COMPANION DOCUMENT

Delivering Assistive Listening Technology to K-12 Students with Cochlear Implants

BACKGROUND

This document is a companion document to the Regional Agreements for delivering Assistive Listening Technology to School-Aged Children and Youth, signed off in June 2010. The original Agreements dealt with providing, fitting and supporting Assistive Listening Technology (typically referred to as FM) for students with hearing aids. The area involving fitting FM to students with cochlear implants was not included in the original document and is addressed in this companion document.

Fitting and supporting students with cochlear implants is a specific area of expertise of audiology; the competencies and experience are not held by all audiologists. Within British Columbia, the Cochlear Implant Team of the BC Children's Hospital (herein referred to as BCCH-CI) is considered to be the expert in audiological and equipment issues for paediatric cochlear implants. However, there are students with cochlear implants throughout the province where audiology services are also provided by public health audiologists in the Regional Health Authorities. Collaboration between BCCH-CI, the public health audiologists of the Regional Health Authorities, school district personnel, and the Provincial Resource Program-Auditory Outreach (herein referred to as PRP-AO) is critical for effective service delivery. Inherent within this collaboration is the recognition that families need seamless support. All key personnel need to be kept informed of service plans and delivery for students within the school district, Regional Health Authority and BCCH-CI caseload.

The original Agreements were between school districts, health regions and PRP-AO. BCCH-CI was not included at that time. Within the past several years, the number of students with cochlear implants has increased and there is even more recognition of the importance of FM equipment for these students. This document lays out the framework for the proposed roles and responsibilities for assessing the need for FM equipment for students, for fitting FM, and for providing support to students who have a cochlear implant and are in the school system. As such, compared to the original Agreements, the Cochlear Implant Team of BCCH-CI is a key player and will determine the necessary guidelines for integrating FM equipment with cochlear implants.

The original Regional Agreements are scheduled to be renegotiated in 2013, at which time BCCH-CI will be a signatory.

TECHNOLOGY DEFINITIONS

The following terms are periodically used within this document when referring to providing FM for students who have cochlear implants.

Fitting: the act of connecting the FM receiver to the cochlear implant sound processor and completing a listening check through designated monitor earphones to ensure there is a signal from the FM transmitter.

Verification: the objective testing of how the FM system is working with the child's cochlear implant equipment to ensure the combined unit is programmed and functioning as intended. Verification should be conducted in a controlled and repeatable environment.

Validation: an assessment of the benefits and limitations of the recommended FM device to ensure the child/youth is receiving optimal input without interference in their classroom environment. Validation is an ongoing process that involves functional outcome measures, questionnaires, and/or regular listening and behavioural checks.

Delivering Assistive Listening Technology to K-12 Students with Cochlear Implants

BCCH-CI, Regional Health Authorities, and school districts agree to accept the following regarding delivering assistive listening technology to students with cochlear implants through the PRP-AO for school-aged children and youth who attend public schools, as well as those attending Group 1 & Group 2 independent schools. *Participating independent schools will follow the same procedures as the public schools within their health region.* The primary purpose of PRP-AO's program is to provide personal FM equipment from existing inventory, with the ultimate goal of improving student's access to education.

A. CONSULTATION

Consultation between staff in BCCH-CI, audiology clinics, school districts and PRP-AO is critical to student success. There is an expectation that the Director responsible for the BCCH-CI team, Public Health manager or designated Lead audiologist responsible for the regional audiology program, and the school district administrator responsible for student services, will establish and maintain a communication process to address current and emerging operational matters regarding assistive listening technology in schools. PRP-AO, as a tertiary service provider to school-aged children and youth, is available for consultation to both BCCH-CI and Public Health clinics, as well as schools districts, regarding the needs of this population.

