ACKNOWLEDGEMENTS

The author thanks:

Frank Piddisi
Superintendent of Special Services

Lea Cardinali
Coordinator, Special Programs-Deaf and Hard of Hearing

Andrea Coke
Chief Speech-Language Pathology Services

And teachers for reviewing this document:
Pat Nadeau, Mario D’Alimonte & Diana Francavilla
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory Processing Testing and the TCDSB</td>
<td>3</td>
</tr>
<tr>
<td>Auditory Processing Fact Sheet</td>
<td>4</td>
</tr>
<tr>
<td>Auditory Processing Referral Process</td>
<td>5</td>
</tr>
<tr>
<td>Sample Letter for Referrals</td>
<td>6</td>
</tr>
<tr>
<td>Auditory Processing Disorder Technology Options</td>
<td>7</td>
</tr>
<tr>
<td>School Based Support Learning Team Meeting</td>
<td>8</td>
</tr>
<tr>
<td>Special Equipment Amount (SEA) Funding</td>
<td>8</td>
</tr>
<tr>
<td>Privately Funded Hearing Systems</td>
<td>9</td>
</tr>
<tr>
<td>Synopsis of the Canadian Guidelines on APD in Children</td>
<td>10</td>
</tr>
<tr>
<td>International Classification of Functioning, Disability and Health (ICF)</td>
<td>10</td>
</tr>
<tr>
<td>Canadian Auditory Processing Model</td>
<td>12</td>
</tr>
<tr>
<td>Caution Interpreting Auditory Processing Results</td>
<td>13</td>
</tr>
<tr>
<td>Canadian Guidelines &amp; Auditory Processing Protocol at the TCDSB</td>
<td>14</td>
</tr>
<tr>
<td>References: Canadian Guidelines on APD in Children</td>
<td>15</td>
</tr>
</tbody>
</table>
Auditory Processing Testing and the TCDSB

Research in the area of Auditory Processing Disorders (APD) began in the mid 20th century. In 1954, researchers experimented with ways to stress the auditory system. By using filtered speech tasks, these researchers were able to identify lesions in the auditory systems of individuals with temporal lobe tumours. This work and other groundbreaking research began during this period (Myklebust, 1954 and Kimura, 1961).

Many of the auditory processing tests used today were developed in the 1960s and 1970s, including the commonly used Staggered Spondaic Word Test (Katz, 1962) and the Low-pass Filtered speech test (Willeford, 1977). The primary purpose for these tests was to pinpoint specific brain lesions that were linked with specific auditory tasks. This is when researchers thought it was possible and clinically useful to identify boundaries between peripheral and central auditory systems.

Research from the fields of neuroscience, neuroanatomy and neuroimaging have provided a much better understanding of the auditory system and how it interfaces with brain function. In contrast, however, current auditory processing testing continues to focus on identifying disconnected areas of difficulty, when current evidence instead suggests that the brain is characterized by highly complex interactive networks, including that of the auditory system.

So, in December 2012, the Canadian Interorganizational Steering Group for Audiology and Speech-Language Pathology published the Canadian Guidelines on Auditory Processing Disorder in Children and Adults: Assessment and Intervention. The Canadian Guidelines utilize a theoretical framework that considers: the Canadian context, changes in audiology practice, international health and function (World Health Organization) and international APD recommendations.


TCDSB Auditory Processing Disorder Protocol (2013)
Auditory Processing Fact Sheet

- The human ear receives, amplifies and processes thousands of tones per second, which must be rapidly processed by the brain.

- Most mature listeners can process thousands of complex tones per second during an average conversation. Some listeners have more trouble than others as they struggle to process sounds into speech; particularly in noise.

- The majority of persons with normal puretone thresholds have good word recognition ability for clear and unclear speech. Learning to understand degraded speech is called is auditory processing ability. Students use their auditory processing skills together with their language skills to learn in today’s dynamic classrooms.

- Research shows that there is a long maturational timeframe for the development of auditory processing skills that continues well into adolescence. An audiologist must balance between the identification of auditory processing disorder versus over-identification and misdiagnosis of auditory processing problems, as current Auditory Processing Test batteries are not reliable, valid or predictive of future problems.

- Auditory Processing skills include:
  - **Auditory perception**: detection of tone, pitch and discriminating between sounds
  - **Hearing function**: application of location, pitch, loudness and quality to sound
  - **Listening**: use of hearing for the enjoyment of music or a story
  - **Mental functions**: sustaining and dividing attention, short- and long-term memory and higher-level cognitive functions

- Audiologists may test Auditory Processing for children who are at least 7 years old and have:
  - normal puretone thresholds
  - normal English language skills
  - and overall normal development.

