**What is hyperacusis?**

Hyperacusis means being intolerant or oversensitive to sounds we encounter in our daily life, at loudness levels which typically do not bother most people. Between 3 to 17% of children are said to have such issues at varying degrees; “Hyper” implies excessive, and “acusis” represents sound. Depending on the severity, reactions of individuals with hyperacusis could range from mild irritation or annoyance to severe distress and ‘meltdowns’.

**Why does it happen?**

We do not exactly know what causes hyperacusis. Different parts of our brain work together to understand the meaning of sounds we hear. Some interactions between different parts of the brain enhance detection of sounds that are important to us, such as sounds we enjoy or sounds that alert us of danger. On the other hand, some interactions suppress sounds that are not important. According to one model, hyperacusis arises if the brain enhances ‘ordinary sounds’ which are supposed to be suppressed. This results in different behavioural and emotional responses.

Hyperacusis happens in all ages. In children it is commonly seen in those with gross developmental delay, language impairment, poor social interaction and anxiety. In many young children, hyperacusis can improve as they mature. It can also persist but most children learn to cope with it. Help is needed if hyperacusis causes significant difficulties with daily activities. Children with hyperacusis could have difficulties listening to conversation in noisy environments, such as within a school setting. This can have an impact on academic progress. Assessments for auditory processing difficulties (disorder) (APD) may be considered in such circumstances for children six and half years of age and older.

Oversensitivity is not only limited to sounds. A large number of children with hyperacusis are oversensitive to food textures, smell, taste, touch and pain. Hyperacusis can also be associated with some medical conditions, such as Bell’s palsy (paralysis of the nerve of the face), William’s syndrome and others.

 **What sounds cause hyperacusis?**

Children are usually affected by a number of different sounds that vary from child to child. Common themes include sudden loud sounds, loud voices, household appliances (hoover, hair dryer etc.), alarms and sirens, animal noises, fireworks, crowed places (parties, busy shopping areas etc.), school assembly, school dining rooms, noisy class-room amongst others. The sounds do no need to be loud, and some are averse to specific quieter sounds with significant hatred towards chewing, sucking, sniffing, tapping or crackling noises.

**How do children respond to hyperacusis?**

Common reactions in young children include covering their ears and cry, trying to get away, crying and getting anxious or distressed. They can also appear frightened or go very quiet or get aggressive. Older children may describe their reactions and feelings in more detailed and meaningful ways.

**Assessment:**

To understand your child’s problem, a detailed history is needed. A questionnaire is enclosed with your appointment and it would be helpful if you complete the questionnaire and bring it with you at the appointment.

The initial assessment will include a full medical history and examination of your child. A comprehensive hearing assessment will be performed. For children older than 6 years we may also carry out a test to check their reasoning ability using a computer game.

Depending on the age of the child and our findings we will provide some management strategies. Some school aged children may need a further assessment and we will provide you with additional questionnaires that you need to return fully completed to our Fulwood Clinic, in order to arrange the second appointment.

# MANAGEMENT

**1. Reassurance / Cognitive Behavioural Therapy**

Where hyperacusis is not impacting on family or school/nursery life on a regular basis or causing avoidance of particular situations, explaining the source of the sound may be sufficient to reassure your child.

You may well develop your own coping strategies in specific situations, which distress your child. It important to breakdown the association of the triggering sounds and the resulting emotional responses generated by misperception of the sound being threatening or unpleasant. This can be achieved with the following steps:

1a). When your child becomes distressed to certain sounds, move away from the source where possible and then comfort and reassure.

1b). Explain that there is nothing to worry about the sound, and that we can make our brain get used to the sounds by doing some games and exercises on a daily basis. Our brain needs repetition of events over a time period to learn and adjust. This may take from six months to 2 years.

1c). Allow your child to have some control by allowing him/her to make the sounds, such as clapping hands, tapping a table, shaking rattles or switching the Hoover / hair dryer etc. on and off. These can all be made part of play activities which can allow them to build some confidence.

*Please remember, it is not advisable to use earplugs or ear protection on a regular basis as that may make the situation worse. Rather than helping the brain to adapt to the loudness of sounds, ear defender strengthens dependence on it and isolates your child from the world around them.* However, ear defenders may be used in an emergency situation. You may also wish to discuss this with your child’s teachers or carers.

1d). Children with hyperacusis frequently have anxiety issues. If simple reassurance does not work support from counsellor/clinical psychologists may be needed. Along with the reassurance some activities can to be carried out as outlined below.