B. DISPUTE RESOLUTION

In any cooperative endeavour involving multiple ministries, regional health authorities, and local boards of education, issues will inevitably arise. In addressing any issues, the principle of expeditiously resolving them at the lowest (i.e. most local) level possible will be respected. The process for resolving issues between ministries/agencies will, in order, involve:

1. Public Health audiology clinic staff, BCCH-CI audiologist, local school district staff and PRP-AO staff,
2. BCCH-CI Clinical Coordinator or Professional Practice Leader, the Public Health manager or designated Lead audiologist responsible for audiology services, the school district administrator responsible for student services and the PRP-AO manager,
3. The BCCH-CI Program Manager, the Public Health Director responsible for audiology services, the Superintendent of the local school district and the Superintendent of the PRP-AO host district.

Rarely will issues need to be raised beyond the third level mentioned above, but, where this occurs, the concern will be forwarded to the appropriate ministries and/or agency (BCCH-PHSA) for resolution.

C. KEY ACTIVITIES

Delivering assistive listening technology services to students with cochlear implants requires a coordinated inter-ministerial approach. The direct delivery of educational services and resources required for those services, as specified in the *School Act*, is the responsibility of the local boards of education funded by the Ministry of Education.

Delivery standards for the health authorities and the local boards of education under agreement(s) with the Ministry of Education are provided in the Protocol in the section entitled *Obligations of Each Ministry*.

The various activities deemed necessary for providing assistive listening technology (FM) for students with cochlear implants are outlined below:

Step 1: Child Readiness and Sound Booth Verification

The BCCH-CI Team audiology clinic will:

- Determine student readiness for each individual ear and make recommendations for personal assistive devices,
- Consult with school district staff, PRP-AO audiologists and/or public health audiologists regarding the benefit of assistive listening technology (personal FM),
- Work collaboratively with the PRP-AO audiology team to develop evidence-based protocols required for the fitting, verification, validation, and support for FM with CI; including printed resources that will support implementation of the protocols,
- Where there is mutual agreement that personal FM should be used by the student, the BCCH-CI audiologist will determine the most appropriate FM system for the student from a list of equipment available through the PRP-AO,
- Complete sound booth verification at BCCH using the student's personal cochlear implant system and a clinic loaner FM system of the same make and model to that which will be provided, to determine that cochlear implant parameters have been set adequately and the student receives appropriate FM benefit when tested in a controlled environment.

Step 2: Request for Equipment

- The BCCH-CI audiologist will initiate the equipment request following discussion with the Hearing Resource Teacher (HRT) and PRP-AO or public health audiologist and will forward the necessary documentation through the Hearing Resource Teacher to the school administrator responsible for student services in the school district,
- The administrator responsible for student services will complete and sign the Request for Support form, acknowledging financial liability for loss or damage of equipment, and send the completed forms with supporting documentation to the PRP-AO, along with a signed PRP-AO Parent's Consent form,
- The administrator responsible for student services will send a copy of the completed request form to the Health Unit and BCCH-CI,
- The PRP-AO will, on receipt of the completed request form, send the equipment to the PRP-AO audiologist and notify the school district when the equipment was shipped.

Step 3: Initial Fitting and Classroom Validation

- Upon receipt of the equipment, the PRP-AO audiologist will connect the FM system to a cochlear implant processor of the same make and model as the student's and conduct a listening check to ensure the equipment is functioning prior to classroom use,

- The PRP-AO audiologist will contact the designated school district and/or public health clinic to determine support required for validation,
- The PRP-AO audiologist will arrange for delivery of the equipment to a site agreed upon by the school district. Training and/or written material will be provided for individuals working with the student to ensure they are aware of the individual needs of the student. The responsibility of training would be assumed by the PRP-AO in consultation with the Hearing Resource Teacher,
- Upon delivery of equipment to the school, the Hearing Resource Teacher or the PRP-AO audiologist, will complete a listening check and walk through the student's classroom and school environments to determine a clear and consistent interference-free FM signal. Based on the outcome of this activity, modifications to channel selections or classroom environments may be needed,
- A functional evaluation of the student's FM system coupled to his/her CI system should be completed in a timely manner to determine the student receives appropriate benefit using their CI and FM system within their school environment.