- Auditory Processing Disorder is indicated when an APD test score is below the 2nd percentile.
Auditory Processing Referral Process

All Hearing Referrals are sent with Audiograms to:
Coordinator of Special Services, Deaf & Hard of Hearing,
Our Lady of Mount Carmel

TCDSB Audiologist reviews all
Auditory Processing Reports and audiograms

APD results appear average
Send letter to parent & school
Arrange classroom observation & questionnaires with Teacher
Classroom Questionnaires
Follow-up letter to parent & school
Age-appropriate auditory processing
Recommend SBSLT to discuss other contributors to learning difficulty

APD results are below 2nd percentile
Send letter to parent & school
Classroom observation (pre & post questionnaires) with Teacher
Begin three-month trial with hearing technology
Follow-up letter to parent & school at end of trial
SBSLT to discuss possible other contributors to learning difficulty and discuss SEA claim

IEP
SEA Claim written by DHH Audiologist
Assign student to DHH Itinerant Teacher

TCDSB Auditory Processing Disorder Protocol (2013)
Dear Parent

We received the Request for Audiological Services for your child, along with a copy of your child’s audiogram and auditory processing assessment.

I am the school Board audiologist and my role is to prescribe and fit Remote Microphone Hearing Assistance Technologies (i.e. hearing assistance systems transmitted with Bluetooth, FM, Infrared, etc.), to students with hearing disorders. This means that I provide support to students with documented hearing loss, Auditory Neuropathy Spectrum Disorder (ANSD) and Auditory Processing Disorder (APD). This role is fulfilled in the Deaf & Hard of Hearing (DHH) Department; with my colleague Teachers of the Deaf & Hard of Hearing.

On May 6, 2013, the College of Audiologists and Speech-Language Pathologists (CASLPO) issued the Canadian Guidelines On Auditory Processing Disorder In Children And Adults: Assessment and Intervention (December 2012). They are to be followed for best practice and care of your child.

The Canadian APD Guidelines specify that a child must be at least 7 years of age, have normal development, normal English language skills and normal hearing thresholds to be appropriately assessed. An Auditory Processing Disorder, for assistive listening technology can be prescribed, is indicated when scores on an APD test are below the 2nd percentile.

I will be meeting with your child to carefully observe his auditory ability to function in and out of the classroom setting. Together, with the classroom teacher we will complete behaviour questionnaires to document auditory performance in the classroom.

In addition, we will convene a School Based Support Learning Team (SBSLT) to discuss the results and any other issues that may impact on your child’s learning.

Maureen Burke, MSc., Reg. CASLPO
TCDSB Audiologist, Deaf & Hard of Hearing

TCDSB Auditory Processing Disorder Protocol (2013)
Auditory Processing Disorder Technology Options

Trials with hearing assistance technology will take place for Auditory Processing Disorders only. Technology trials will **not take place for** auditory processing delays. The TCDSB Audiologist will meet with the student and decide which system will be used for trial.

1. Sound field system
2. Ear-level receiver
3. Receiver with earphones
School Based Support Learning Team Meeting

Difficulties with auditory processing can result in classroom behaviours such as:

- difficulty following instructions
- difficulty hearing in background noise
- poor listening skills
- academic difficulties
- poor auditory association skills
- distractibility
- inattention

As there is very high overlap between the symptoms of APD and other learning difficulties, a School Based Support Learning Team Meeting (SBSLT) must also convene to discuss other contributors to a student’s learning difficulties. A student with APD will experience similar hearing symptoms as children with hearing loss—both in and outside of the classroom.

Application for Special Equipment Amount (SEA) Funding

An SEA application will be completed, when a remote microphone hearing assistance technology is deemed essential for the academic success of a student following a three-month trial. The technology trial may be extended, if benefit is not clearly established. The application will be completed by the TCDSB audiologist, with input from the DHH Co-Ordinator, SBSLT, classroom teacher, and family.

SEA claims may be completed for a student once every three years, thus ongoing communication between home and school are essential to ensure that the necessary system is well planned for the upcoming SEA period.

The TCDSB audiologist in collaboration with the Administrative Assistant for Special Services, Deaf & Hard of Hearing, prepares SEA claims in accordance with Board procedures and timelines. The specific process of writing SEA claims have been discussed in detail in the TCDSB Binder titled: SPECIAL EQUIPMENT AMOUNT (SEA) (2006), which should be consulted for in-depth directions.

TCDSB Auditory Processing Disorder Protocol (2013)
Privately Funded Hearing Systems on TCDSB Property

Remote microphone hearing assistance technology that is purchased by the TCDSB with SEA funding is supported by the Special Services, Deaf & Hard of Hearing Department. Other technology that is privately-funded will not be supported by the Deaf & Hard of Hearing Department in any manner.

Privately funded systems will be allowed under the following terms and conditions:

- The TCDSB will **not be responsible** for loss or damage of privately purchased hearing systems on its properties.
- Itinerant Teachers, Deaf & Hard of Hearing will **not assist** in the care or troubleshooting of these systems and allocation of Itinerant Service will be modified to reflect the difference in the level of service.
- The student’s own **clinical audiologist** will be responsible for the fitting, verification, and validation measures; which are required by the College of Audiologists and Speech-Language Pathologists of Ontario (CASLPO).
- The TCDSB Audiologist will not be responsible for the fitting, verification, or validation of these systems.
- Each school-year, the student’s family must sign and date a letter in agreement with the terms of *Use for privately-funded wireless Hearing systems.*
In order to develop a Canadian model for auditory processing, the CISG examined the International Classification of Functioning Disability and Health (ICF) Model from the World Health Organization (WHO, 2001).

