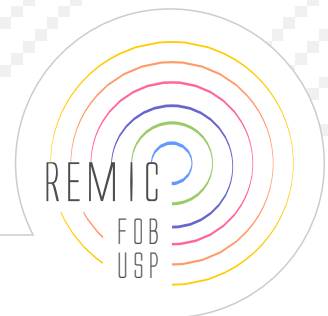
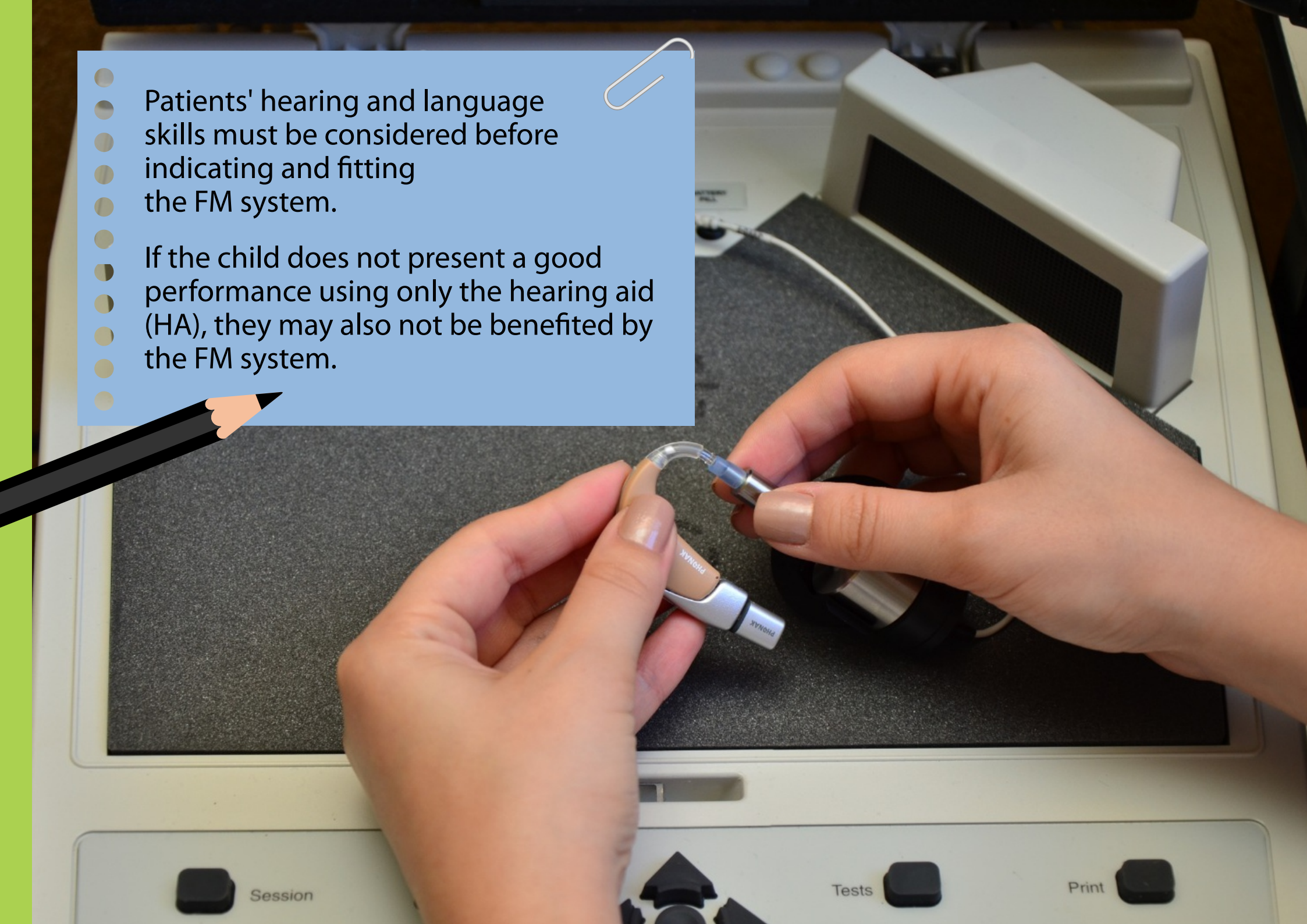


# Guidelines for Fitting and Assessing FM Systems





- Patients' hearing and language skills must be considered before indicating and fitting the FM system.

