Report on a School Board's Interprofessional Approach to Managing the Provision of Hearing Assistance Technology for Students with Auditory Processing Disorders

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The purpose of this article is to describe one Ontario school board's protocol for the provision of hearing assistance technology (HAT) for students with auditory processing disorders (APD). Audiologists are faced with assessment and management challenges surrounding APD. An interprofessional approach is recommended because APD is multi-faceted and complex. Audiologists, speech-language pathologists, psychologists and education professionals play a role in the assessment and management of APD; however, realities of practice often make it difficult to coordinate the efforts of multiple professionals. The Thames Valley District School Board (TVDSB) observed that clinical audiologists alone were left to assess and make recommendations for children with auditory processing challenges. As such, a greater number of students than the Board's staff and budget could manage were receiving recommendations for HAT from their clinical audiologists. The TVDSB needed a way to manage the volume of requests for HAT in such a way that optimally serving student need was prioritized. Thus, the TVDSB APD protocol was developed. This article explains the rationale for the TVDSB APD protocol, its guiding principles, and procedures. The protocol is an interprofessional, evidence-informed approach to managing HAT for APD in the school setting. Two case examples illustrate the protocol at work, and implications and subsequent steps are discussed.

Introduction

The assessment and management of auditory processing is a challenging domain for audiologists, and as such it is often a controversial topic. The following report reflects the perspective from which a school board's auditory processing protocol was designed, explains the protocol's guiding principles and procedures, and discusses how it is implemented by educational audiologists and other health and education professionals employed by the Thames Valley District School Board (TVDSB).

Children who are referred for APD testing often present with multiple concerns, including speech, language, cognition, attention, and learning difficulties (Witton, 2010). Some experts suggest that evaluation for an auditory processing disorder (APD) should occur *in addition to* assessment of other domains (Bellis & Beck, 2000; Bellis & Ferre, 1999). If a child, for example, has a severe speech or language impairment, or an autism spectrum disorder, this could significantly impact the validity of an auditory processing screening tool or some tests in an APD assessment battery (Dawes & Bishop, 2010; Whitelaw, 2003). Thus, recommendations based on the results of an audiologist's APD screening or assessment must be made and interpreted with careful consideration of potential confounds and co-morbidities. Ideally, these recommendations should be made collaboratively with other professionals who have assessed the other domains (American Speech-Language-Hearing Association [ASHA], 2005b; Bellis & Beck, 2000). However, the reality of audiology practice in our local context is that clinical audiologists conduct their assessments and report their results and recommendations. These results and recommendations are shared with parents and relevant agencies and professionals.

Due to time and resource constraints, and limited availability of assessment batteries (Emanuel, 2002), auditory processing assessments conducted in local audiology clinics are not necessarily comprehensive. They are often screenings, which may not meet the criteria of minimal assessment batteries described in the literature (ASHA, 2005a). In and of themselves, screenings or minimal assessments of auditory processing abilities may not be sufficient to inform educational programming or recommendations that translate from a clinical setting to the classroom environment. Depending on a child's needs, a tailored interprofessional approach informed by a combination of assessments, including academics, attention,

cognition, language, learning, and speech is recommended for both assessment and management (ASHA, 2005a; Bellis & Beck, 2000; Bellis & Ferre, 1999; Dawes & Bishop, 2010; Jerger & Musiek, 2000; Sharma, Purdy, & Kelly, 2009). Multiple perspectives, including those of professionals working with the student *in the classroom setting,* are most helpful in providing appropriate academic student/patient-centered programming (Bellis & Beck, 2000).

Hearing Assistance Technology for Students with an Auditory Processing Disorder

Clinical audiologists' recommendations for children with auditory processing disorders are considered seriously by TVDSB. A very common recommendation that TVDSB receives from local audiologists is the provision of hearing assistance technology (HAT) for students with suspected APD. HAT refers to personal or sound field amplification systems. Personal HAT typically uses frequency modulation to transmit the teacher's voice to a student-worn receiver. The receiver is either worn at the ear-level (receiver in the ear), or on the body with headphones or earbuds used as transducers. Sound field HAT utilizes one or more loudspeakers to broadcast the teacher's voice to the entire classroom.

We do not rely upon the clinical audiology report as the sole information source upon which to base HAT provision for students with auditory processing challenges. Not all HAT recommendations are appropriate and feasible for all situations; it is important for clinical audiologists to consult with school system staff to ensure that work is accomplished together. Otherwise, parents are placed in the difficult position of managing differing views between clinical and educational professionals. Audiologists must consider each student's individual needs in the classroom, which are sometimes significantly different from how the student presents in the audiology clinic. Thus, clinical and educational audiologists must work as partners in supporting clients/students to ensure client/student-centered best practices are provided.

Funding for Hearing Assistance Technology

Hearing assistance technology in the province of Ontario's public school systems is jointly funded by the individual school board's special education budget and the Ontario Ministry of Education's Special Education Amount (SEA; Ontario Ministry of Education, 2009). School boards are required by the Ontario Ministry of Education to responsibly manage use of the ministry-funded SEA, which funds the purchase and maintenance of equipment essential to students' special education needs. School boards must pay for the first $800 of such equipment from their own budgets, with SEA covering the remaining cost. School boards are asked to develop their own policies and procedures for management of SEA assets, and as such, are held accountable for their use of the funds. Audits are conducted annually by the Ontario Ministry of Education, to ensure proper and consistent use of SEA-funded equipment. The TVDSB staff who manage APD have implemented a protocol to responsibly negotiate the purchase of HAT for students with APD.