Step 4: Monitoring

- The designated school professional (e.g. Hearing Resource Teacher, learning assistance teacher, student assistant) will assess the benefit of the equipment for the student on a regular, frequent and on-going basis.

Step 5: Administration and On-going Equipment Maintenance

- When the student has been fitted with assistive listening technology (FM system), a designated individual in the school district will: *(Please note that the school district designated individual is usually the Hearing Resource Teacher.)*
    a. Ensure the administrator of the school is aware the student is in receipt of an FM system,
    b. Inform the classroom teacher(s) and other staff about how the FM system works and potential problems that might occur,
    c. Ensure security measures are in place to protect the FM equipment,
    d. Have an individual selected by the school administrator who will be responsible for on-going maintenance and equipment checks.
- When the Hearing Resource Teacher determines FM equipment is in need of repair, the equipment will be shipped to the PRP-AO. Neither clinics, nor school district staff, will engage in equipment repairs, as it may void equipment warranties.
- When FM equipment is no longer required by the student, the equipment will be shipped to the PRP-AO for reissue as soon as possible.

D. INFORMATION SHARING

Information sharing between BCCH-CI, boards of education, public health authorities and the PRP-AO, will be in accordance with the *School Act* and *Freedom of Information and Protection of Privacy* legislation. To facilitate information sharing, BCCH–CI and public health clinics will, at the student's first visit to the clinic, seek parent/guardian signed consent to share audiological assessment and evaluation information with both the school district and the PRP-AO.

Sound Booth Verification of FM on Cochlear Implants

FM READINESS GUIDELINES

The following conditions should be met when considering FM readiness for school aged children with cochlear implants. FM use for students with additional needs and those that do not meet the criteria below will be considered on an individual basis:

- Student's listening or language skills should be reliable and consistent in order to identify and report problems with the quality of the FM signal.*
- The student has had at least three to six months of consistent CI use and has stable maps; or for more experienced CI users, the child has been mapped at least within the last year.
- The student has open set speech recognition abilities as measured by the cochlear implant audiologist; those whom cannot complete open set speech recognition tasks will be considered on an individual basis.
- The student is able to participate in and complete sound booth verification to determine that the cochlear implant and FM system are functioning appropriately together in a controlled environment.
- A qualified and trained individual is present at the school that can do a daily listening check and troubleshoot the CI + FM.
- The BCCH-CI audiologist, public health audiologist (if involved in the process), Hearing Resource Teacher, and PRP-AO have communicated about FM use.

* If a student is not able to report interference or problems with the equipment, an alternative to a personal FM system is recommended. Adult users have reported interference with FM systems when on some channels. This interference was resolved after trying several channels (Wolfe and Schafer, 2008). This highlights the importance that the student must have adequate communication skills to report such issues. The user is the one who monitors sound quality continuously and may well detect such problems as intermittent function or a condition that "doesn't sound normal." Indeed, one of the goals of management should be to encourage self-monitoring (ASHA, 2002).

SELECTING FM SYSTEMS

Selecting appropriate FM system includes:

a) Assessing the student's auditory capacity,

b) Considering current auditory and communication function levels,

c) Identifying other factors related to device use.

These assessments may include audiological evaluation, performance observation in student's classroom setting (i.e. classroom), student consultation, or consultation with those who have information regarding the student's performance/communication ability (ASHA, 2002).

FM System Selection Considerations *(ASHA, 2002)*

- Student's ability to report non-functioning FM equipment,
- Student's ability to wear, adjust, and manage the device,
- Support available in educational setting (e.g., in-service to teachers, classmates),
- Acceptance of the FM system by the student,
- Recommended equipment is appropriate for the student's educational environment/setting,
- Compatibility with the student's personal cochlear implant as well as other options for coupling with audio sources,
- Individual CI characteristics and accessories.

Sound Booth Verification

One way to verify the benefit from an FM system is to complete testing in a sound booth. Verification testing in a sound booth should include testing in four conditions:

- Speech recognition testing in quiet without FM,
- Speech recognition testing in quiet with FM,
- Speech recognition testing in noise without FM,
- Speech recognition testing in noise with FM.

