

Auditory Processing Delay

This leaflet is for the parents/carers of children with suspected Auditory Processing Delay (APD) and explains how the condition is managed.

What is APD?

Auditory Processing Delay (APD) is a condition where an individual has difficulties making sense of the sounds they hear. This can be thought of as difficulties processing sounds, particularly speech signals. Although 10% of children will experience APD, the central auditory system continues to develop through childhood and adolescence and as such the majority of cases will have resolved by the time they enter adulthood.

Many children who have normal hearing detection levels, as determined by testing, may still have difficulties listening and attending in a variety of situations. So, although a child with APD can hear sounds within the normal levels, the brain interprets what it hears as if there is a delay or distortion to the sound.

This in turn can make it difficult for a child to comprehend what has been said and as such they may not be able to retain the information. In quiet situations, they don't appear to have a problem, but in a noisy classroom or when there are numerous distractions, they can have difficulty understanding what has been said. It is important to remember that children under the age of 12 years show a greater difficulty hearing in the presence of background noise.

The most commonly reported problems include:

- Hearing speech clearly in the presence of background noise and reverberant environment.
- Picking out one voice from others.
- Hearing speakers clearly at a distance.
- Localising and tracking sounds.
- Taking longer to respond to and process auditory information.
- Poor listening skills and auditory attention.

As such, children may also have difficulty:

- Maintaining attention to speakers.
- Remembering spoken messages or instructions.
- Recognising letter sounds in isolation.
- Combining letter sounds to make words.
- Breaking words down into their component sounds (such as phonics).

There may be other reasons why a child has the above symptoms. The ability to listen to sounds involves several components - memory, vision and attention, in addition to hearing. If any of these functions, or their coordination, is impaired, listening may be compromised. The British Society of Audiology (BSA, 2011) position statement on APD outlines three categories of the condition:

(1) Development APD

Cases presenting in childhood with normal hearing (as determined on audiometry - measurement of the range and sensitivity of a person's hearing) and have no other known cause or potential risk factor. In some cases, the individual may retain their APD into adulthood.

(2) Acquired APD

Cases associated with a known post-natal event (for example, neurological trauma or an infection) that could possibly explain the APD.

(3) Secondary APD

Cases where APD occurs in the presence, or as a result of a peripheral hearing impairment. This includes temporary hearing impairment after its resolution (for example, glue ear).

APD may co-exist with other neurodevelopmental disorders, such as language and learning impairments, literacy difficulties or poor attention. This does not mean that APD causes these.

Difficulties in diagnosing APD

There are several key reasons why it is challenging to diagnosis APD. One is the overlap of typical symptoms of APD (such as difficulties hearing speech-in-noise, following verbal instructions, language difficulties, poor attention) with other developmental disorders, such as dyslexia, language impairment and attention-deficit-hyperactivity disorder.

Secondly, although there are tests available that aim to assess an individual's auditory processing abilities, these assessments don't have clear results. Furthermore, these assessments are language-based, leading to confusion of APD with a language-based disorder. Also the assessment may depend on other skills, such as memory.

Due to these issues, there is a lack of an internationally accepted gold standard for testing and diagnosing this condition. A gold standard assessment or battery of assessments is an agreed measure with which the sensitivity (the ability of a test to correct identify individuals with a condition) and specificity (the ability of a test to correctly identify those without the condition) of other measures can be compared. Although there are some assessments available that attempt to explore an individual's central auditory processing, none of these achieve the level of a 'gold standard' measure.

Currently, there are only a few recognised centres that have the facilities to assess for APD. The nearest centre to Reading is:

(1) The Auditory Implant Service at the University of Southampton

This service uses a team comprising of audiologists, speech and language therapists and teachers of the hearing impaired/educational audiologists. This is a **self-funded**

route – so is not free on the NHS. Please see <http://ais.southampton.ac.uk/auditory-processing-disorder/> for further information.

