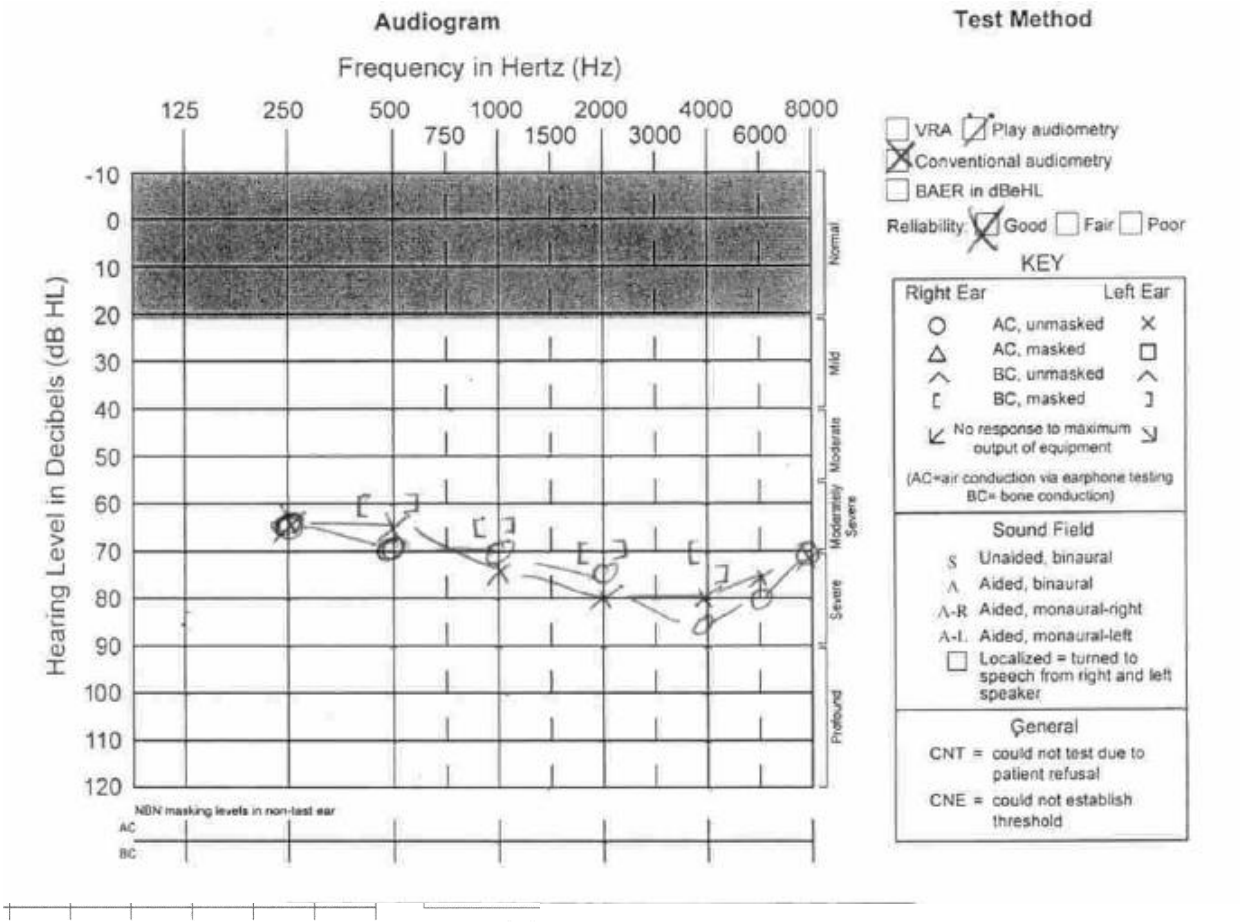
AUDIOLOGICAL EVALUATION and HEARING AID CHECK
TEST DATE: April 15, 2010