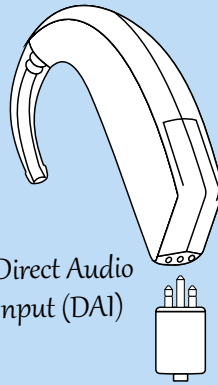
- If the child does not present a good performance using only the hearing aid (HA), they may also not be benefited by the FM system.

## FM SYSTEM AND HA:

Evaluating the technical features of hearing aids.

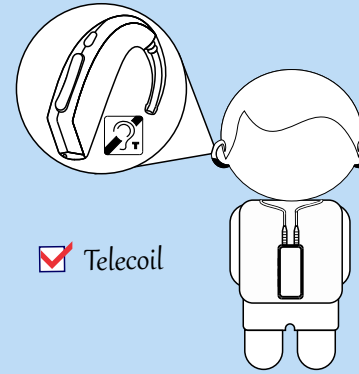
The hearing aid compatible with the FM system **must contain:**

Direct Audio Input (DAI)



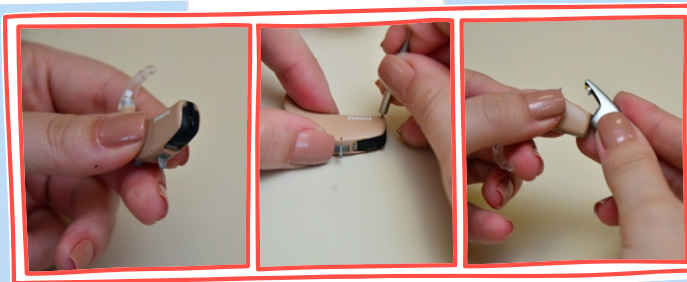
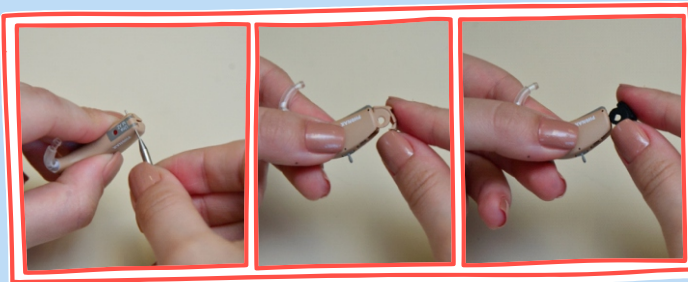
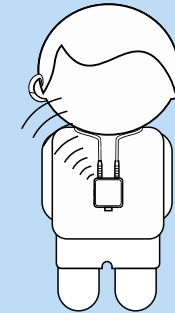
or

Telecoil



or

Wireless Digital Connectivity



### Note 1:

Most BTE (behind the ear) hearing aids have an adaptor called **DAI Shoe**, which allows the connection to hearing aids, such as the FM system receiver.



### Note 2:

Some hearing aids do not require a DAI Shoe to connect to the FM receiver because the manufacturer develops a receiver – a **specific** receiver – that adapts to the hearing aid design.

How to  
connect and  
disconnect  
the DAI Shoe



How to  
connect the  
DAI Shoe



How to  
disconnect  
the DAI Shoe



To fit the FM System properly, tests must include a combination of electroacoustic and behavioral evaluations in silence and in noise appropriate to the case.

