

FM – when and how!

Liz Reed-Beadle, Liz Wood and Richard Vaughan led a workshop introducing practitioners to the rationale for using FM and the basic equipment needed to make the listening conditions easier for a child with a hearing loss

The workshop began by going back to first principles and the need to overcome obstacles to everyday listening. Deaf children find it difficult to listen in class due to background noise, distance and reverberation. Even with the latest audiological technology, these problems cannot be solved by a hearing aid alone. We know that background noise affects the understanding of speech, and we know that the speech signal drops by 6dB with every doubling in distance. We also know there needs to be a good signal-to-noise ratio. For adults to make sense of a speaker in noise they need to have the speaker's voice (signal) 6dB louder than the background noise (noise). This is a signal-to-noise (S/N) ratio of +6dB. However, a child needs +16db S/N ratio and a deaf child needs a +20–30dB S/N ratio. An 'uncontaminated' speech signal is particularly important for young children.

So how does the FM system help? It decreases the distance between speaker and listener delivering the sound direct to the ear. The sound is delivered uncontaminated by noise and reverberation. There are many different types of FM system but each consists of a transmitter which includes a microphone and receiver together with direct audio input (DAI) shoes for the hearing aids. Neck loops are still available for some systems but they are not used routinely in schools.

When to fit an FM system

In the *Quality standards for the use of personal FM systems*, QS1 states that 'every child should be considered as a potential candidate for provision with a personal FM system as part of their amplification package, in line with a written policy on candidacy'. Some services have a policy in place focusing on audiological criteria, but a child may be considered as suitable for other reasons such as asymmetrical hearing loss, additional difficulties or functioning in noise, or the school's acoustic conditions. Flexibility must be allowed for, and a flowchart to help the decision-making process is detailed in the FM QS *Good Practice Guide*.

For children with cochlear implants there are some important general considerations:

- The decision to trial the use of an FM system must be one that has been agreed by all professionals and include the support and agreement by the child/family and local professionals.
- The child should have a stable 'map' and wherever possible be able to report on sound quality.
- Any mapping changes to the child's speech processor need to be made before the FM fitting, by an implant

centre audiologist, for example a specific programme may be needed with a correct mixing ratio.

- QS4 recommends that initial fitting and setting up of an FM system must be carried out by an appropriately trained CI professional. In this way everyone can be assured that the FM receiver volume is set optimally.

It is vital for both the fitting of a hearing aid and a cochlear implant with an FM system that correct procedures and policy are followed and that the whole system is evaluated regularly.

Monitoring and checking considerations

The equipment must be kept in good working order to maximise the benefits for users. There should be daily checks of the equipment, both hearing instrument, shoes and components of the FM system. The FM QS *Good Practice Guide* gives suggestions for monitoring and checking FM systems. For example:

- Are the batteries working in the hearing instrument?
- Has the correct shoe been used? Some slide on, some push on, some are fixed to the battery drawer.
- Are there dirty contacts on the hearing instrument – have the cover plates been removed?
- Have the hearing instruments been FM enabled? Some do this automatically when the shoe is attached; others need to be enabled through the programming software at the hospital.
- Is the child wearing the equipment correctly?
- Is the transmitter microphone working?
- Are the transmitter and receiver on the same frequency?
- Is the transmitter microphone muted?

Setting up an FM system with hearing aids is not difficult and most ToDs have been trained in this process. Some systems need verification in a test box as they are said to give the FM advantage automatically. Setting up an FM system with a cochlear implant is a more technical procedure and the child's implant centre should be consulted as often staff there will set up the equipment and provide troubleshooting training. Basic fault-finding requires the process of elimination – be methodical and start with the most likely causes. Finally, know who to call and don't be afraid to ask!

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