Background on Thames Valley District School Board

The TVDSB is a public education provider servicing the London and surrounding area, a district located in Southwestern Ontario. The TVDSB covers 175,000 students in 140 elementary schools and 30 secondary schools. There are approximately 500 students with a peripheral hearing loss on the TVDSB Deaf and Hard of Hearing Program's caseload. The population of students with an APD as identified by a clinical audiologist is estimated at 200, although only half this number results in consultation with speech-language pathology and audiology services throughout a school year. In some cases, students are identified by the clinical audiologist as having auditory processing challenges, but the audiologist makes no recommendations beyond preferential seating and other minor accommodations, which are typically managed at the school level.

The TVDSB employs itinerant teachers of the Deaf and Hard of Hearing (6.5 full-time equivalents) to directly support the students with peripheral hearing loss, in consultation and collaboration with two educational audiologists (sharing one full-time equivalent). The TVDSB employs 35 speech-language pathologists. Each school has at least one Learning Support Teacher (LST), who acts as case manager for students with special education needs. A speech-language pathologist co-ordinates speech, language, and audiology services for the TVDSB, while a special education learning coordinator (a certified teacher) oversees the Deaf and Hard of Hearing program (including the teachers of the Deaf and Hard of Hearing).

Educational audiology in the TVDSB. In Canada, there is currently no standard for assessment and management of APD, although a guideline is in development. In Ontario, educational audiologists do not tend to conduct clinical assessments of hearing or auditory processing. In this article, the terms "clinical audiologist" versus "educational audiologist" are used to differentiate between audiologists who provide clinical services in private practices or hospitals, and audiologists who work in the school system acting as support staff, respectively. Educational audiologists act as liaisons between the clinic and the classroom, and as case managers and consultants within the school system. The purpose of providing the above explanation is to emphasize that educational audiologists in this district are not responsible for the clinical assessment of auditory processing. However, educational audiologists play a leading role in the coordination of efforts to support students with APD.

In our district, auditory processing assessments are often

prompted by a physician's referral when parents present concerns regarding school performance, or when they hear about such testing through word-of-mouth or teacher referral. The clinical versus educational audiologist distinction thus presents the challenge of and opportunity for collaboration; efforts must be coordinated between the clinical community and the school board to best support clients'/students' needs. In our school board, the educational audiologist is typically not aware that a clinical APD assessment has been conducted until the assessment is complete and clinical audiology report is received. Despite attempts from both sides to improve the coordination of pediatric audiologic care, particularly in the area of APD, much room for improvement exists. Clinical audiologists must continually strive to remain apprised of the nuances of the TVDSB's protocols, funding schemes, and available resources, and the TVDSB must be transparent and consistent in their message to the clinical community.

Rationale for protocol for provision of hearing assistance technology. Currently in the TVDSB, universal sound field amplification does not exist. That is, classrooms are not equipped with any form of hearing assistance technology unless, (1) an individual student has SEA-funded HAT associated with him/her (due to a hearing loss or APD), (2) a parent or school has obtained HAT for a classroom through their own funding (i.e. personal funds, community sponsored), or (3) unique circumstances exist, such as a HAT supplier trialing HAT systems in a particular school site. Retrofitting sound field amplification in each classroom across the 170 existing schools in TVDSB is not currently planned, nor is universal or mandatory installation of sound field amplification planned for newly-built schools. Thus, the TVDSB's audiology services needed to have a feasible and consistent way to respond to clinical audiologists' HAT recommendations for children with suspected APD.

In 2005, professionals working for TVDSB began to develop a protocol for supporting students with identified auditory processing challenges. Development was motivated by an over 200-student waiting list for either personal or sound field HAT recommended by clinical audiologists. Parents often expected the TVDSB to provide HAT once it had been recommended by the clinical professional. However, due to resource constraints, the school board's audiologists could not possibly keep up with the numbers of recommendations for HAT for children with APD. Note that TVDSB speech-language pathologists' and audiologists' caseloads also include thousands of students with speech or language needs, and hundreds with peripheral hearing losses. Also, it was observed that some students who may benefit most from HAT could be situated far down the waiting list for services. Likewise, students who may perhaps benefit from other forms of support (for example, assistive technology for written language) and/or who may not need support in the form of HAT could be situated at the top of the list. Therefore, the "first-come, first-served" approach was not optimally meeting the needs of students.

The TVDSB *does* believe in providing HAT to *appropriate candidates* based on the literature in support of this form of intervention for some individuals with APD (ASHA, 2005a; Johnston, John, Kreisman, Hall, & Crandell, 2009), but must practice within the limitations imposed by resource constraints. The APD protocol was thus developed by a committee comprised of the TVDSB's co-ordinator of speech-language pathology and audiology services (second author), an educational audiologist (third author), and a special education learning coordinator (fourth author). The protocol developers attended workshops about APD, reviewed the available research literature, and considered the local clinical climate and funding schemes within the school board and ministry of education, to create an evidence-informed protocol.

In late 2006, the protocol was piloted, with the first author of this paper (an educational audiologist) taking on the responsibilities of implementing the protocol with an APD committee comprised of five staff members. The APD committee includes members from TVDSB's speech-language pathology and audiology services, psychological services, and special education services administrative team. The following section outlines the TVDSB APD protocol's principles and procedures, followed by two descriptive case examples to illustrate how the protocol is enacted.