***Note**: If the student wears bilateral CI's or CI plus HA, each side should be verified separately and then together (AAA, 2011).*

Recommended Speech Levels

- For each scenario is 50 dBHL (65 dB SPL) to represent the teacher's voice at a distance of 2 meters AAA, 2011).

Recommended Noise Levels

- For each scenario is 50 dBHL (65 dB SPL) to represent the average diffuse background noise levels in a classroom and a 0 signal-to-noise ratio. Appropriate competing noise stimuli would be speech-weighted noise or four-talker babble (AAA, 2011).

Testing should be completed using monitored live voice (MLV) presentation with the tester wearing FM microphone/transmitter at a typical distance (six inches from mouth for lapel/lavalier; one to three inches from mouth for boom or check microphone) (AAA, 2011).

Selected speech recognition materials must have multiple equivalent lists and should be appropriate for the child's developmental and speech/language skills. Generally, open set phrases or sentences are recommended; however, appropriate modifications may be required based on the child's receptive or expressive performance, as well as his or her primary language).

***Note:** Please refer to Appendix A for a list of suggested speech recognition materials.*

Behavioural Verification Steps

Step 1: Speech Recognition Testing in Quiet without FM *(FM attached but turned off)*

- Attach FM receiver to CI sound processor using FM program designated by CI audiologist,
- FM microphone on mute or OFF,
- Student at 0 degrees azimuth facing the speaker presenting speech stimuli,
- Speech presented at 50 dB HL (65 dB SPL) to represent typical level of teacher's voice in classroom setting.

Step 2: Speech Recognition Testing in Quiet with FM *(FM attached and turned on)*

- Activate FM transmitter microphone and turn on FM receiver,
- Student remains in same test position,
- Evaluate speech recognition performance with FM microphone ON or activated.

Step 3: Speech Recognition Testing for CI alone in Noise at 0 SNR *(FM attached but turned off)*

- FM microphone on mute or OFF,
- Student remains at same test position,
- Speech presented at 50 dB HL (65 dB SPL) to represent typical level of teacher's voice in a classroom setting,
- Noise presented from same speaker at 50 dB HL (65 dB SPL) to represent 0 SNR (signal to noise ratio) relationship.

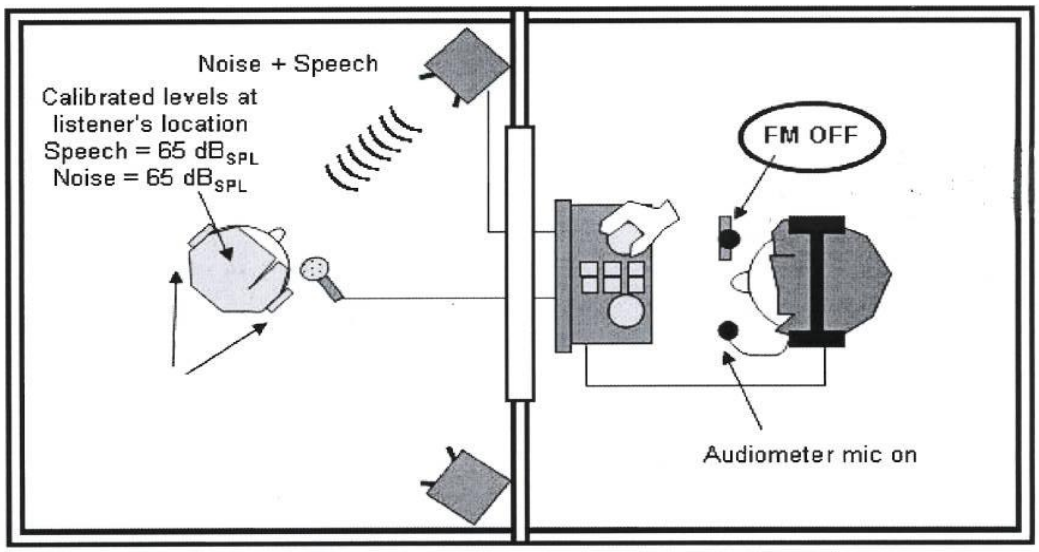
Step 4: Speech Recognition Testing for CI+FM in Noise at 0 SNR *(FM attached and turned on)*