HISTORY

Name: Evin Evers
Age: 12 years 2 months
Reason for visit: Follow-up audiological evaluation and hearing aid check.
Hearing history: Evin presents with a bilateral severe sensorineural hearing loss for which she has been followed in this clinic since her hearing loss was diagnosed at 3 months of age. Her hearing was last evaluated at this clinic on April 17, 2009; she demonstrated behavioral hearing thresholds across the frequency range at levels of 65 to 85 dBHL in both ears. Her hearing loss is congenital and has been stable since diagnosis. The etiology of her hearing loss is genetic; previous evaluations at Seattle Children's have identified that Evin has Waardenburg Syndrome, characterized by sensorineural hearing loss and heterochromia. Her father has a bilateral hearing loss and her older sister has a unilateral hearing loss.
Middle ear history: Evin has a negative history of ear infections.
Amplification: Evin has worn hearing aids since shortly after diagnosis at age 3 months. She currently wears Oticon Opn3 binaural behind-the-ear hearing aids, devices that she has had for 2 years. Evin and her parents report that she wears her hearing aids full-time both at home and at school; her datalog measures showed an average daily use time of 10 hours. They report that the battery door on one hearing aid is broken. She reports that she rarely uses Program 2 on her hearing aids, mostly because she forgets about the option. Evin and her parents report that they do a battery check and clean the earmolds as needed on a daily basis. They store the hearing aids in a drying kit each night. Her earmolds were made at her last visit in April 2009. Previous aided testing at Evin's last visit in April 2009 demonstrated that she had fair ability to understand conversational level speech while wearing her hearing aids, as evidenced by an aided speech recognition score of 70%. In addition, she demonstrated some difficulty understanding speech in noise, with a score of 60% correct.
Hearing assistance technology: Evin reports that she uses an alarm clock that has both a light and bed vibrator. She is able to hear the doorbell and telephone ring with her hearing aids on. She communicates by texting on her cellphone.. She listens to music and computer audio using direct streaming to her hearing aids.
School: Evin is in the 7th grade at Renton Middle School. She has access to a remote mic/FM-DM soundfield system in her classrooms along with the teacher transmitter/mic. She receives services from the educational audiologist, Karen Thomas, in her school district.
Medical home: Evin lives with her family in Renton. She is followed by Dr. Jones at Valley Medical Center.

TEST RESULTS

Behavioral Assessment
Procedure: conventional audiometry: an individual is taught to respond to auditory stimuli with a hand raise. Threshold is determined as the lowest decibel (dB) level at which the person responds a minimum of two times.
Normal range: Normal hearing is defined as thresholds of 0-20 dBHL
Results:



	Speech awareness threshold	Speech reception threshold	Speech recognition			
	dB HL	dB HL	% correct	dB HL	word list	noise/ babble
Right						
Left						
Soundfield						
Aided			90%	50	W-22	
Aided			75%	50	W-22	45

SNR loss = 5dB (BKB-SIN)

Outcome measure: Aided speech recognition testing

Measure: Evin's ability to understand speech while wearing her hearing aids was evaluated using recorded words from the W-22 word list presented at a an average conversational level (50 dBHL) in soundfield in quiet and in noise, with multi-talker babble presented at 45 dBHL from the opposite speaker. In addition, her ability to understand sentences in noise was evaluated using the BKB-SIN test, in which sentence stimuli are presented at a conversational level with varying levels of multi-talker babble. An age-adjusted SNR loss was calculated from these measures.

Results: are listed in the table above

Outcome Measure: P-APHAB (Pediatric Abbreviated Profile of Hearing Aid Benefit):

Evin and her parents filled out the P-APHAB questionnaire during today's appointment. The 24 items on the questionnaire evaluate communication at different distances and in background noise. The parent and Evin independently determined the Evin's listening difficulty on an 8-point scale (0=cannot hear at all, 4=hear most, 8=hear and understand everything). The % scores below indicate the average % scores from the perspective of the parent and child for each condition.

Category	*Parent report: average % problems*	*Evin report: average % problems*	*Norms*
Ease of communication	43	23	12-40
Background noise	50	54	20-60
Reverberation	37	36	24-54
Aversiveness	30	10	5-40%

Hearing Aid Evaluation: The hearing aids were adjusted using the Desired Sensation Level (DSL) prescription method and real ear measures using the Verifit electroacoustic/real ear system. The target and measured values were derived after measurement of the Evin's real-ear-to coupler difference (RECD). Aided SII values demonstrate the proportion of the speech signal that is audible for both average and soft speech; normative values are derived from published norms for the degree of hearing loss at .5, 1, and 2 kHz.

Manufacturer/Model	Serial #	dBSPL at eardrum	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	6000 Hz	Aided SII
Oticon Opn3	**U23334**	**Right Ear**							
		Target output -avg speech (6	92	91	90	91	95	96	50-80
		Measured output-avg speech	**92**	**90**	**90**	**90**	**93**	**94**	**78**
		Target output-soft speech (5	79	82	82	81	81	80	55-75
		Measured output-soft speech	**79**	**81**	**82**	**81**	**81**	**78**	**68**
Oticon Opn3	**U23345**	**Left Ear**							
		Target output -avg speech (6	92	91	90	91	95	96	50-80
		Measured output-avg speech	**92**	**90**	**90**	**90**	**93**	**94**	**78**
		Target output-soft speech (5	79	82	82	81	81	80	55-75
		Measured output-soft speech	**79**	**81**	**82**	**81**	**81**	**78**	**68**

Current hearing aids: binaural Oticon Opn 3 digital behind-the-ear hearing aids.