Description of the Protocol

Guiding Principles

An important initial point is whether we (the APD committee) should provide personal or sound field HAT to students with APD. We began our protocol with the provision of sound field HAT, with the pragmatic rationale that this equipment benefits the entire classroom rather than just one student with APD. However, as our protocol implementation grew, we transitioned to the provision of personal HAT for three main reasons. First, at the junior or intermediate level (depending on the school), students begin rotary class schedules, moving from one classroom to another for different subjects. Once rotary class schedules begin, the sound field HAT systems are no longer practical. Second, given our accountability to the ministry-funded SEA, we must ensure that the HAT benefits the individual student for whom it is purchased and that the HAT will be used consistently. Personal HAT places a shared responsibility on both teacher and student; the onus placed on the student is informative in confirming benefit and compliance with HAT. Third, we noted that ASHA (2005a) specifically recommends personal HAT because of its documented improvement of signal-to-noise ratio, benefits of which were recently confirmed in a study of personal HAT for children with APD (Johnston et al., 2009).

The TVDSB APD protocol has set out certain criteria that must be met in order for HAT to be pursued for a student with auditory processing challenges. Initially, a student must be identified as struggling in some way that is affecting his/her academic performance. This identification is most commonly instigated by classroom teacher(s) or parent(s) and leads to the formation of the program development team (PDT) and a formal assessment. Auditory processing assessment results suggesting APD must be based on a recent (within one year) formal assessment by a clinical audiologist registered for practice in Ontario. Also, the APD assessment must be completed on a child over the age of 7 years in order for the APD committee to consider provision of HAT (Beck, 2002; Leibold, Yarnell Bonino, & Fleenor, 2007; Pinheiro & Musiek, 1985; Whitelaw & Yuskow, 2006). At the time of the APD assessment, peripheral hearing sensitivity must be documented as normal bilaterally. Note that the TVDSB has a different, simplified procedure for providing amplification for students with peripheral hearing loss as quickly as possible; these students proceed through a different set of steps led by the school's itinerant hearing resource teacher (a teacher of the Deaf and Hard of Hearing). The results and recommendations regarding the APD must indicate the need for accommodations and/or modifications to the student's classroom environment and/or program. Furthermore, regular monitoring of the APD by the clinical audiologist is recommended on an annual basis or as indicated by the clinical audiologist.

The TVDSB APD protocol further specifies that the primary needs of the student must not be the direct result of an *unmanaged* attention deficit/disorder, speech or language delays or impairments, general cognitive functioning deficits, social/emotional difficulties, motor skill difficulties, reading disabilities, learning disabilities, cultural differences, peripheral hearing loss, or behavior disorders. If the PDT has not yet ruled out or identified co-morbidities, they will be identified through the required assessments of the APD protocol. This criterion does *not* preclude students with co-morbidities from receiving HAT support. Rather, if there are concerns in other domains, these concerns must be investigated and addressed in addition to the APD. This requirement ensures that the identification of APD is based on assessments by multiple professionals, that the management of APD does not preclude management of other deficits or disorders, and that provision of HAT is not applied as a "one size fits all" solution (but rather as a student/patient-centered intervention when appropriate).

The TVDSB APD protocol invites information derived from school-based assessments, teacher observations and reports, and parent reports. These data are considered in light of the formal health professional assessment data available to the committee. School-based interventions, supports, and strategies must also be in place when the student has an identified need and when parents wish for their child to receive such intervention. Possible interventions include involvement of the school speech-language pathologist, support through literacy programs, and classroom accommodations and modifications. These interventions are often documented on the Individual Education Plan (IEP). The IEP in the Ontario context is an accountability tool, identifying a student's specific learning expectations and the school's plans to address these expectations through accommodations, modifications, alternative programs, and specific instruction and assessment strategies (Ontario Ministry of Education, 2004). IEPs are mandatory when a student receives any equipment funded by SEA.

Procedures

The Learning Support Teacher (LST) and educational audiologist share the leadership role in the implementation of the APD protocol; the LST co-ordinates activities at the school level with system support staff and the student's caregivers, and the educational audiologist co-ordinates activities at a system level and with community health professionals. If parental consent and desire to proceed has been documented, the following steps proceed with leadership by the school's LST. See Figure 1 for a summary of the steps that are described next. See Appendix A for the checklist of steps that is included in the TVDSB APD protocol for completion by the LST.

Program development team meeting. First, a PDT meeting is called, at which professionals and parents discuss the student's existing assessment results, parental and teacher concerns, and the student's presenting needs. At this meeting, the PDT also discusses strategies that have been attempted to date to support the students' needs. The educational audiologist and LST facilitate this meeting and help the team reach a decision regarding whether or not the APD protocol is the appropriate path to pursue. If it is, then the series of assessments begins, with the LST, speech-language pathologist, psychologist/psychometrist (if indicated), and classroom teacher conducting appropriate assessments as follows.

Assessment. The LST administers the Woodcock-Johnson Tests of Achievement III (WJ-III; Woodcock, McGrew, & Mather, 2001) . The speech-language pathologist conducts a comprehensive speech and language assessment. The psychologist will be consulted to determine if psycho-educational testing is required based on results of the WJ-III, the speech-language pathologist's assessment report, academic achievement, and anecdotal reports. If assessment is warranted according to the psychologist, a psychometrist completes the assessment. The classroom teacher must complete the Children's Auditory Performance Scale (CHAPS: Smoski, Brunt, & Tannahill, 1998). Finally, the LST and classroom teacher rank order a list of behavioral symptoms (see Appendix A) that can help differentiate between attention and auditory concerns (Chermak, Somers, & Seikel, 1998). Furthermore, if there is any

observed medical concern, assessments from appropriate medical professionals are recommended to the parents. Once the above assessment data are gathered, the LST submits the package and the student's most recent report card, IEP if applicable, and the checklist in Appendix A to the APD committee for review.