- Activate FM transmitter microphone and turn on FM receiver,
- Student remains in same test position,
- Speech presented at 50 dB HL (65 dB SPL) to represent typical level of teacher's voice in a classroom setting,
- Noise presented from same speaker at 50 dB HL (65 dB SPL) to represent 0 SNR (signal to noise ratio) relationship.

Expected Outcomes

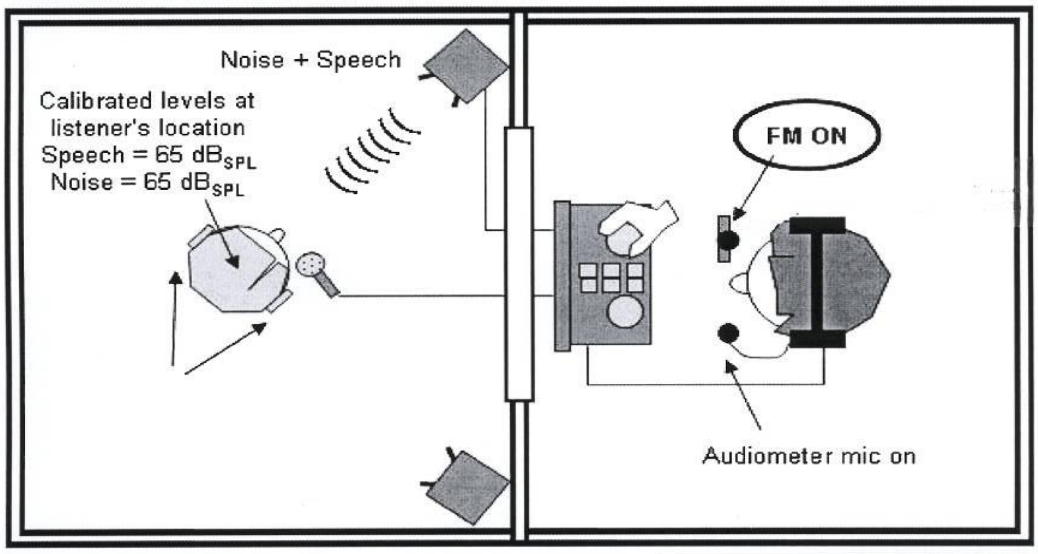
- Speech recognition performance is tested in quiet with and without the FM enabled to confirm the FM system is working properly and there is no decrement of CI performance.
- Ideally, speech recognition testing scores using the FM system in noise should be similar to test scores of CI alone in quiet.
- Speech recognition performance using the FM system in noise should offer a benefit compared to CI alone in noise.

Behavioural Testing via Cochlear Implant Alone



A

Behavioural Testing via Cochlear Implant Plus FM



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(Adapted from American Academy of Audiology. AAA clinical practice guidelines: remote microphone hearing assistance technologies for children and youth birth–21 years. Available at: http://www.audiology.org/resources/documentlibrary/Documents/HATGuideline.pdf. Accessed July 24, 2009.)

Classroom FM System Validation

After the FM equipment has been checked by the PRP-AO audiologists, a classroom validation must be completed to ensure the student receives expected benefit from FM use based on sound booth verification results. Following a successful classroom validation, this session should also include an orientation and training on the proper use and function of the equipment, a plan for usage (part-time/full-time), and suggestions for monitoring procedures**.** *See Appendix B for a sample documentation template.*

Validation Procedure

Validation includes a functional evaluation of the benefit of the processor with FM attached, and a self assessment/observation questionnaire for subjective feedback of their function. Validation ensures that the student is receiving optimal speech input from others and his/her own speech is adequately perceived.