(2) Great Ormond Street (GOSH), London

It is a specialist service would need to come from a consultant. This is a NHS clinic. Please see <http://uk/medical-information/search-medical-conditions/auditory-processing-disorder> for more information.

Should a centre make a recommendation(s) for equipment we will be unable to provide this/these. The recommendation relies on the care giver.

Management of APD

Listening tactics

Even without a formal diagnosis, it is possible to introduce management strategies for a child suspected of having APD. These strategies are functionally driven, such that they are designed to target difficulties an individual may experience in everyday life, such as at school. This can include the following tactics:

- Giving one direction at a time.
- Using short, simple phrases to give directions, repeating if necessary.
- Giving a child some extra time to listen and process the information before expecting them to start an action/task.
- Giving visual cues, such as pictures, gestures/signing or visual demonstration to support the verbal information.
- Reducing auditory distractions where possible.
- Sit the child close to what they are listening to.
- Start with one step instructions and increase as competence grows, for example 'get your shoes' (one step) increase to, 'Get your shoes and your coat' (two steps).
- Providing positive feedback.

There are activities which one could implement to help to develop a child's auditory processing. These include:

- 'Simon says' – giving more complex 3-4 instructions. If this is too difficult reduce the number of elements.
- Recognition of every day noises/sounds on CD.
- When reading a story, have a selection of props relating to the story beside you on a table. As each item is mentioned in the story, the child has to pick up the related prop.
- Musical chairs/statues.
- Acting out simple stories as they are narrated.
- Sound lotto games.
- Counting how many times a specific noise is heard.
- Playing Twister.
- Find a hidden ticking clock/watch.
- Play mini games such as charades to develop attention and the ability to read visual cues.
- Auditory sequencing/memory games such as 'I went to the shop'....'I went to the shop and bought a banana'....'I went to the shop and bought a banana and apple'.

- Listening to audio books and following the words.

It can be tiring for a child if they have difficulties with auditory processing because it requires increased concentration to understand instructions and complete tasks. The above activities may therefore need to be completed little and often, so as not to cause fatigue and de-motivate the child.

Adjustments in a school environment

- Make sure they are appropriately seated, i.e. near the front to the side of the room so that they can see the teacher and turn around to see classmates during discussions.
- Avoid seating near sound sources; place the child away from competing or distracting noise sources, such as outside noise or equipment in the classroom.
- Turn off computers and printers when not in use.
- Speaking in a clear, well-modulated voice, avoiding over-articulation.

Specific strategies for children in primary school

- As there may be auditory memory difficulties, providing written instructions may be useful.
- Give a child the opportunity to work in a quiet environment where possible, i.e. small groups and with an assistant.
- Helping to make it physically, visually and audibly clear when something new is being discussed.
- As the curriculum becomes more complex and demanding, the use of a diary may help organise and order thoughts and ideas more easily.
- Consider delivering spoken tests, particularly mental maths, at a slower pace, for example 10 seconds instead of 5 seconds per questions.

Specific strategies for children in secondary school

- Encourage effective use of a diary and 'to-do' lists to organise tasks.
- Provide written information in clear bullet pointed steps.
- Provide visual aids and prompts.
- If possible, providing a written lesson outline and glossaries of terms in advance of the lesson so that the student knows what to expect and is 'cued in' to the topic.
- Consider work on note-taking skills and as picking out salient points can be difficult.

Training programmes

Training programmes aim to improve auditory processing skills through practice, somewhat like brain train software packages. However, training programmes are considered time-consuming due to the level of commitment and dedication that is required. The effectiveness of training programs can vary depending on different reports. They generally involve being completed over an extended period of time, for example 30 minutes, 3-4 times a week for 6 weeks. Apart from the LACE programme (see below), the programmes outlined below are not available on the NHS at the present time. However, they can be purchased privately.

