

BIAP Recommendation 06/16 – 07/7:

Management of Hearing Assistive Technology (HAT) – FM / RF

Foreword

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

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Introduction

FM-systems have existed for many years, especially in schools, and their benefits are well described in [Rec 06/10 – 09/5](#). With digital technology a more general term to cover all the technical options available in the market is used: Hearing Assistive Technology (HAT).

With digital technology the requirements and expectations of FM-systems have changed. A larger group of candidates can benefit from these systems in many different situations.

An accurate selection and proper way of setting up the system is necessary. A correct way of evaluating and monitoring follow up is also important for a successful experience.

This recommendation attempts to present a correct indication and evaluation of HAT systems. High end technology today offers an array of options that must be taken into account by the hearing care professionals, so that greater benefit and satisfaction can be achieved, improving the communication and listening abilities for any HAT-candidate.

Recommendation

❖ Other Terminology:

HADS: Hearing Assistance Devices/Systems

ALD: Assistive Listening Device

HATS: Hearing Assistive Technology System

Remote Microphone

Hearing Assistance Technology

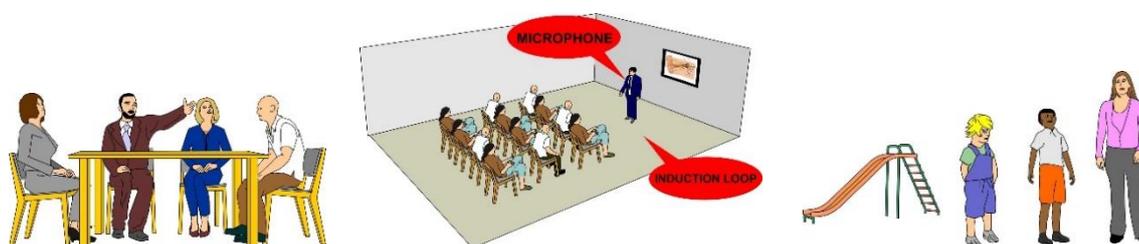
Wireless Technology

FM/RF: Frequency Modulation / Radio Frequency systems

❖ Definition:

'HADS/HAT are a group of instruments with diverse physical configurations that are intended to facilitate hearing by providing amplification of an acoustic signal and/or improving the signal-to-noise ratio by means of a non-acoustic signal transmission method.'
(ANSI, 2014)

Principle: A microphone is placed close to the talker's mouth or close to the sound source where the sound pressure level of the acoustic speech signal is well above that of interfering noise and reverberation levels. The resulting high quality signal is then delivered to the listener.



Five different basic wireless receivers are available:

1. **Personal HAT** : the wireless receiver on the listener will pass the relevant signal (speech, music, ...) on to the hearing aid, cochlear implant or any other hearing device. Better known as personal FM/RF-technology
2. **Free Field** audio distribution systems (ADS): the speech signal is sent to one or more loudspeakers.
3. **Near Field** audio distribution system¹: the speech signal is sent to a small single loudspeaker placed close to the listener or target group.
4. **Induction loop** systems in which the relevant signal is delivered to the telecoil of the personal hearing aid, cochlear implant and any other hearing device.
5. **Remote Mic**: this technology that has been used with HAs and CIs through wireless connection in similar conditions as for personal HATs but in a simplified way, mostly by Bluetooth connection.

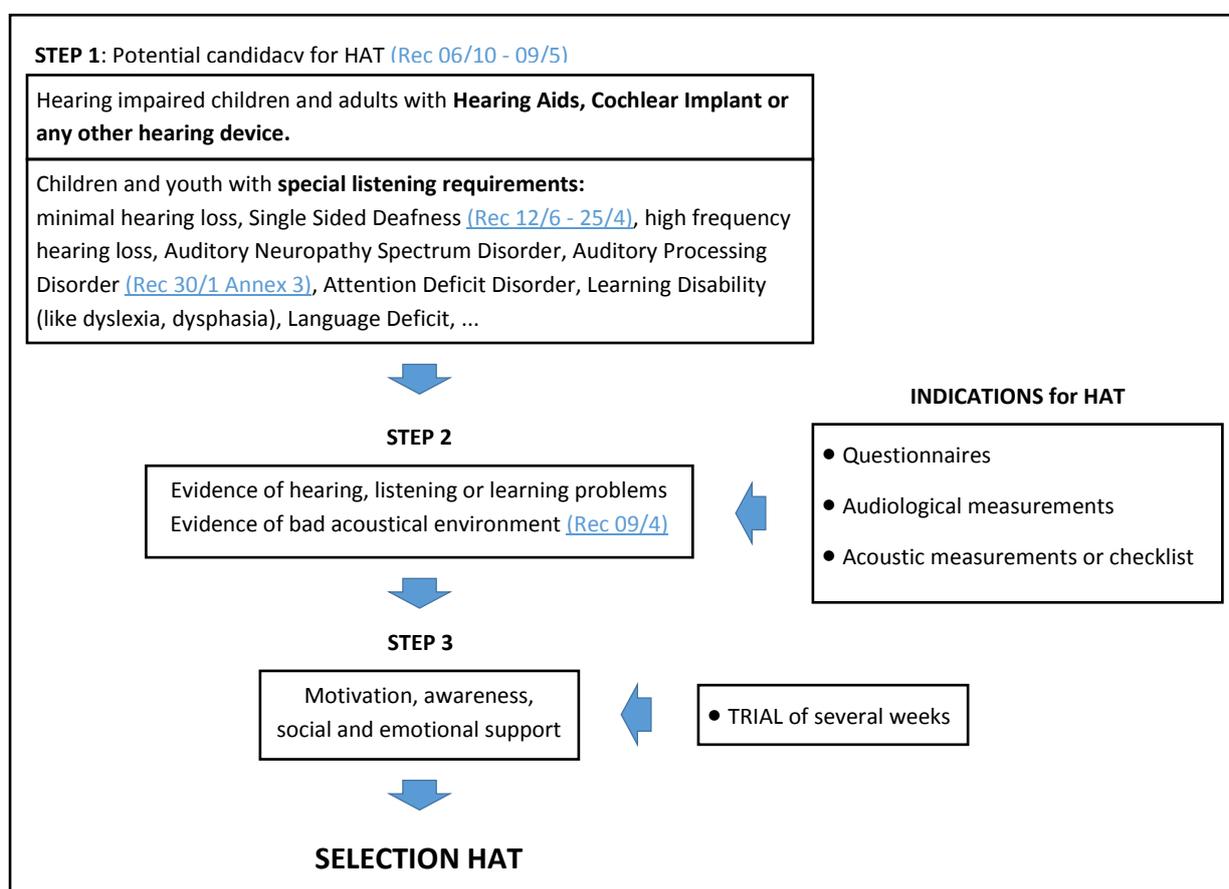
¹ different from the NFC -Near Field Communication- system in mobile phones.

