Most universal newborn hearing screening (UNHS) and childhood hearing surveillance (CHS) programs lack a systematic etiologic focus. As a consequence, the scientific literature reports that the proportion of permanent hearing loss (PHL) cases with uncertain etiology ranges from 30% to 60%. In addition to this, little is known about the actual epidemiological distribution of specific genes involved in congenital and childhood non-syndromic PHL. This report aims to obtain more data on the epidemiological distribution of the PHL causes and the long-term features of PHL within a UNHS and CHS program.

In the period form July 2012 to June 2014 all newborns and toddlers referred by the Friuli Venezia Giulia UNHS and CHS program (total 19,468 subjects) were included in the study. Audiologic characteristics and etiologic data of subjects with identified PHL has been analyzed and further revised in 2017.

**UNHS protocol**: two step (A-TEOAE + A-ABR if refer) for well-baby unit; one step (A-TEOAE + A-ABR) for NICU.

**CHS protocol**: High Risks Registry (JCH 2007) and catch-up of UNHS miss or lost-to-follow-up cases, performed by family pediatrician at regular 1mth-3 yrs health checks.

**Audiologic evaluation** (2. level): single appointment that includes click evoked ABR, admittance testing, DPOAE, questionnaire of auditory development, otoscopy.

**Diagnostic-etiologic evaluation**: ENT and PED examination, ophthalmology, TORCH, ECOG, GJB2/GJB6 mutation analysis, imaging, clinical and molecular genetic evaluation, other exams on individual base, final multidisciplinary team discussion.

**Diagnostic classification**: PHL subjects grouped into 4 etiologic profiles (A, B, C, D):

- A. PHL of ascertained exogenous origin (es CMV)
- B. Defined syndrome that includes PHL (es Charge)
- C. GJB2/GJB6 biallelic mutation
- D. Putative non-syndromic PHL (when A, B, C excluded)

**HLTSP (Hearing Loss Targeted re-Sequencing Panel) analysis**: next-generation Targeted re-Sequencing evaluation proposed to all subject with profile D. (Ion Torrent PGM, Life Technologies), to analyze coding and UTR regions of 96 genes related to PHL and hearing function [1].

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**Table 2017**: Audiologic re-evaluation of subjects with bilateral PHL (41)

<table>
<thead>
<tr>
<th>Subj no</th>
<th>Gene / Chrom</th>
<th>Mutation</th>
<th>Locus</th>
<th>Audiology, History</th>
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**Chart**: Prevalence of PHL results 1.6/1000 (UNHS program) 1.35/1000 (CHS programs), according to the literature on the prevalence of PHL in industrialized countries. An etiologic diagnosis has been achieved in 75% of examined bilateral PHL cases of our program. The HLTSP (Hearing Loss Targeted re-Sequencing Panel) analysis clarified etiology in 31.25% of subjects for whom the putative genetic aetiology was not characterized by the standard etiologic protocol.

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It is important to underline the high number of loss to follow up subjects in the articulated of audiological and etiologic investigation course of a child referred from UNHS and CHS program. It is necessary to discuss and review screening and follow-up methods, protocols, quality controls and cost-effectiveness assessments, to make the promise of screening and early intervention programs truly effective.