**2. Sound Therapies**

***2a). Successive approximations to troublesome sounds:***

This is a form of desensitization to help your child to adapt to the sound he/she is oversensitive to. Tape one of the sounds that your child is oversensitive to. Play the sound via some loudspeakers for your child to listen to it at a time he/she is relaxing or at playtime or tea time. First week the loudness of the sound needs to be very quiet so that it is just audible. Raise the loudness slightly once a week, over a period of six to eight weeks, so that at the end of the eighth week the sound reaches it natural loudness. You may also need to gradually increase the duration the sound is played continuously, such as ten minutes a day the first two weeks, 15 minutes the 3rd and 4th week, 20 minutes the 5th and 6th week and 30 minutes the 7th and 8th week. There is no specific prescription and you need to set the loudness and duration depending on the response of the child. Once you have tried with one sound for 8 weeks you can try another sound for another 8 weeks.

***2b). Counterconditioning***

This is another form of desensitization, and in this form, you combine one of the troublesome sounds with an activity you child enjoys. You need to tape another sound you have not used in 2a above. After explaining your child what you are doing, you present the sound very briefly for about two to five seconds and repeat it everyone to two minutes for 15 minutes when you child is engaged in his/her favorite activities. You may present the sound seven to ten times during the 15 minutes. You may start with a quiet level initially and increase the loudness every couple of weeks.

***2c. Background music at home:***

Play relaxing music in the background at home, at a comfortable level. This will provide low-level noise stimulation as well as soothing effect on the brain that can help hyperacusis. The choice of music will depend on your child’s preference. There is suggestion that ***Mozart’s classical music*** helps to improve sound processing and cognitive abilities, and known as Mozart’s effect.

***2d. Music through headphones:***

The idea is to listen to relaxing music of your child’s choice via soft headphones at quiet intensity. This approach is most useful when the child is out-doors and expected to be exposed to sounds, such as when in the town or in the super-market. It is best used using something like an iPod which can be clipped on to the child’s dress and allow full mobility.

The use of music at school has mixed outcomes. Some children find it helpful, but some children get too engrossed with the music interfering with their engagement in educational activities. Additionally, hyperacusis is associated with listening difficulties in noisy environment, and therefore music may cause the child to miss-hear the teacher during lesson time.

***2e. White noise generators* or WNGs**

White noise generators (WNGs) are essentially modified hearing aids, which generate a continuous wide band noise. Their use is based on idea gathered from adults who have hearing loss and tinnitus; suggesting that our brain increases the loudness of sound to compensate for any hearing loss by increasing what is known as ‘central gain’ (like turning the volume control of your TV higher) resulting in hyperacusis. It is hoped that WNGs provide additional noise to the ear, to help the brain to reduce the central gain, and improve hyperacusis. Therefore, WNGs can helps adults who have hyperacusis along with hearing loss and tinnitus. There are very few reports of WNGs being used in children with hyperacusis, and definite evidence of its value in children is lacking. Even in adults it has been suggested that the use of WNGs can be detrimental and it interferes with processing of sounds in the brain (auditory processing). It needs to be noted that most children with hyperacusis do not have hearing loss (they passed new-born hearing screening or have normal hearing test). Additionally children with hyperacusis have difficulties in listening to conversation, especially in noisy environment. Therefore, it is highly likely that children attending mainstream schools will have difficulties listening to the teachers during lesson time if they use of WNGs. However, for children with significant learning difficulties and hyperacusis, who attend special schools, WNGs could be tried.

**3. Sensory motor integration**

Hyperacusis can be associated with some form of language delay, which in turn is linked to motor skills. The areas of the brain that control our anxiety are also connected with different areas of the brain that control our listening, language and motor skills. It is therefore, suggested that activities that make different parts of our brain to work together may help. Some of the activities suggested are listed below. These need to be carried out along with measures suggested earlier, especially with reassurance and addressing anxiety issues.

**3.1. Learning Musical instrument:**

Musical instrument that uses two hands to play will engage both sides of our brain in a coordinated way. In addition, such activities require attention, reading musical notes, playing a tune from memory and listening to what is being played. A number of research has shown the benefits of learning musical instrument for improving auditory processing and other cognitive issues.

**3.2. Juggling**

Juggling exercises enhances coordination between the two sides of the brain and has been shown to improve our brains ability to learn. You may log on to you-tube and there are a number of video clips which shows how to learn to juggle.

**4. Noise cancelling headphones with remote microphone**

Children with hyperacusis have two related issues, firstly the oversensitivity to sounds and secondly difficulties in listening to conversation especially in noisy environments. Management of both of these two components together is important in children attending school with a need to hear the teachers in noisy classroom situations. One of the options is for school to consider ‘personal assistive listening device’, which may involve a noise cancelling headphone or earphones that are linked to a remote microphone the teachers wear. The rationale is that the noise cancelling headphone will reduce the annoying background noise, but at the same time due to its connection with the teachers microphone the child would hear the teacher’s voice very clearly.

This information leaflet is based on a number of research articles. We can provide the references (not the whole article due to copy right issues) on request. Please contact us at Fulwood clinic on 01772 401310 or email us at lth-tr.Paediatricaudiology@nhs.net if you have any queries.

Thank You

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