### **Verification procedures**

Procedures depend on the target population and on the chosen microphone/transmitter and receiver.

## Electroacoustic Evaluation:

Electroacoustic transparency: The concept used to verify the electroacoustic characteristics of the FM system is the "Transparency." (AAA 2008; 2011)

If the FM System is not transparent, the child may not be as benefited as s/he could be by the use of this assistive technology. An FM System that is not transparent provides insufficient benefits, that is, the advantage of the FM System does not occur.

If the FM System is not transparent, the child may also lose information spoken by their classmates and other people who are not using the FM System transmitter, and may not be able to perform the adequate acoustic-articulatory feedback.



Transparency Evaluation  
BTE Hearing Aid



Transparency Evaluation  
Intra-canal Hearing Aid



## Behavioral Evaluation

There are many behavioral evaluation protocols indicated to validate the FM fitting worldwide.

**Important:** results with and without the FM system must always be compared.

The FM advantage is the 10 dB difference found between these conditions in speech perception tests.

# Guidelines for FM Systems and Remote Microphones

## American Academy of Audiology

[https://audiology-web.s3.amazonaws.com/migrated/HAT\\_Guidelines\\_Supplement\\_A.pdf\\_53996ef7758497.54419000.pdf](https://audiology-web.s3.amazonaws.com/migrated/HAT_Guidelines_Supplement_A.pdf_53996ef7758497.54419000.pdf)

## American Speech-Language-Hearing Association

<https://www.asha.org/policy/GL2002-00010.htm>

## FM Working Group

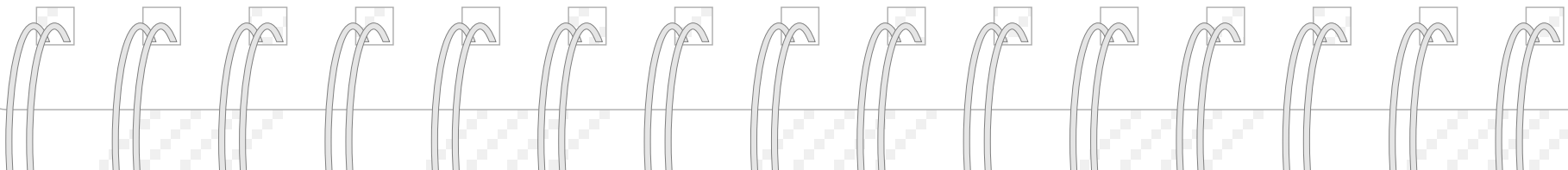
<http://www.fmworkinggroup.org.uk>

## International Bureau of Audiophonology

<https://www.biap.org/en/>

## Thibodeau, Wallace; 2014

<https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0034-1383501>







# Available Protocols

## **CHAPS: Children's Auditory Performance Scale**

[https://www.phonakpro.com/content/dam/phonakpro/gc\\_hq/en/resources/counseling\\_tools/documents/child\\_hearing\\_assessment\\_childrens\\_auditory\\_performance\\_scale\\_chaps\\_2017.pdf](https://www.phonakpro.com/content/dam/phonakpro/gc_hq/en/resources/counseling_tools/documents/child_hearing_assessment_childrens_auditory_performance_scale_chaps_2017.pdf)

## **CHL-QPL: Childhood Hearing Loss Question Prompt List (QPL) for Parent**

[https://www.phonakpro.com/content/dam/phonakpro/gc\\_us/en/products\\_solutions/documents/QPL.PDF](https://www.phonakpro.com/content/dam/phonakpro/gc_us/en/products_solutions/documents/QPL.PDF)

## **CPQ: Classroom Participation Questionnaire**

<https://academic.oup.com/jdsde/article/12/2/158/451581#6777840>

## **ELF: Early Listening Function and SIFTER: Screening Instruments For Targeting Educational Risk**

<https://successforkidswithhearingloss.com/for-professionals/tests-informal-assessments-for-parents-students-teachers/>