The WHO ICF model is centered about the assumption that every human can experience a decrement in health and thereby experience some degree of disability during their lifetime. Disability is not something that happens to a minority of people, but a majority of persons will experience some degree of disability during their lifetime. It is part of the human experience.

The ICF model is focused on the impact of the disability—not from the cause of disability. This allows all health conditions to be considered on an equal footing and allowing them to be compared using a common metric. The ICF model also addresses the social aspects of disability—and not just a 'medical' or 'biological' dysfunction.
When considering Auditory Processing Disorder, based on the ICF model, we must consider the tests of auditory function in the context of both the Individual and their environment.

In the context of the Individual: We must examine the impact of auditory processing based on:
- age
- gender
- educational level
- coping & learning style
- on individual’s daily functioning

And consider any mediating contextual factors:
- such as acoustical environment
- an assistive listening device
- individual’s self-concept
- self-confidence

For example: A difficulty noted on a specific auditory task may result in difficulties in the classroom. However, when the supportive contextual factors such as parents, effective metacognitive strategies and excellent teaching may counterbalance any negative effects and thus the disorder has limited impact.

In the context of the environment: we consider the impact of traditional APD recommendations:
- Acoustical accommodation
- modifications to the listening environment
- support from family and school
- supportive communication strategies
- formalized support --such as development of the IEP
- provision of hearing assistive technology

Continuing with the example of difficulty noted on a specific auditory task that results in difficulty in the classroom...we need to evaluate if these recommendations facilitate or hinder function in a typical classroom.

In other words, not all persons respond in the same manner to the same interventions.
The Canadian APD model is centered the intervention to improve participation. It is easy to see that it resembles the ICF model, such that it addresses auditory function in the context of both the Individual and their environment.

The Canadian guidelines state that the behavioural assessment of auditory processing requires that:

- children are able to understand the task requirements,
- have receptive and expressive language skills that enable them to understand and respond to speech stimuli,
- and have sufficient attention and memory to complete tasks

The Canadian guidelines, like the United Kingdom, USA and Australia, state that the minimum developmental age for assessment is 7 years, as behavioural tests of auditory processing have greatly reduced reliability and validity for younger children.

In addition, if the presence of intellectual disability has been confirmed through psycho-educational assessment, an auditory processing assessment should not be performed.
The Canadian APD Guidelines repeatedly state that audiologists should exhibit caution when interpreting APD test results due to the highly overlapping nature of behaviours for different types of disorders.

For example, researchers have noted:

- “different conceptual and diagnostic approaches adopted by audiologists and psychologists can lead to a confusing picture whereby the child who is regarded as having a specific learning disability by one group of experts may be given an APD diagnosis by another.”

Historically, the auditory processing test battery was used to find abnormalities of the adult auditory system. While diagnostic techniques such as magnetic resonance imaging (MRI) have largely replaced this function; use of the auditory processing test battery continues to be a part of audiology practice.

While concerns of test validity, reliability, sensitivity and specificity have plagued many of today’s auditory processing tests, with appropriate usage, tests of auditory processing may help in various ways, such as:

- Identifying children at risk of auditory processing difficulties, perhaps related to earlier chronic otitis media or other risk factors, and prevent secondary learning and social problems.
- Identifying persons at risk of auditory processing difficulty, with cumulative noise exposure and auditory processing difficulties, without any notable change in audiometric thresholds.
- Identifying the capacities of individuals using hearing aids or cochlear implants in their everyday lives.
Canadian Guidelines & Auditory Processing Protocol at the TCDSB

Like the Canadian Guidelines On Auditory Processing Disorder In Children And Adults: Assessment and Intervention (December 2012), the TCDSB Protocol is very consistent with its message.

The TCDSB Protocol supports auditory processing assessment for children who are at least seven years old and have:

- normal puretone thresholds,
- normal English language skills,
- and overall normal development.

An Auditory Processing Disorder is indicated when a test score is below the 2nd percentile.

Like the Canadian Guidelines and the World Health Organization, the TCDSB supports the use of low cost interventions, such as:

- universal design for teaching
- preferential seating
- note takers
- and waiting for evidence before investing in high cost intervention.

The University of Western Ontario convened a group of Canadian APD experts in May 2013:

- to develop a Canadian evidence based auditory processing battery
- that will improve outcomes for persons living with APD
- the TCDSB audiologist is a contributing member of this group.
REFERENCE

Canadian Guidelines On Auditory Processing Disorder In Children And Adults: Assessment and Intervention (December 2012)

Canadian Interorganizational Steering Group for Speech-Language Pathology and Audiology (CISG), Pam Millett, PhD, Benoît Jutras, PhD, Greg Noel, M.Sc., Kathy Pichora-Fuller, PhD, Charlene Watson, M.Ed., Arden Nelson, Au.D.