Functional Evaluation

The goal of this functional evaluation is to obtain baseline data (i.e. performance without FM use) and demonstrate achievement with appropriate device fitting. At minimum, the user's speech recognition should be evaluated with FM on and off, in Quiet and in Noise (four conditions all together). This procedure is detailed below. To note, in some circumstances more involved testing, like the Functional Listening Evaluation (Johnson, 2004), may be warranted – use of more involved testing is upon the discretion of the tester.

Environment

Validation of the user's FM equipment should be completed in an environment that reflects the typical listening environment experienced by the user.

Testers

The first validation of the user's new FM equipment should be completed by a designated school professional (such as a PRP-AO audiologist or Hearing Resource Teacher) familiar with the evaluation protocol.

Materials

Speech material should be based on the vocabulary level and language competence of the student. Selected speech material should be similar to the speech that the student typically encounters in the classroom. These materials should have multiple, equivalent lists, sufficient to use for each test condition, and should closely match the length and level of materials that were used during the sound booth verification procedure. Generally, open set phrases or sentences should be used; however, appropriate modifications may be required based on the child's receptive or expressive performance, as well as his or her primary language. At minimum, 10 stimuli should be presented in each condition. Noise should be a multi-talker babble or a recording that simulates classroom noise. A recording of a single voice is insufficient noise.

Note: Please refer to Appendix A for a list of suggested speech recognition materials.

Procedure

Step 1 - INFORMAL BEHAVIOURAL VERIFICATION

- Listening check of user's processor alone, without FM attached. Toggle through the programs and visually check the program indicators. Check the cables for static or intermittency.
- Listening check of user's processor with FM attached and turned on, on the recommended FM program and default volume/sensitivity.
- With the student (each FM receiver evaluated separately)
- Present simple commands in front of the student with lips covered.
- *Confirm reception of local processor microphone*.
    - Turn FM on and place transmitter and microphone far away.
    - Give simple directions behind the student.
- *Confirm reception of FM microphone***.**
    - Stand at a distance away from student
    - Give simple commands with lips covered.

Step 2 - VALIDATION - *(each FM receiver evaluated separately and then together)*

Testing in Quiet

- Evaluate performance of CI only (FM attached but turned off).
- With the tester standing a typical distance, and lips covered, present a target number of speech stimuli. Using a sound pressure level metre, measure the average intensity of the tester's voice at the student's ear level when standing at a typical distance.
- Evaluate performance of CI + FM (FM attached and turned on).
    - Activate FM (ensure the CI is in the correct program and FM mode) and evaluate speech perception in same way as detailed above.

Testing in Noise

- Evaluate performance of CI only (FM attached but turned off).
    - Place the noise source (lap top, speaker system, etc) three feet from the student at a 90 degree angle. Adjust the noise level so that the environment is at a +5 Signal to Noise Ratio (SNR). SNR is the difference in intensity between the signal (tester's voice) and noise (multi-talker babble). For example, if the tester's average voice level at the student's ear is 65 dBA at a typical distance, the noise should be adjusted to be at 60 dBA to create an environment of +5 SNR. Present speech stimuli.
- Evaluate performance of CI + FM (FM attached and turned on).
    - With the same noise, and student and tester positioned the same way, activate the FM and present speech stimuli.

Results

In addition to recording scores obtained per condition, record any observed benefits or detriments with FM use compared to FM turned off. These might include clarity of speech, response time, etc.

- Expected results:
    - For CI alone conditions, the score obtained in quiet should be better than that obtained in noise.
    - In quiet, CI alone and CI + FM conditions should yield similar results.
    - In noise, CI+FM results should be significantly better than results from CI alone.
- Adjustment required:
    - The CI alone in quiet score should be similar to the CI +FM in noise score. If the CI + FM in noise score is unexpectedly poorer than that obtained in the CI alone in quiet condition, FM receiver gain needs to be increased.
    - The CI + FM in quiet score versus the CI + FM in noise score should be similar. If the CI + FM in noise score is unexpectedly poorer than that obtained in the CI + FM in quiet condition, FM receiver gain needs to be increased.