Review. As mentioned previously, the APD committee is comprised of five TVDSB staff members from speech-language pathology (1), audiology (1), psychology (1) and special education (2). The APD committee meets once monthly, at predetermined meeting dates. The committee reviews every file submitted, with

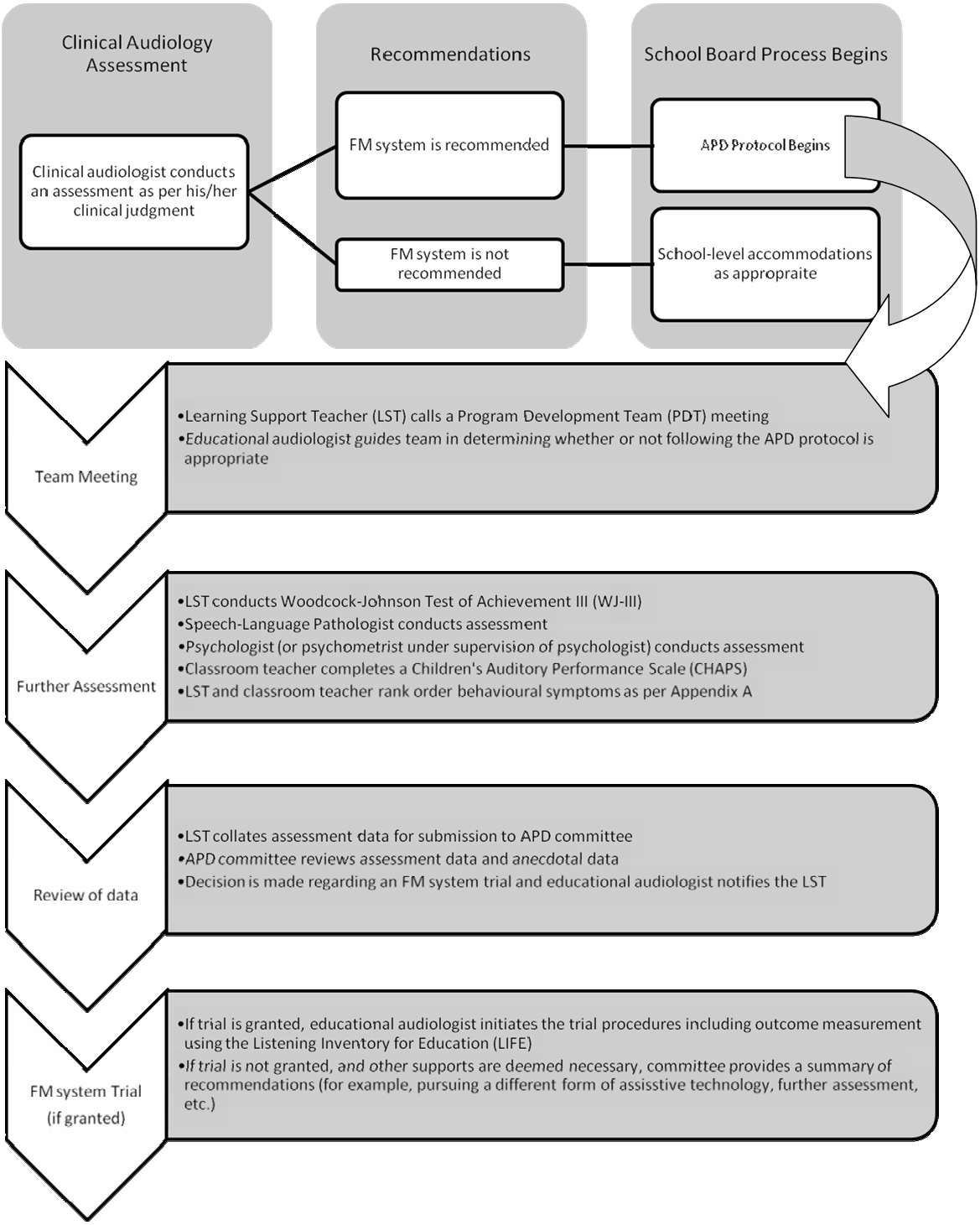

Figure 1. **Procedures of the Thames Valley District School Board's Auditory Processing Disorder Protocol .**

consideration and decision-making taking place as follows.

First, the committee checks that all criteria have been met as outlined above. Second, the committee considers whether or not HAT would be an appropriate form of support for each student. At times, HAT may be contraindicated. For example, we have had cases of students who required personal HAT due to a rotary class schedule, but who were unable or unwilling to use a personal system due to sensory issues relating to an autism spectrum disorder, or due to low self-esteem. Third, the committee seeks to determine if the HAT might be beneficial to the student in terms of improving access to the curriculum or improving academic performance (or both). To determine this point, the committee looks for gaps between assessed ability and academic performance. For example, if a student is assessed as having average cognitive ability and is achieving above average grades without accommodations, then this student would not be prioritized to receive HAT. However, if a student is assessed as having greater ability than he/she demonstrates in classroom performance, HAT might be a consideration to help bridge this gap.

In cases of multiple exceptionalities, the committee also considers other factors, such as whether or not the primary need (for example, attention deficit hyperactivity disorder) has been addressed appropriately in accordance with best practices and parental values. If so, and if the student continues to struggle to follow oral instruction and demonstrates gaps between ability and performance, then HAT may be warranted even if the APD appears to be co-morbid with other deficits or disorders (Updike, 2006).