## **FAP: Functional Auditory Performance Indicators**

[https://www.phonakpro.com/content/dam/phonakpro/gc\\_hq/en/resources/counseling\\_tools/documents/child\\_hearing\\_assessment\\_functional\\_auditory\\_performance\\_indicators\\_fapi\\_2017.pdf](https://www.phonakpro.com/content/dam/phonakpro/gc_hq/en/resources/counseling_tools/documents/child_hearing_assessment_functional_auditory_performance_indicators_fapi_2017.pdf)

## **FLE: Functional Listening Evaluation**

[https://www.phonakpro.com/content/dam/phonakpro/gc\\_hq/en/resources/counseling\\_tools/documents/child\\_hearing\\_assessment\\_functional\\_listening\\_evaluation\\_fle\\_2017.pdf](https://www.phonakpro.com/content/dam/phonakpro/gc_hq/en/resources/counseling_tools/documents/child_hearing_assessment_functional_listening_evaluation_fle_2017.pdf)

## **FM Listening Evaluation**

<https://www.utdallas.edu/hhlab/files/fm-listening-evaluation.pdf>

## **IT MAIS: Infant-Toddler Meaningful Auditory Integration Scale**

[https://advancedbionics.com/content/dam/advancedbionics/Documents/Regional/BR/AB\\_IT-MAIS\\_Resource.pdf](https://advancedbionics.com/content/dam/advancedbionics/Documents/Regional/BR/AB_IT-MAIS_Resource.pdf)

## **LIFE-R: Listening Inventory for Education – Revised**

<http://successforkidswithhearingloss.com/for-professionals/listening-inventory-for-education-revised-life-r/>

## **MAIS: Meaningful Auditory Integration Scale**

<https://successforkidswithhearingloss.com/wp-content/uploads/2014/09/MAIS-Instructions.pdf>

## **PEACH: Parents' Evaluation of Aural/Oral Performance of Children**

<https://outcomes.nal.gov.au/peach.html>

Watch the videos about PINT and HINT



American Academy of Audiology. Clinical Practice Guidelines: Remote Microphone Hearing Assistance Technologies for Children and Youth from Birth 21 Years [Internet]. April 2008, updated April 2011 [cited 2018 Aug 29]. Available from [https://audiology-web.s3.amazonaws.com/migrated/HAT\\_Guidelines\\_Supplement\\_A.pdf\\_53996ef7758497.54419000.pdf](https://audiology-web.s3.amazonaws.com/migrated/HAT_Guidelines_Supplement_A.pdf_53996ef7758497.54419000.pdf)

Anderson KL. Approaches to Functional Verification of Classroom Accessibility. In: Smaldino JJ, Flexer C. Handbook of Acoustical Accessibility Best Practice for Listening, Learning, and Literacy in the Classroom. New York: Thieme; 2012.

Anderson KL. Screening Instrument for targeting educational risk (SIFTER). Litle Rock, A.R. Educational Audiology Association Products Manager. 1989

ASHA - American Speech-Language-Hearing Association. Guidelines for fitting and monitoring FM systems. Rockville: ASHA Desk Reference, 2002. Available from: <https://www.asha.org/policy/GL2002-00010.htm>

Bevilacqua MC, Banhara MR, Costa EA, Vignoly AB, Alvarenga KF. The Brazilian Portuguese Hearing In Noise Test (HINT). International Journal of Audiology 2008, 47(6), 364-65.

BIAP - International Bureau for Audiophonology. BIAP Recommendation 06/16 – 07/7: Management of Hearing Assistive Technology (HAT) – FM / RF. 2017 [cited 2018 Aug 29]. Available from <https://www.biap.org/de/recommendations/recommendations/tc-06-hearing-aids/228-rec-06-16-07-7-en-management-of-hearing-assistive-technology/file>

Boothroyd A. Speech Perception in the Classroom. In: Smaldino JJ, Flexer C. Handbook of Acoustical Accessibility Best Practice for Listening, Learning, and Literacy in the Classroom. New York: Thieme; 2012.