Auditory training

The aim of auditory training is to optimise speech perception through the use of formal listening activities. It was not designed explicitly for APD and at the present time there is no specific evidence to demonstrate the benefits in this population. There are several computer-based auditory training programmes available. Although auditory training tasks are used, the focus is more on language than fundamental auditory processing training. These tasks are typically reported to improve phonological awareness, phonics, auditory attention and language. They include the following programmes, which can be purchased privately:

- Earobics – see www.earobics.com
Earobics Step 1 is designed for developmental ages 4-7 year olds
Earobics Step 2 is designed for developmental ages 7-10 year olds
Earobics Adolescents and Adults
- Fast ForWard – see www.innovative-therapies.com
Fast ForWard Language Basics is aimed at 4-6 year olds
Fast ForWard Language v.2 is aimed at 5-12 year olds
Fast ForWard Middle & High School is aimed for adolescents and older learners
- Phonomena – see www.mindweavers.co.uk
Designed for children aged 6-12 years old
- LiSN & Learn – see <https://capd.nal.gov.au/lisn-learn-about.shtml>

The Listening Programme

This is a music listening therapy programme designed to improve listening and learning. It involves listening to acoustically-modified instrumental music through headphones to improve focus, self-regulation, learning and memory. As such, this programme has not been specially designed to treat APD and there is no evidence to indicate the benefit in this group of children. The programme does however focus on some of the challenges associated with APD, such as challenges listening in background noise, the need for information or directions to be repeated. Please see http://www.learning-solutions.co.uk/listening_program3.php for further information.

Listening and Communication Enhancement (LACE) Programme

LACE is an interactive software training programme that enhances an individual's ability to communicate by maximising their listening skills and communication strategies. Although not specifically designed for APD, the programme is intended for teenagers and adults with or without hearing loss who have difficulty understanding speech in challenging listening environments. Please see <http://www.laceuk.co.uk/about-us/> for further information. LACE is limited to age due to the complexity of the listening tasks.

Assisted Listening FM System

Assistive listening FM systems are wireless devices that receive distant auditory input and transmit the signal to the ear of the listener. A microphone is worn by the speaker and connected to a transmitter that picks up the speech signal of the speaker and converts this to an electrical signal, which is transmitted via FM band waves to the receiver. These

devices help counteract the problem of distance between the teacher and a student, as loss of critical speech elements is overcome since the distance travelled by the speech signals is reduced, while masking of the speech signals by ambient noise is minimized and overall audibility is increased. FM systems can help to reduce the effects of reverberations.

The provision of a FM system is currently not available through the NHS. FM systems can be purchased privately, for example:

- ReSound Unite Mini Microphone, please see <http://www.educationalhearingsystems.co.uk/index.asp?function=PP-LOGIN>. Login is Unite This consists of a microphone and two ear pieces, one for each ear.
- Phonak iSENSE, please see <http://www.phonak.com/com/b2c/en/products/fm/receivers/isense.html>

Both of these systems have been specifically designed for children with normal hearing.

FM systems may not be appropriate for all children with suspected APD. Moreover, the FM system may only be effective in appropriate cases if problems caused by poor classroom acoustics have been addressed. There is a school of thought that children who use FM systems can become reliant on their use, which may slow the development of listening tactics and processing skills.

Sensory Services

At the current time, APD does not come under the umbrella of the Sensory Consortium Service (SCS). As the child has not been diagnosed with a hearing loss, and hearing aids are not issued, a referral will not take place. If a diagnosis of APD has been made, then the information may be passed to the school along with recommendations for intervention (Department for Education, 2015).

Contact us

If you have any further questions or concerns please feel free to ask one of the Paediatric staff who will try and help. The contact number of the Audiology Department is 0118 322 7238.

Further information

www.nhs.uk/conditions/auditory-processing-disorder/

NDCF http://www.ndcs.org.uk/family_support/auditory_processing_disorder/

Visit: <http://www.royalberkshire.nhs.uk/wards-and-services/audiology.htm>

If you would like this leaflet in other languages or formats (e.g. large print, Braille or audio), please contact the Audiology department.

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