If the above adjustments do not remedy the situation, reconsideration of FM use, in terms of type of equipment, or usage plan, may be warranted. To note, take into account observational benefits of the use of FM for the user, when determining the program for FM use.

Self-Assessments and Observation Questionnaires

A self-assessment or observation questionnaire (depending on age of student) should follow a successful FM validation testing. This provides information on the user's *pre-FM* or *pre-upgrade FM* listening ability and serves as a baseline for FM benefit comparison. One month following consistent FM use, the same questionnaire should be given for comparison. Repeat every four to five months thereafter. Evaluators should be a designated school professional (such as a PRP-AO audiologist or Hearing Resource Teacher). Answers for post FM should be either the *same* or *better* than answers from the pre-FM evaluation.

Examples of Self-Assessments/Observational Questionnaires

Tool		
Self-Assessments	Listening Inventory for Education – Revised - (L.I.F.E.-R Student Appraisal of Listening Difficulty)	Anderson, Smaldino, & Spangler, 2011
	Student's Opinion About Using an FM System	DeConde Johnson, Benson, & Seaton, 1997
Observation Questionnaires	FM Listening Evaluation for Children	Gabbard, 2004
	Screening Instrument for Targeting Educational Risk (SIFTER)	Anderson, 1989

Equipment Orientation and Training

As the CI processor or FM system may be new to the user's teacher, family, or special assistance educator, orientation and training must be provided. Orientation and training topics may include:

- Implications of hearing loss,
- Basic function of processor and FM,
- Appropriate use of FM and features,
- Expectations (benefits and limitations of FM, when to use and when not to use),
- Care and maintenance,
- Basic trouble-shooting and reporting of suspected malfunction,
- Self-monitoring of function,
- Self-advocacy.

Plan for Usage

A written document outlining the plan for usage will help all parties involved be consistent in the appropriate use of the system. The usage plan should include if the student is a:

- Full time user,
- Part time user, only in
    - Specific environments?
    - Specific activities?

Monitoring Procedures

A monitoring plan must be drafted to ensure that the equipment is working optimally to give the student full auditory access. Appropriate equipment to monitor performance must be available. A monitoring plan should include:

- Name and job title of person who will monitor,
- Location of monitoring,
- When and how often monitoring should take place,
- Procedure for monitoring,
- Procedure to follow if device malfunctions.

Troubleshooting and Resources - *(see Appendix C)*

For resources on the FM equipment, please visit:

www.auditoryoutreach.ca, www.phonak.com, www.cochlear.com

In the event that troubleshooting of FM equipment is required, please contact a PR-AO audiologist at 1-866-430-4327.

Appendix A:
Suggested Speech Materials for FM Fitting on CI Students

OPEN-SET SPEECH RECOGNITION MATERIALS

Phrases and Sentences

Common Phrases Test	4-8 yrs	Robbins, Renshaw and Osberger, 1995
BKB-SIN Sentences	5 yr and up	Etymotic Research, 2005
Bamford-Koval-Bench/Standard American English (BKB/SAE) Sentences	8-15 yr.	Bench, Kowal, & Bamford, 1979
HINT-C Sentences	6 yr and up	Nilsson, Soli, & Gelnett, 1996
HINT Sentences	16 yr and up	Nilsson, Soli, & Sullivan, 1994
CID Sentences		Davis & Silverman, 1978

Words

Multisyllabic Lexical Neighbourhood Test (MLNT)	3 yr and up	Kirk, Pisoni, & Osberger, 1995
Lexical Neighbourhood Test (LNT)	4 yr and up	Kirk, Pisoni, & Osberger, 1995
Phonetically Balanced Kindergarten Test – PBK 50	5 yr and up	Haskins, 1949
NU-6	8 yr and up	Tillman & Carhart, 1966

Closed-Set Speech Recognition Materials

NU-CHIPS	3-5 years	Elliott & Katz, 1980
WIPI	5 yr and up	Ross, Lerman, & Cienkowski, 1971