Settings:

- Program 1 for everyday listening using wide dynamic range compression
- Program 2 for noisy settings using automatic adaptive directional microphone technology
- Frequency compression with a cutoff frequency of 3.6 kHz
- Volume control is activated with +/- 10 dB range

Datalog: average of 11 hours of daily use since last visit 12 months ago.

Earmolds: Evin's earmolds are fitting somewhat small due to ear growth since her last visit; new earmold impressions were made.

- Style: full shell

- Venting: none
- No helix
- Material/color: Silicone Disappear B

ASSESSMENT

Hearing loss: Evin demonstrates a severe sensorineural hearing loss in both ears. Specifically, she demonstrates behavioral hearing thresholds of 65 to 80 dBHL in both ears across the frequency range. Individual ear masked bone conduction testing shows no significant air-bone gap, consistent with a hearing loss that is sensorineural in nature in both ears. Today's results are consistent with previous results, indicating that her hearing loss continues to be stable.

Amplification: Evin is a full-time hearing aid user as indicated by her report as well as datalogging measures showing 11 hours of average daily wear time. The family maintains and stores the hearing aids appropriately each day. Electroacoustic evaluations of the hearing aids indicate that current settings achieve DSL target gain values for soft and average speech and aided SII values fall within the expected range for the degree of hearing loss. Aided SII values estimate that 68% of soft speech and 78% of average speech are audible in quiet for Evin when she is wearing her hearing aids; in contrast, unaided SII values show that 27% of average speech is audible for her without hearing aids. Directional microphone technology is functioning properly, showing reduction in gain from behind. Evin demonstrates excellent ability to distinguish speech while wearing her hearing aids as evidenced by an aided speech recognition score of 90% correct. She does show a decrease in her ability to distinguish speech in the presence of noise, as demonstrated by a speech in noise testing score of 75% correct. Evin demonstrates an SNR loss of 5 dB, indicating mild difficulty understanding speech in noise for her age on testing with the BKB-SIN. The P-APHAB questionnaire shows that when wearing her hearing aids, Evin is hearing and understanding well in a variety of settings, but both she and her parents report she has difficulty hearing in noisy settings. New earmold impressions were made today as her current earmolds are not fitting well due to ear growth.

Hearing assistance technology: Evin successfully utilizes a soundfield remote mic/FM-DM system in school to help her hear the teacher above the noise of the classroom. She uses hearing assistance technology to help her hear her alarm clock and successfully. She uses direct streaming to her hearing aids to listen to music and video on smartphones and computers.

RECOMMENDATIONS

Hearing loss

1. It is recommended that Evin's hearing be monitored with evaluations every 12 months. Her family is advised to contact this clinic if concerns arise about a change in hearing in the interim.

Hearing technology

2. It is recommended that Evin continue to wear her hearing aids at the current settings full-time at home, in the community, and at school.
3. Since Evin is having some listening difficulties in noisy settings and is not using the manual program 2, it is recommended that she use an automatic "everyday" program that automatically switches to a directional mic setting to help her hear in noisy settings; this program change was made today.
4. It is recommended that Evin's hearing aids be evaluated at follow-up visits with electroacoustic hearing aid checks. New earmold impressions will be made as needed for ear growth. Her family is advised to contact this clinic if concerns arise with hearing aids or earmolds in the interim.

5. It is recommended that Evin and her parents continue to care for her hearing aids and earmolds with daily cleaning and battery checks and nightly storage in a drying kit.
6. It is recommended that Evin continue to use a remote mic/FM-DM system in conjunction with her hearing aids in school to assist her in hearing the teacher when distance and noise create listening challenges. It was demonstrated in clinic today that Evin shows a decrease in her ability to recognize speech in a noisy setting. In addition, both Evin and her parents report that she has difficulty communicating in noisy settings. Use of a remote mic/FM-DM system in school will help in maintaining an optimal signal to noise ratio in her classrooms. It is also recommended that the family consider use of a remote mic/FM-DM system at home and in the community to help her hear in challenging and noisy settings.
7. It is recommended that Evin continue to use direct streaming to listen to music and video with her hearing aids.

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cc: parents (Mary and John Smith)
primary care physician (Dr. Jones-Valley Medical)
school audiologist (Karen Thomas-Renton Schools)