In rare cases, the results of the APD protocol assessment battery have demonstrated eligibility for intensive support placements that would otherwise not have been identified, or identified at a later date. In these cases, the PDT is referred to procedures for application to these alternative class placements. These cases highlight the importance of the APD protocol or other similar interprofessional approaches to identifying and managing APD. Without a comprehensive assessment beyond the auditory domain, it is possible to misidentify a student with APD or to overlook primary needs.

Generally, students will be denied a trial of HAT if (1) they are performing commensurately with their assessed abilities, (2) it appears that APD, HAT, or both are low on a long list of needs that require attention in priority sequence, (3) if the assessment results as a whole (across professions) do not support the identification of an APD, or (4) if there are contraindicating factors, such as sensory challenges associated with an autism spectrum disorder (Whitelaw, 2003). In the case that a student is *not* given a HAT trial, the committee provides the school team with the rationale for the decision and specific recommendations for next steps. These steps may include further assessments, implementation of existing recommendations, or accessing other appropriate school supports. Program Development Teams may also decide to reapply for HAT in the future if other factors are resolved making HAT an appropriate option.

In summary, the outcome of the APD committee meetings can be one of four decisions: (1) no HAT trial because student is achieving appropriately or overachieving based on assessed abilities, (2) gather further information (e.g. assessment for autism spectrum disorder due to reported symptoms), (3) manage other concerns first, or (4) a trial with a HAT system. Recommendations for next steps are provided in cases of all four types of outcomes.

Hearing Assistance Technology Trials

To date, the TVDSB APD committee has reviewed 65 cases and has approved 35 HAT trials. Sixteen of the 35 approved trials have been successful (note that seven of these trials are ongoing at the time of this report). Success of a trial is determined based on the combined results of an outcome measure completed by both the student and the classroom teacher, and anecdotal evidence gathered from discussions with the LST, classroom teacher, parent/guardian(s), and student. Trials proceed for a minimum of three months up to a maximum of six months.

The educational audiologist monitors trials as follows. First, the educational audiologist convenes with the LST, classroom teacher, parents, and student to determine the most appropriate type of HAT (i.e. personal with body-worn receiver and earbuds, personal with wireless receivers, sound field, sound field with pass-around microphone). Students are allowed to select the color of their system when applicable. A trial of the system is ordered, and the educational audiologist visits the student's classroom to set up the system, fit the system if necessary, verify output levels, and show the teacher(s) and student how to use and care for the system.

Fitting and verification. For personal HAT, listening checks are conducted for each system and the educational audiologist works with the student to informally determine a comfortable listening level for the system. Electroacoustic verification using a hearing aid test system is conducted for the first of any type of HAT being used by TVDSB in order to confirm that the HAT does not exceed maximum output levels (as listed in product specifications). This measure is conducted to ensure that narrowband predicted upper limits of comfort (ULC) for normal hearing thresholds are not exceeded (Scollie et al., 2005). For example, for systems using occluding earbuds, the earbud is coupled to the 2-cc coupler and verification of various input levels, including a maximum power output test, is conducted to ensure that speech signals and maximum output levels are appropriate and safe. This approach is inferred from the evidence for pediatric hearing aid fittings (Scollie et al., 2005); evidence for fitting personal HAT on children with

normal hearing is an area of need in our profession. A listening check is performed before fitting an individual HAT system on any child, and fine-tuning or volume adjustments are made based on the student's feedback.

For sound field HAT, the educational audiologist adjusts the system to a level such that the teacher's voice is noticeably and comfortably amplified across all areas of the classroom in which students are seated, without producing any perceptible distortion, reverberation, or discomfort. Sound- level and reverberation-time measurements are not conducted and this is a known weakness; the recent introduction of dynamic sound field amplification systems that adjust output levels based on measured noise levels may warrant consideration in the near future. Note that although listening checks are conducted at the time of fitting or setup, we cannot do much to prevent manipulation of levels by teachers and students beyond providing education.

Counseling, education, and observation. The educational audiologist is available for consultation throughout the trial, responding to any requests from the teacher or student regarding problems or questions. An important consideration is the student's (in cases of personal HAT) and teacher's compliance with use of the system. Compliance is assessed based on student, parent, and teacher report. In addition, informal observation by the LST is conducted. If use of the system is irregular, the educational audiologist will make contact with the student and teacher to determine reasons for lack of use and will address the problems on a case-by-case basis. For example, in cases in which the HAT was in use - but the teacher was often wearing a boom microphone around his/her neck instead of on his/her head - counseling and education are reinforced. Trials can be continued an additional three months with continued and closer monitoring, if necessary.

The education of the classroom teacher and counseling of the student for appropriate HAT use and realistic expectations is crucial to the trial. If the system is not used properly or consistently, the trial is not valid; thus, the LST is relied upon to perform regular check-ins with the classroom, reporting back any concerns to the educational audiologist. Furthermore, these initial discussions allow an opportunity for the teacher or student to disclose any potential factors that may impact the trial, such as a teacher's aversion to wearing the system or a student's sensitivity to sound. Thus, in addition to the formal completion of the outcome measures, the conversations between educational audiologist, LST, classroom teacher, student, and parent(s) weigh heavily into the decision to purchase the HAT or not.

Outcome measurement. Just prior to the trial onset, the educational audiologist or LST administers the pre-trial Listening Inventory for Education to the student (LIFE; Anderson & Smaldino, 1998). The LIFE has been recommended as an outcome measure for HAT benefit and is useful in this context because it allows for measurement of benefit from both student and teacher perspectives (Johnston et al., 2009).