***Note**: The list of speech recognition material in each category is based on a hierarchy from easy to hard.*

Appendix B: Sample FM Validation Template

FM System Classroom Validation

Student Name:		**School:**	
Date of Birth:		**Hearing Teacher:**	
Date of Visit:		**CI Audiologist:**	
Validation Location:		**FM Validation Conducted By:**	

Equipment			**Receiver**	**Transmitter**
FM Default Channel ☐	**Right:**	Type:		
		Serial#:		
	Left:	Type:		
		Serial#:		

Recommended CI Processor Settings for FM Use:				
Right Side	Program		**Left Side**	Program
	Volume			Volume
	Sensitivity			Sensitivity

Informal Behavioural Verification

Listening check CI processor alone	
Listening check FM and CI processor	
Follow instructions using CI alone *(Examiner at about 1 metre from the front of student, lips covered)*	
Follow instructions using CI + FM *(Examiner directly behind the student, and transmitter far away)*	
Follow instructions using CI + FM *(Examiner at a distance, speaking through transmitter microphone, lips covered)*	

Functional Evaluation

Speech Material(s):	
No. of Stimuli Per Condition:	
Noise: Multi-Talker Babble, 3 feet away, Volume Set at:	
Examiner Distance From User:	

Condition		**# Correct**	**% Correct**
Quiet	CI		
	FM + CI		
Noise	CI		
	FM + CI		

Comments:

Orientation and Training

Topics	Completed
Basic function of processor and FM	
Start Up Sequence	
Appropriate use of FM and features	
Expectations (benefits and limitations)	
Care and maintenance	
Troubleshooting	
Self-monitoring of function	
Self-advocacy	
Other:	
Other:	
Other:	

Usage Plan

☐ **Full Time** ☐ **Part Time**

Specific Activities	Specific Environments
☐ Assemblies	☐ Auditorium
☐ Therapy	☐ Outside (Recess, Lunch)
☐ Classroom discussion	☐ Classroom
☐ PE	☐
☐	☐
☐	☐

Monitoring

Monitor's Name & Job Title:	
Monitor Location:	
When & How Often:	
Monitor Method:	
Malfunction Steps:	

Appendix C: FM for CI Troubleshooting Tips

IF:	CHECK:
Static or "hissing noise" as reported by student or from Listening Check	• Ensure same FM channel on transmitter and receiver (may need to "synchronize"). • Pay attention to any real "hissing" in the environment such as air conditioning. • Try a different channel (remember to synchronize the receiver). • Switch off any large electrical appliance to find the source of the interference.
No FM signal via monitor earphones	• Ensure the following insertion sequence: **For N5 processor**: 1) Turn ON processor 2) Insert monitor earphones into processor 3) Insert FM receiver into Euroadaptor 4) Insert Euroadaptor (with receiver) into monitor earphones **For Freedom**: 1) Start with Freedom processor turned off 2) Insert FM battery pack into processor 3) Insert monitor earphones into battery pack 4) Turn ON processor • Was it the auto-power-off feature of the monitor earphones (90 seconds for Freedom earphones)? (try repeating the above sequence) • Was the transmitter charged and turned on? • Transmitter and receiver on same channel? • Was the transmitter microphone muted?
No FM signal as reported by student	• **For N5:** Check the connection between the euroadaptor and the processor's accessory port. Is the euroadaptor fully inserted? Is the FM receiver fully inserted into the euroadaptor? • **For Freedom**: Try pushing the *left* and *right* buttons SIMULTANEOUSLY until you see "EA" on the screen. • Was the transmitter microphone muted? • Check that the processor is on the correct program, volume, and sensitivity for FM use. • Try increasing the FM advantage. • Is the transmitter microphone within 20 cm to the speaker's lips? • Is there enough battery life on the processor and the FM transmitter? o **For N5**: Ensure the *standard* (not compact) rechargeable battery pack is used. o **For Freedom**: Replace ALL three batteries.

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