Castiquini EAT, Bevilacqua MC. Escala de Integração Auditiva Significativa: Procedimento Adaptado para a Avaliação da Percepção da Fala. RevSocBrasFonoaudiol 2000;6:51-60.

Costa MJ. Lista de sentenças em português: apresentação e estratégias de aplicação na audiologia. Santa Maria: Pallotti; 1998.

Ferreira K, Moret AL, Bevilacqua MC, Jacob RTS. Translation and adaptation of functional auditory performance indicators (FAPi). J Appl Oral Sci. 2011 Nov-Dec;19(6):586-98. Disponível em [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1678-77572011000600008](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1678-77572011000600008)

Fidêncio, Vanessa Luísa Destro. Avaliação digital do efeito do ruído sobre a fala: relação sinal/ruído [dissertação]. Bauri: Universidade de São Paulo, Faculdade de Odontologia de Bauri; 2013 [citado 2018 Ago 29]. Disponível em <http://www.teses.usp.br/teses/disponiveis/25/25143/tde-03122013-170001/pt-br.php>

Howard, A. National broadband plan takes shape with digital literacy corps. Available from [http://www.huffingtonpost.com/alexander-howard/national-broadband-plan-t\\_b\\_492478.html](http://www.huffingtonpost.com/alexander-howard/national-broadband-plan-t_b_492478.html).

Jacob RTS et al. FM listening evaluation for children: adaptação para a língua portuguesa. Rev. Bras. Ed. Esp., Marília, v.16, n.3, p.359-374, Set.-Dez., 2010. Disponível em <http://www.scielo.br/pdf/rbee/v16n3/v16n3a04.pdf>

Jacob RTS et al. Participação em sala de aula regular do aluno com deficiência auditiva: uso do Sistema de frequência modulada. Rev. CoDAS. v. 26. n. 4 p.308-314. Maio. 2014. Disponível em [http://www.scielo.br/scielo.php?pid=S2317-17822014000400308&script=sci\\_arttext&lng=pt](http://www.scielo.br/scielo.php?pid=S2317-17822014000400308&script=sci_arttext&lng=pt)

Oshima M et al. EarlyListeningFunction (ELF): adaptação para a língua portuguesa. Rev. soc. bras. fonoaudiol. vol. 15. no. 2. p. 191-196. São Paulo. 2010. Disponível em [http://www.scielo.br/scielo.php?script=sci\\_arttext&pid=S1516-80342010000200008](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-80342010000200008)

Santos LG, Jacob RTS, Schafer EC, Thibodeau L. The Brazilian Phrases in Noise Test (PINT Brazil). Journal of Educational, Pediatric & (Re)Habilitative Audiology, 2017 [cited 2018 Sep 11];23,p.1-8. Available from <https://pdfs.semanticscholar.org/0006/089cb2357d17dbf6ff73920b4a6ca5c895b9.pdf>

Souza-Jacob RT, Sistema de Frequência Modulada (FM): Comunicação Sem Limites Para o Aluno Com Deficiência Auditiva em Sala de Aula. In: Maximino LP et al, org. Intervenção em Fonoaudiologia: Comunicação Sem Limites – São Paulo: São José dos Campos: Pulso Editorial, 2013. p. 41-48.

Thibodeau LM; Wallace S. Guidelines and Standards for Wireless Technology for Individuals with Hearing Loss. Semin Hear, v. 35, n. 3, p. 159-167, 2014.

UKCFMWG - UK Childrens FM Working Group. Quality Standards for use of personal radio aids. London: National Deaf Children's Society. 2017 [cited 2017 Jul 12]. Available from: <http://www.fmworkinggroup.org.uk>