BIAP Recommendation 09/1 Revision 1:

Examining hearing of people exposed to noise

Foreword

This document presents a Recommendation by the International Bureau for Audiophonology BIAP.

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Introduction

Noise can be dangerous for the hearing and the complete human´s health.

According to actual scientific knowledge, the effects of noise on the inner ear depends on the time of exposure and the acoustic pressure level, indicated by Leq in dB (A), and which can be measured exactly.

Noise is dangerous within a Leq of 85 dB_A, 8 hours a day. In certain cases, however, hearing damage may already appear at noise intensities of 80 dB_A 8 hours a day.

At higher noise levels, the same dangerous effects can already occur in shorter times, for example after 1 hour at 94 dB_A or after 15 minutes at 100 dB_A.

Noise is also dangerous for the health as a single noise peak with an intensity of p_{peak} 200 Pa, which is 140 dB_{Cpeak} (reference level 20 µPa).

Sensitivity to noise in any case may vary a lot across individuals.

Noise exposure may have direct or indirect negative repercussions on hearing capacity or hearing ability. These repercussions may occur delayed after initial noise exposure. They include not only hearing impairment, but also tinnitus, psychological impacts and stress- related somatic symptoms.

Every person has to be informed about the danger of noise exposure!

Scope

This document recommends which tests are relevant for the examination of the hearing of people who are exposed to noise.

In a lot of countries minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise, vibration, …) exists.

This recommendation is also addressed to people who are staying in a noisy environment in private and in leisure (excessive loud music (especially in cars, discotheques, open air concerts, musicians), hand crafting tools, motor sport, motor bike and convertible driving, hunting and shooting, …).

Attention: National and local legislation has to be respected, if it is more restrictive than in this recommendation!

Recommendation

1. All people who are exposed to noise regularly should undergo a hearing examination prior to starting in a noisy situation (above 80 $dB_{A\,Leq}$) and even by any change.
2. When a person is placed for the first time to noise regularly, it is essential for his hearing capacity to be retested within one year.
3. Prior to the audiometric screening a common anamnesis, if applicable a working anamnesis (working years in noise, time and type of exposure, usage of hearing protectors) and an otoscopy shall be done.

   The common anamnesis shall cover questions regarding hearing and speech understanding, Tinnitus and Hyperacusis.
4. Audiometric screening tests can take place with no preliminary acoustic rest period. If the results are pathological, however, an acoustic rest period should be considered before the retest to avoid the temporary threshold shift effect.
5. A person exposed for the first time to noise independently of existing Leq shall undergo a pure tone audiometry (PTA) screening test by air conduction between 500Hz and 8000 Hz (including 3000 and 6000 Hz) frequencies. Attention: this is not a full or standard audiometric examination.

   The gold standard is to perform PTA for conversational frequencies ranging between 125 Hz and 8000 Hz and for high frequencies ranging between 10000 Hz and 16000 Hz.

   Objective measurements like automated ABR and OAE are more efficient for detecting infra clinical noise-induced hearing loss, which will be detectable only afterwards with PTA. Besides, automated OAE are much less time consuming than PTA as a screening test.
6. A further medical investigation is recommended if PTA screening test shows a threshold value of 25 dB HL or more in one specific frequency even if a pure tone average of 20 dB HL (500 Hz / 1000 Hz / 2000 Hz / 3000 Hz / 4000 Hz / 6000 and 8000 Hz) is achieved.
7. Checking of hearing function shall take place in a soundproof cabin.

   Audiometric screening tests can be done outside a soundproof cabin but only when using sound-proof headphones and when environmental noise does not exceed 50 dB_A.

8. Preventive actions shall be implemented on the basis of audiometric and objective test results and environmental conditions in the work-place or on noisy places. These actions consist of
   - regular hearing function examinations for every exposed worker according to national regulations, or at least once a year as recommended by the BIAP;
   - the wearing of hearing protection devices for every noise exposure (within the European Union the wearing of hearing protectors is anyway regulated by the Directive 2003/10/EC, Art. 6 Personal Protection, and out of the scope of this Recommendation);
   - recommendations for a limitation of the exposure time in loud environment;
   - systematic information of the worker about any change in the acoustical situation of his/her workstation.
9. For people with a hearing loss and hearing instrument users a regular hearing function checks (periodical audiological examinations) every year is especially recommended to avoid an additional sound induced hearing loss.

Changing history

Initial version: BIAP recommendation n° 09/1: Examining industrial workers hearing capacity, accepted in Lagos (Portugal) on 03-05-1983

Revision 1: BIAP recommendation 09/1 Rev.1: due to strong regulations within the EU regarding workers health and safety requirements and strong changes in the acoustical environment of the daily life, major changes in the scope and the recommendation itself were necessary.

References

- Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC)
- Directive 2003/10/EC of the European Parliament and of the Council of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)
- BIAP Recommendation 02/1 Audiometric classification of hearing impairments
- EUHA Guideline No. 06-01 Custom-made earmoulds for hearing protection
- EN ISO 389 Acoustics - Reference zero for the calibration of audiometric equipment
- EN ISO 8253-1:2010, Acoustics — Audiometric test methods — Part 1: Pure-tone air and bone conduction audiometry, Art.11 maximum ambient noise level for hearing threshold measurement.
- EN 60318 Electroacoustics – Simulators of human head and ear

This recommendation was created and approved in multidisciplinary cooperation between professionals of all audiophonological discipline

, which are medicine, pedagogy, speech therapy, psychology and hearing instrument audiology.

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