de Pediatria. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

The latest scientific literature identifies early diagnosis of deafness as the key to defining the prognosis for the education and inclusion of deaf children, as it makes it possible to take advantage of the critical period of development (the first 3 or 4 years of life). This is the age at which brain plasticity is at its highest and the child acquires certain cognitive and linguistic abilities that are difficult to recover if the opportunity to act in this period is missed.

Deafness meets all the minimum requirements for conditions suitable for screening through early detection programmes; furthermore, it has been demonstrated and recognised that treatments capable of preventing the consequences of deafness, or at least of mitigating them significantly, can be instituted at an early stage.1-3

Critical period of child development

In the case of deaf children it is vital to take advantage of the critical period of development, since this is when the foundations are laid for communicative development and oral language acquisition, as well as the maturation of auditory perception and of all the abilities and skills that are derived from it and affect neurological maturation processes.

There is growing scientific evidence indicating that when identification and intervention take place no later than six months of age, the child will achieve better results (by between 20 and 40 percentile points) in his or her language and communication ability: vocabulary, articulation and intelligibility of speech, social adjustment and behaviour.1-3

It is therefore an irretrievable period, in which the auditory information required for the brain to develop and for oral language to be comprehensively and automatically acquired needs to be available.

Only thus is it possible for deaf children to internalise phonological patterns, linguistic elements and the structure of oral language in a natural way and at an early stage, by sharing normal, spontaneous communicative interactions with their parents, using the same code, without restrictions of content or form.6-11 And consequently the risk of hearing loss having a permanent effect on the child’s development, and more specifically on oral language development and the learning and communication abilities that depend on it, will be avoided.

This explains the highly significant differences between deaf children that have been stimulated early and those that have received this specific kind of attention later and/or in an inappropriate way.13

It is important to stress the crucial importance of adopting a comprehensive, holistic and coordinated approach with a defined protocol for action on deaf children and their families, taking account of all areas of development, beyond clinical issues and the provision of hearing aids.15

The experience of thousands of families in Spain underlines the fact that the time when the condition is diagnosed and the taking of immediate action on adapting to hearing aids and beginning speech-language rehabilitation are crucial in the life of a deaf person.15 Today we can say that the implications of deafness have changed substantially thanks to early intervention and advanced hearing-aid technology, normalising the educational situation of children with hearing loss and their emotional development, as well as the experience and behaviour of families.17

CODEPEH recommendations

The CODEPEH recommendations document for 2010 recalled that the ultimate aim of all screening and early treatment of congenital hearing loss is to optimise communication and social, academic and professional development in every child with permanent hearing loss, as well as to facilitate early and natural access to oral language through hearing, taking advantage of brain plasticity in the first years of life and stimulating the child’s communicative and language development.
For this reason, in line with its previous recommendations, CODEPEH wishes to emphasise the need for ongoing monitoring of the auditory health of the child population throughout its development.

Although the results confirm the value of universal neonatal screening for hearing loss, the “Achilles heel” of neonatal screening programmes is the rate of loss to followup of children with abnormal results in the tests performed at birth. We need to achieve early diagnosis of hearing loss that appears de novo in infancy in the postnatal period.

These points do not affect the intrinsic justification of universal neonatal hearing screening. On the contrary, what they imply is that we need to take additional actions and design programmes beyond neonatal screening to ensure that all children with significant hearing loss are identified early. This is why many programmes include some kind of rescreening aimed at children that show risk factors for late-onset or progressive hearing loss.

However, early identification of these delayed disorders requires special attention and knowledge on the part of the health services, as well as information and awareness-raising among educators, and these must be developed through education programmes and information strategies. Consideration should even be given to pre-school and school screening programmes, which have already demonstrated their usefulness.18,19

In relation to all the foregoing, this Committee considers it appropriate to establish the following recommendations for all professionals working with children in early childhood, divided into 3 spheres of action:

**CODEPEH recommendations for the early detection of delayed hearing loss**

- Surveillance needs to be performed in the primary care setting following neonatal screening.

- On each regular visit in the “Healthy Child” Programme the child’s auditory abilities, middle-ear status and developmental milestones should be assessed. It is advisable to use the algorithm proposed by CODEPEH for application at 6, 12, 18, 24 and 48 months of age (Fig. 1).

If a child does not pass the assessment he or she should immediately be referred to an ear, nose and throat (ENT) specialist or a Children’s Hearing Unit for examination:

- The state of the middle ear needs to be carefully examined. Children found to have serous otitis media that persists for at least 3 consecutive months must be referred for an otological assessment.

- Children with developmental and behavioural abnormalities should be given a hearing evaluation at least once by an ENT specialist, paying special attention in this case to relapsing or persistent serous otitis media that may worsen their prognosis.