Following the three-month minimum trial period, the classroom teacher completes the post-trial LIFE and the educational audiologist or LST administers a post-trial LIFE to the student. Scores are compared to determine if there was an improvement from pre-trial to post-trial scores. Again, these scores alone are not the determinate of a trial's success, and thus we do not have a set criterion for improvement. We require some improvement in LIFE scores coupled with reports of benefit. In cases of benefit indicated by the LIFE and anecdotal report, the HAT is purchased. In cases where both LIFE results and anecdotal evidence suggest no benefit, the trial is discontinued. In cases where there is contradiction between the LIFE results and anecdotal evidence, we extend the trial by another three months. If the HAT then continues to be used for and by the student, this supports the belief that there is some benefit associated with its use, and the HAT can be purchased. Even when a HAT system's benefit is supported by both LIFE and anecdotal reports, the trial may continue for an additional three months to ensure its continued use before purchasing the HAT.

Summary of trial period process. In summary, LIFE scores, student, parent, and teacher anecdotal reports are considered in determining whether or not a HAT system should (1) be purchased, (2) be continued for another three months, or (3) be discontinued. In cases of a continued trial, the HAT system is purchased as long as HAT use continues regularly for the remaining three months (based on LST observation). If lack of teacher compliance is considered a confounding factor, the HAT system can still be purchased for the student if it is documented that the student does benefit, based on the student version of the LIFE and student self-report. To discontinue a HAT trial, all sources of information must indicate no benefit from the HAT. That is, anecdotal reports from all parties, observations of the LST, and the results of the LIFE must all indicate a lack of benefit in order for a trial to be discontinued at the three-month point. If any one of these information sources suggests benefit, the trial must be continued for three more months. The LIFE is not re-administered during this additional three-month period. The main factor considered in this extended trial period is the continued use of the system.

In order to illustrate the application of this protocol, two case examples will be described below. Specific details (e.g. names, dates) have been omitted to avoid revealing the identity of the professionals and students described. Note that clinical assessments are conducted by different professionals, and in some domains, there is no standard test battery to use across cases; thus, specific tests used may differ across cases. For the auditory processing assessments, all test results provided by the clinical

audiologist are outlined. The TVDSB APD committee interprets the results that are provided by community professionals, but cannot dictate what community professionals do. Variation across clinics is a reality that is managed through the interprofessional protocol's broadly scoping review of assessment data. Also, recall that the TVDSB's educational audiologists do not conduct clinical audiology assessments, in part due to the limited amount of time and resources available for such activities, but more-so due to the shared role of the clinical and educational audiologist in this district. The educational audiologist's role in TVDSB is primarily to help schools and families navigate the intersection of the clinical healthcare system and the public education system through educating, liaising, and consulting. HAT verification and outcome measurement is, however, a part of the TVDSB educational audiologist's responsibilities.

Case Examples

Case One

Case One is a male, grade four student. Case One was assessed by a clinical audiologist (normal hearing bilaterally) using the SCAN-C (Keith, 2000) and the Staggered Spondaic Word (SSW) test (Katz, 1962). Results indicated borderline normal performance on the Competing Sentences subtest of the SCAN-C, with an overall composite score in the normal range. However, results on the SSW indicated significant difficulties with tolerance/fading memory, organization, and decoding. Case One's report card showed that he was achieving Cs across subjects. Teachers and parents reported no concerns with attention or behavior. Results of the WJ-III ranged from average to high-average scores across all sub-tests. The speech-language pathologist's assessment indicated no concerns with speech and all language abilities fell in the average to high-average range.

Anecdotally, all teachers involved in the education of this student remarked that Case One put forth considerable effort and was not hyperactive or fidgety, but seemed to struggle to follow along with oral instruction or class discussion, especially when there were sources of auditory distraction. The APD committee concluded that Case One demonstrated some high average abilities on the WJ-III and speech and language assessment, yet achieved only average grades across subjects. Furthermore, Case One demonstrated difficulties with auditory processing as indicated by results of the SSW. Anecdotal evidence supported the potential benefit from HAT.

The APD committee thus decided to trial a sound field HAT, including a pass-around microphone for student participation. Results of the LIFE and discussions with teachers and Case One indicated that the HAT was benefitting Case One. Thus, once the trial period was complete, the HAT was purchased for this student. The classroom teacher and Case One reported that Case One is now more successfully attending to lessons and finds it less onerous to attend to oral instruction and class discussion.

Case Two

Case Two is a male, grade three student. Non-audiology case history will be presented first in this case, due to its impact on the audiologic considerations. Case Two has been diagnosed with Attention Deficit Hyperactivity Disorder for which he is medically treated. Case Two also has diagnoses of Obsessive Compulsive Disorder and an anxiety disorder. Case Two was seeing a speech-language pathologist for therapy for a severe articulation disorder, disordered receptive and expressive language, and disordered phonological awareness. Case Two was seeing an attendance counsellor for significant concerns regarding truancy.

In terms of audiologic assessment, Case Two had normal hearing bilaterally, acoustic reflexes present at 1000 Hz, normal performance on the Competing Sentences subtest of the SCAN-C, and borderline normal results on the other subtests (Auditory Figure-Ground, Competing Words, and Filtered Words). The clinical audiologist noted that scoring the SCAN-C was challenging, due to the lack of intelligibility of Case Two's speech. The clinical audiologist recommended HAT for this student.