❖ HAT Candidacy:

Any child or teenager with documented hearing, listening or learning problems may benefit from HATs. These children and youths have conditions such as hearing loss and other auditory deficits, underdeveloped auditory systems, language delays and disorders, limited knowledge of language, as well as attention problems that compromise their ability to hear and listen in adverse acoustic situations. These HAT-systems counteract the effects of background noise and high reverberation levels and bridge the distance from the talker.

Adults with hearing loss are also candidates for HATs. They can benefit from these devices in complex listening situations at work, study or leisure. At the same time, hearing-impaired adults and the elderly with difficulties in processing acoustically relevant information in adverse listening situations may take advantage of this important resource, as they need better listening conditions.

We recommend the use of the flowchart below (based on the guidelines from AAA, 2011) for selecting the candidate:



If the answer for every step is 'yes' → start selection of HAT.

If the answer for step 3 is 'no' → counselling will be necessary before starting with HAT.

You can find a proposal '**Indication of Hearing Assistive Technology (HAT)** in the annex: REC 06/16 – 07/6 annex 1.

❖ Selection

Once the candidacy has been established, the audiologist can start with the selection of the device by taking into account following considerations:

- Audiological (hearing status, current use of hearing technology, ...)
- Developmental (age, academic performance, additional problems, motor skills, ...)
- Listening Environment (school, other users, different locations, ...)
- Technology (interference, compatibility with existing amplification, computers, phones, cost, ...)
- Management issues (ease of use, automatic connection issues, visual indicators, ...)

❖ Fitting, Verification and Validation

For the fitting and verification, the hearing care professional will need:

- Sound level meter
- Materials for measuring or estimating reverberation time (optional)
- Electroacoustic Analysis equipment (Testbox/ Real Ear Measurement equipment)
- Age-appropriate speech audiometry materials for selection, evaluation verification and validation
- Stethoscopes, hearing aid checking devices and cochlear implant monitoring earphones
- Visual aids and materials for training and classroom presentations
- Back-up HAT devices/accessories
- Appropriate fitting software

Once an appropriate remote microphone HAT has been selected, the performance of the system requires careful verification before fitting the device. The specific procedures implemented for verification will vary depending on the listener's needs and the type of remote microphone system selected. Evaluation involves a combination of **electroacoustic** and **behavioural** measures, which include tools such as self-assessment questionnaires and reports that will be useful to validate the HAT.

You can find detailed information on:

1. **Verification of Hearing Assistive Technology: Electroacoustic measurements**
(REC 06/16 – 07/6 annex 2)
2. **Validation of Hearing Assistive Technology: Behavioural measurements**
(REC 06/16 – 07/6 annex 3)

❖ Counselling & Follow-up

Training and information about the HAT must be shared with every user. Special attention will be needed for the child, his parents, teachers and all those involved in supporting the child. In relation to the elderly, the family must also be orientated about the system use in a social context.

It must be ensured that the required skills in using the system and troubleshooting (including daily checks) are well known.

At the same time, outside the educational context, it may be necessary to give more information on the extent of use and the possibilities that the systems can offer. For example, that they permit direct connections to other equipment (TV, telephones, music, multimedia devices, ...) and can also be useful in many different environments (in cars, on bikes, in public places, ...).

Account should be taken of the many ways of using the system (interview mode, conference mode, around the neck), which may vary depending on the equipment chosen by the professional.

Regular follow up of the system, including contact with the teachers or any other person who uses the HAT-system, will be necessary to be sure listening goals and communication access are still achieved.

Annexes

REC 06/16-07/7 annex 1 Indication of Hearing Assistive Technology

REC 06/16-07/7 annex 2 Verification of Hearing Assistive Technology: Electroacoustic measurements

REC 06/16-07/7 annex 3 Validation of Hearing Assistive Technology: Behavioural measurements

References

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Smaldino J.J. & Flexer C. (2012). *Handbook of Acoustic Accessibility: Best practices for Listening, Learning and Literacy in the Classroom*. New York: Thieme

AAA Clinical Practice Guidelines (2011). Remote Microphone Hearing Assistance Technologies for children and Youth from birth to 21 Years. Supplement A.

AAA Clinical Practice Guidelines (2011). Remote Microphone Hearing Assistance Technologies for children and Youth from birth to 21 Years. Supplement B.

NCDS (2008), Quality Standards for the use of personal FM systems

This recommendation was created and approved in multidisciplinary cooperation between professionals of all audiophonologic disciplines, which are medicine, pedagogy, speech therapy, psychology and hearing instrument audiology.

The original language of this document is English.

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