- All children with a risk indicator for hearing loss (Table 1), regardless of the findings in their followup, must be referred for an audiological assessment at least once between the ages of 24 and 30 months. Children with risk indicators strongly associated with delayed-onset hearing loss, such as extracorporeal membrane oxygenation or a cytomegalovirus (CMV) infection, should be subjected to more frequent audiological assessments.

- Confirmation of hearing loss in a child is considered a high risk factor for his or her siblings and they must be subjected to an audiological assessment.

- All children in whose families there is significant concern about their hearing or communication should be referred without delay to an ENT specialist or to the Children’s Hearing Unit for the appropriate audiological and language assessments, regardless of their age. The same procedure should be followed if the suspicion comes from their educators.

**CODEPEH recommendations for audiological assessment and fitting of hearing aids**

- The processes of audiological diagnosis and aural rehabilitation are of equal priority and need to be pursued in the first months of life in order to maximise the child’s optimum development. These 2 processes begin sequentially but must be conducted simultaneously.

- The follow-up intervals should be:

  - In the first 18 months of life: continuously, as each situation demands;
  - From 18 months to 3 years: every 3 months;
  - From 3 to 6 years: every 6 months;
  - Over 6 years of age with stable deafness: every year.

- The ENT specialist must be in charge of coordinating the actions of the multidisciplinary team involved in fitting a hearing aid, together with the hearing-aid specialist and the speech therapist, and is responsible for prescribing the hearing-aid treatment.

- Working groups, distributed according to the structure of each autonomous community, also need to be formed for comprehensive diagnosis and treatment of children with deafness.

<table>
<thead>
<tr>
<th><strong>Table 1</strong> Risk factors for hearing loss in children.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Family suspicion of deafness</strong></td>
</tr>
<tr>
<td><strong>Family history of deafness</strong></td>
</tr>
<tr>
<td><strong>Hypothyroidism</strong></td>
</tr>
<tr>
<td><strong>More than 5 days in NICU</strong></td>
</tr>
<tr>
<td><strong>Exposure to ototoxic substances</strong></td>
</tr>
<tr>
<td><strong>Assisted ventilation</strong></td>
</tr>
<tr>
<td><strong>Persistent otitis</strong></td>
</tr>
<tr>
<td><strong>Perinatal infections (CMV, herpes, rubeola, syphilis and toxoplasmosis)</strong></td>
</tr>
</tbody>
</table>

* Very high risk factor for postnatal deafness.
- It is essential to involve parents in the process of treating children with hearing deficit, and in order to achieve this throughout the process they must be given abundant, comprehensible and truthful information so as to create accurate expectations regarding the prognosis.
- The results of the brainstem auditory evoked potentials (BAEP) test should be supplemented by performing a steady-state auditory evoked potentials (SSAEP) test.
- The results obtained in the brainstem and steady-state auditory evoked potentials tests must be completed and confirmed using conduction audiometry appropriate to the age of the child.
- For tympanometry in children younger than 4 months of age it is recommended that high-frequency (1000 Hz) probes should be used.
- The decision to fit a hearing aid should be based on the child’s audiological data, language development and family, school and social environment.
- Until 10–12 years of age the conventional hearing aid should be behind the ear. Various types of moulds should

---

The paediatrician will check that the screening tests have been performed and passed, according to the child deafness early detection programme, as well as the presence of risk factors.

**Guidelines for detecting hearing problems in children**

**Paediatric evaluation**

The paediatrician will check that the screening tests have been performed and passed, according to the child deafness early detection programme, as well as the presence of risk factors.

**06 months**
- Does the child turn his/her head towards voices or sounds?
- Does he/she respond with vocal sounds when spoken to?
- Does he/she react to his/her name?

**12 months**
- Does the child locate the source of sounds?
- Does he/she point to familiar objects when they are named?
- Does he/she say mummy/daddy?

**18 months**
- Does the child point to parts of the body when asked?
- Does he/she pay attention to children's songs?
- Does he/she make two-word phrases?

**24 months**
- Does the child understand simple orders without the support of gestures?
- Does he/she come when called from another room?
- Does he/she use the pronouns me/I/you?

**4 years**
- Does the child repeat phrases without visual support?
- Does he/she maintain a conversation?
- Can he/she count a series of simple numbers (e.g., from 1 to 10)?

