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Ten-year outcome of newborn hearing screening in Austria

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Summary

Objective: Current health care standards recommend that congenital hearing loss be confirmed before age three months and intervened for before age six months. This study evaluated to what extent the Austrian universal neonatal hearing screening (UNHS) program achieves this goal. The Austrian UNHS program is a hospital-based, two-stage screen based on transient oto-acoustic emissions, as promoted in 1995 in a position paper of the Austrian ENT Society.
Methods: Retrospective chart review and data analysis. All Austrian institutions engaged in the diagnosis and treatment of childhood hearing loss were requested to provide their data on children with permanent congenital sensorineural hearing impairment registered since 1990. Children who had undergone hearing screening, were compared to those who had not. Main outcome measures were age at confirmation of and age at intervention for the hearing loss. In each group, the percentage of children, whose hearing loss was confirmed by age three months, and intervened for by age six months, was determined.
Results: Data from 321 hearing-impaired children were useable. Of these children, 167 were screened and 154 were not. At age three months, a hearing loss was diagnosed in 35% of screened children, but in only 2% of unscreened. These percentages rose to 69% and 6%, respectively, at age six months and to 81% and 12%, respectively, at age one year. Intervention mostly started within less than one month after diagnosis. At age six months, 61% of screened children, but only 4% of unscreened children, had undergone intervention.
Conclusions: Hearing screening enormously increases the number of early-detected children. However, in quite a few screened children hearing loss is neither confirmed within three months after birth, nor intervened for within six months after birth. Reasons for the delay must be paid attention in order to warrant that UNHS can be as effective as possible.

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1. Introduction

Current health care standards recommend that neonatal hearing loss be confirmed before age three months and intervened for before age six months [1]. Achievement of this goal essentially relies upon the availability of universal neonatal hearing screening (UNHS) and of early intervention services. Considering that programs for early detection of and intervention for newborn hearing loss are currently implemented worldwide [2–8], the above recommendations provide a useful parameter for evaluating the efficacy of a national UNHS program on an international scale.

In Austria (Central Europe), the beginnings of newborn hearing screening date back to the early nineties, when a few hospitals implemented screening programs in their neonatal intensive care units or maternal wards. In 1995, the Austrian ENT Society released a position paper, which endorsed early detection of infant hearing loss through the UNHS and set up guidelines for its nationwide implementation. According to these guidelines, UNHS is performed as a hospital-based, two-stage TEOAE screen: newborns are first tested a few days after birth and, if they fail, undergo a second test prior to discharge from hospital. If they fail again (=fail the screening), they are referred for audiological assessment. Because in Austria only 1–2% of all births are home births, and an additional 1–2% are ''ambulant births'' (i.e. mothers leaving the hospital within 24 h after delivery), the very large part of newborns can be covered by a hospital-based screen.

Since 1995, a growing number of Austrian hospitals have introduced UNHS, so that its current coverage (Spring 2005) is estimated at 90% of all Austrian newborns. With a total of approximately 70,000 children born per year [9], and a prevalence rate of 1.11:1000 for congenital hearing impairment [10], some 70 hearing-impaired infants are expected to be born annually in Austria. UNHS is not anchored in legislation (except in one Austrian Federal State). However, testing an infant's hearing became a routine check in the national child health care program in 2003. Hence, the UNHS can be considered a quasi-mandatory preventive measure. To keep this status, the official advisory committee to the Austrian government requires the ongoing provision of evidence to show that the measure contributes to improving or preserving the health status of the society. The current study was thus undertaken to evaluate the efficacy of the Austrian UNHS program from its early implementation to the present.

2. Methods

The study was a retrospective analysis of clinical data of children with permanent bilateral sensorineural hearing impairment, who were born in the past two decades and registered at an Austrian ENT department or institution for the hearing-impaired. The time frame of two decades was chosen to warrant that a large number of children, screened as well as unscreened, were recruited. While children born before 1995 are unlikely to have been screened, children born thereafter will – to an annually growing extent – constitute the group of subjects, who underwent UNHS. The study goal was to compare the two groups, paying special attention to the question, in how many children of each group the hearing loss was confirmed before age three months, and in how many of each group intervention had started before age six months, as currently recommended [1]. The confirmation of the hearing loss was based on objective measures (oto-acoustic emissions and auditory brainstem response) in young children, and on pure-tone behavioural audiometry in older children. ''Intervention for the hearing loss'' referred to the initial action taken to appropriately treat the hearing problem. ''Hearing impairment'' was defined as hearing loss at the better ear, commonly measured by pure-tone audiometry and averaged over frequencies 0.5, 1, 2 and 4 kHz. In young children, the results from the automated auditory brainstem response measurement were used to estimate the degree of the hearing impairment. Categories of hearing loss were mild (21–40 dB), moderate (41–70 dB), severe (71–95 dB) and profound (>95 dB).

Data collection started in August 2003, when all Austrian ENT departments and rehabilitation facilities for hearing-impaired children were informed about the study and asked to participate. Participation consisted of submitting anonymized data on all registered children to a working group at the Department of Hearing, Voice and Speech Disorders at Innsbruck Medical University. For this purpose, a standardized list of questions was devised, which asked for: date of birth, date of diagnosis of hearing loss, date of start of intervention, degree and type of hearing loss and whether or not the child underwent hearing screening. If yes, the result of the screen (pass/fail/unknown) was to be specified. Data submitted to the working group were checked for consistence and entered in a database. After reminding the departments and institutions to complete (or make) their submissions by the end of 2004, all data collected up to that time were used to evaluate the Austrian UNHS program.