The APD committee decided not to trial a HAT. The committee's rationale was that Case Two's challenges did not appear to be the result of APD primarily; many other services and supports needed to be prioritized and ultimately he did not present as a top candidate for provision of HAT. The committee recommended continued implementation of specific recommendations from the psychologist, medical professionals, and speech-language pathologist in addition to the non-technological recommendations from the audiologist (e.g. preferential seating). Note that the APD committee acknowledges that in an ideal situation of *un*limited resources, HAT may indeed have been provided to this student, but such is not reality. The protocol is in place to provide HATs to students with the most potential to benefit, and to provide appropriate recommendations otherwise.

Case Two's father questioned the decision, stating that in addition to the audiologist's recommendation, his son's physician had also supported the HAT recommendation. The educational audiologist addressed the parent's concerns by following up on the case further, including (1) performing an in-class observation, (2) consulting with the pediatrician and psychiatrist involved in Case Two's care, (3) consulting with Case Two's clinical audiologist and school and community speech-language pathologists, and (4) discussing Case Two further with school staff. The in-class observation revealed that Case Two had a high level of educational assistant support; he was taken to a quiet place for one-on-one re-instruction after the teacher taught a lesson, and for individual support with his seatwork. The classrooms in the school were

small with no obvious sources of distracting noise (such as traffic or ventilation noise). Also, the classroom was outfitted with tennis balls on the feet of chairs and acoustic ceiling tiles to reduce reverberation. Case Two was seated optimally in the classroom, away from the door/hallway and within three feet in front of his teacher during verbal instruction.

The physicians involved in Case Two's care indicated that they had supported the HAT recommendation solely based on reading the recommendation in the audiology report, but that they felt the primary concerns related to attention, anxiety, and speech articulation. Conversations with the clinical audiologist who made the HAT recommendation confirmed that assessment results were of low reliability given the intelligibility difficulties (hence her cautionary note in Case Two's audiology report); the clinical audiologist agreed that HAT was a low priority relative to the student's other needs. School staff further supported these statements by presenting Case Two's attendance record, which indicated that he was only attending classes on about 50% of school days. On days that Case Two did attend, he spent much of the time in the hallway or principal's office as a result of his anxiety disorder.

The educational audiologist's follow-up actions confirmed the committee's original decision; therefore, a detailed follow-up report was provided to the school and family. The report included the findings outlined above, including further recommendations from the professionals consulted. For example, it was recommended that the speech-language pathologist train Case Two's educational assistant to be able to use daily speech/language strategies and a software program focusing on phonological awareness, in order to provide more intensive and consistent support in this primary area of need. The following recommendations were further emphasized: continue to provide preferential seating, update the student's IEP based on some of the APD committee's recommendations for refinement, continue to work on student's attendance (through attendance counselling), and continue medical management of the medically indicated exceptionalities.

Further Refinement

In 2009, the APD protocol was formally adapted based on feedback generated from the two preceding years of implementation. The following three changes were made to the protocol. First, wording regarding invitation of the educational audiologist to the initial PDT meeting was strengthened, because some schools were submitting their files to the committee without having consulted the educational audiologist. This change was considered important because there are contextual factors that are sometimes difficult to ascertain without direct interaction with the LST and PDT. The educational audiologist's direct involvement provides the APD committee a better understanding of the individual student's unique situation and allows the educational audiologist to facilitate the LST's efforts to navigate the protocol and counsel the parents. Second, wording of the clause on primary needs and multiple exceptionalities was weakened. In the original protocol, this clause stated that a student must not have other exceptionalities or non-auditory factors as his/her *primary* need(s). This clause has been modified to state that a student must not have another *unmanaged* exceptionality as his/her primary need. The APD committee had observed that some schools were interpreting the previous wording to mean that they should not submit to the committee if a child had any co-morbidities and felt that this was misrepresentative of the philosophy of the TVDSB APD protocol. Third, trials for HATs will now typically take place with *personal* HAT systems as opposed to *sound field* HAT systems, which were more commonly trialed in the first two years of the protocol. This change reflects a need to assess benefit to the individual student and not benefit to the teacher or classroom. It was observed that teachers would be more likely and better able to objectively assess benefit for the individual student rather than for the entire class with trials of personal HATs. Following a successful trial, a sound field HAT system may indeed be purchased instead of the personal system, if deemed more appropriate for the student, teacher, and class. Although it would be ideal to provide a sound field HAT for every classroom regardless of APD, the committee is accountable to budgets and resource allocation and must make best use of available funds and resources. Unfortunately, we do not currently have the resources to retrofit thousands of existing classrooms with sound field HAT nor the authority to mandate all future classrooms be fitted with sound field HAT.

Discussion

Implementation Challenges

The implementation of the TVDSB APD protocol has not been without challenges. LSTs are already burdened with many responsibilities, as they are responsible for essentially managing all cases of special education needs within the school. The protocol can be interpreted by some LSTs as placing yet an additional onus on them. Some parents/caregivers do not agree with the school board's internal mechanism to filter HAT recommendations because they perceive the community clinical professional's recommendation as the authoritative directive. However, in attending PDT meetings, the educational audiologist has found that parents tend to come to an understanding that APD is best identified and managed interprofessionally. Although parents seemed more accepting when the process to acquire HAT for children with APD was based on a "first-come, first-served" philosophy (which did not put a committee in place to filter clinical audiologists' recommendations), this former approach meant that some children would virtually never be considered for a HAT because they were

behind over 200 other children on a waiting list. We strongly believe that the former approach was a disservice to children since many could have been served by a variety of supports other than HAT, but they would remain unmanaged while waiting for HAT. The current protocol does not aim to impose the TVDSB's judgements on clinical audiologist's recommendations. Rather, it ensures that every student with suspected APD is thoroughly and individually managed and that SEA is responsibly allocated. HAT is not a universal solution for APD or other learning and behaviour challenges, and the current protocol ensures that we do not treat it as a blanket intervention. The clinical audiologist's recommendation for HAT for children with suspected APD serves as an impetus for the school team to investigate further. Thus, the educational audiologist serves as the necessary bridge between the healthcare system and the education system, and further serves as the link between the school teams and the APD committee.