**Figure 1** Guidelines for detecting hearing problems in children.
be available so as to achieve a correct fit of the mould to
the external auditory canal, especially in infants.
- Hearing aids with omnidirectional microphones are the
most suitable for infants, who normally crawl, as they
are always in the right position to receive sound.
- A binaural fitting should always be carried out, unless
the child’s behaviour suggests that the fitting in the worse ear
impairs overall performance.
- Each case should be treated individually, since, among
other reasons, there may be children in whom poor per-
formance of the hearing aid can be explained by the
presence of an auditory neuropathy or by central lesions
in the auditory areas.

CODEPEH 2014 recommendations

- Regulating and universalising early care, establishing 0–6
years of age as the care period.
- Achieving the necessary coordination between admin-
istrations and sectors to ensure joint planning of the
services and assistance provided for children and their
families, and also compatibility of support and services
with the needs of the child and his/her background and
development, and with the decisions taken by families.
- Providing multiple responses to diversity in care: there
is no single pattern of response, and it is important to
adapt to individual variability and to new developments in
all areas: social, technological, legislative, etc.
- Updating the competencies and specialised training of
professionals in the various spheres jointly involved in
caring for deaf children and their families.
- Incorporating families into the systems that concern them
regarding their deaf children and involving them at every
level of intervention, leading to increased knowledge of
family support among all the agents involved.
- Establishing easily identifiable and coordinated referral
routes and care pathways for children and their families,
so as to ensure the continuity of care.
- Fostering the participation of the family associations
movement, which not only acts as a social agent and
network, developing family support programmes, includ-
ing mutual help groups for families, but also helps to
avoid regional inequalities, provides specialised technical
advice and promotes necessary change.
- Creating a basic common register of the results of applying
the Early Detection Programme for child deafness,
incorporating data from the various autonomous commu-
nities. This will be crucial for conducting epidemiological
studies, adopting preventive measures, planning pub-
lic healthcare and educational resources addressing the
needs of the affected population and making it possi-
bly to carry out comparative studies at a national and
international level, among other things.
- Establishing consensus on scientific, terminological, pro-
cedural, technical, educational and other issues so as to
make it possible to describe and classify the needs that
exist among the child population currently affected by
auditory problems or at risk of having such problems.
- Informing and raising awareness in society and among the
agents involved on the vital importance of early detection
and diagnosis, monitoring and surveillance of risk factors
and the need to act as quickly as possible to institute medical and hearing-aid treatment, together with early speech therapy intervention.
- Conducting an ongoing and rigorous assessment of services,
resources, procedures and results, with quanti-
tative and qualitative measures in all these areas, through
efficacy and success indicators, with respect not only
to the level of clinical intervention but also the child’s
progress and the satisfaction of the family and the pro-
fessionals, as well as the benefits of the community.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Yoshinaga-Itano C, Sedey AL, Coulter DK, Mehil AL. Language of
2. Yoshinaga-Itano C, Coulter D, Thomson V. The Colorado New-
born Hearing Screening Project: effects on speech and language
3. Yoshinaga-Itano C, Coulter D, Thomson V. Developmental out-
comes of children with hearing loss born in Colorado hospitals
with and without universal newborn hearing screening pro-
4. Yoshinaga-Itano C. Efficacy of early identification and early
5. Yoshinaga-Itano C. Levels of evidence: universal newborn
hearing screening (UNHS) and early hearing detection and inter-
6. Conrad B, Schonle P. Speech and respiration. Arch Psychiatri
7. Harris M, Beech J. Implicit phonological awareness and early
reading development in prelingually deaf children. J Deaf Stud
8. Torres Monreal S. Memoria, fonología y sordera. Rev FIAPAS.
9. Silvestre N, Ramsopp A, Parejo ID. Conversational skills in a
semistructured interview and self-concept in deaf students. J
10. Torres Monreal S, Santana Hernández R. Reading levels of Span-
11. Villalba A, Ferrer A, Asensi C. Ia lectura en los sordos preluc-
tivos. Propuestas para un programa de entrenamiento. Madrid:
Entha ediciones; 2005.
12. Torres S, Moreno-Torres I, Santana R. Quantitative and qualita-
tive evaluation of linguistic input support to a prelingually deaf
dio sobre la situación educativa del alumnado con discapacidad
14. Trinidad-Ramos G, de Aguilar VA, Jaudenes-Casabón C, Núñez-
Batalla F, Sequei Canet JM, Comisión para la Detección Precoz
de la Hipocacusia (CODEPEH). Early hearing detection and inter-
vención; 2010 CODEPEH recommendation. Acta Otorrinolaringol
15. Muse C, Harrison J, Yoshinaga-Itano C, Grimes A, Brookhouser
PE, Epstein S, et al. Joint Committee on Infant Hearing of the
American Academy of Pediatrics Supplement to the JCIH 2007
position statement: principles and guidelines for early interven-
tion after confirmation that a child is deaf or hard of hearing.