Bridging this healthcare-education gap can be challenging, especially in an area such as APD (for which the clinical community possesses a variety of perspectives). An initial letter in the 2006-2007 school-year and a follow-up newsletter in 2009 were disseminated throughout the TVDSB community of clinicians. An update for clinicians including a list of frequently asked questions will be distributed in early 2011. These communications are intended to inform the community clinicians about the TVDSB APD protocol and explicitly invites feedback and interaction. Face-to-face meetings have also been initiated with the audiology clinics that conduct the most APD assessments. Informal feedback from local clinicians is mixed; many speech-language pathologists support the protocol and its interprofessional stance, while many audiologists disagree with TVDSB's stance that audiologist's recommendations must be considered in light of other assessment data. A significant challenge exists in balancing what audiologists may perceive to be the best practices for children with APD with the realities and complexities of the systems in which we educate children.

One of the strengths of the TVDSB APD protocol is that it manages this "grey zone" of practice by making use of available best practice recommendations (e.g. ASHA, 2005a) while exercising the philosophy of client-centeredness. The TVDSB protocol does not require us to strictly adhere to static rules. Such a philosophy would preclude support for certain students who are appropriate candidates because a static protocol may not be current with regard to the latest available evidence. We acknowledge that the protocol might not be necessary if strong diagnostic criteria existed for APD, or if there were clear evidence-based indicators for the type of intervention or support that would be appropriate for specific profiles of children with APD.

Next Steps

The TVDSB APD protocol is far from perfect or absolute. However, a comprehensive approach to identification and management of children with APD within the TVDSB is surely a better alternative to the former waiting list system. It may be perceived as preferable to the approach some school boards have chosen, which is to limit provision of HATs to children with peripheral hearing loss exclusively. The protocol continues to evolve as new research evidence and technologies emerge, and perhaps as board resources change. The APD committee plans to continue to gather the data from its submissions to continually improve its practices. The data can be analyzed in an attempt to detect any patterns regarding best candidates for HATs, success rates of HAT trials, and academic outcomes for students with and without the HATs (Garfinkel, 2003). Again, challenges exist in reaching this goal given the variability in practices across health professionals. Perhaps as the provincial or national regulations, guidelines, or standards for auditory processing disorders are published, consistency across clinics will enable a more standardized approach to assessing and monitoring auditory processing challenges

Acknowledgements

We would like to thank past and present members of the APD committee for their efforts in implementing the APD protocol: Andrea Leatham, Cathy Young, Linda Radford, and Mary Kay Horton. We would also like to thank the speech-language pathologists, psychologists, psychometrists, classroom teachers, principals, and learning support teachers that participate in administering this protocol. We also acknowledge the work of the itinerant teachers of the Deaf and Hard of Hearing, our local community clinicians, and other system staff for being a part of the broader team. Last, but not least, we are grateful to the students and their families who make our work worthwhile.

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Appendix A

Date: _____

Auditory Processing Disorder School Checklist

Name of Student: _____ Grade: _____ D.O.B. _____

L.S.T. _____ Name of Teacher: _____

Date of last PDT meeting: _____ Date of most current IEP report: _____

Submit copy of team minutes ☐ Submit copy ☐ (If applicable)

Please complete the following:	**Attachments (as required)**
Student struggling academically	☐ i) submit copy of most recent report card ii) submit current DRA level _____
Student demonstrates normal hearing in both ears	☐
Student is at least 7 years of age	☐
Student demonstrates average non-verbal abilities	☐
C.H.A.P.S. questionnaire complete (submit report)	☐_____
SLP Assessment	☐_____
Academic Assessment (submit WJ-III report)	☐_____
Other disciplines involved:	
Medical (e.g. ADHD, developmental delay)	☐
Is the student on medication? (specify)	☐ _____
ESL	☐
Psychological assessment (if yes, include all reports)	☐_____
Other (specify)	☐_____
Behavioural concerns - specify	
attention	☐
social, emotional	☐
oppositional	☐
anxious	☐
other (specify)	☐_____
Motor abilities	
Gross motor	☐
Fine motor	☐

APD or CAP testing accessible on record (submit report) ☐ Date of Assessment: _____

Please rank these behavioural symptoms if applicable (where is the most problematic behaviour). Do not include a ranking if the student does not have difficulty in this area. (Rank top 10 concerns with 1 being most severe)

____	inattentive	____	distracted	____	hyperactive
____	fidgety or restless	____	hasty or impulsive	____	interrupts or intrudes
____	difficulty hearing in background noise	____	difficulty following oral instructions	____	poor listening skills
				____	academic difficulties
____	word retrieval problems	____	delayed responses; uses fillers	____	frequently answers “I don’t know”or “I forgot”
____	repeats or rehearses comments	____	incomplete sentences		

L.S.T Signature: _____ Principal Signature: _____

INCLUDE SUPPORT SERVICES REFERRAL FORM