The Ten Commandments of Pediatric Hearing Healthcare

By Joanna T. Smith, MS, & Jace Wolfe, PhD

Should we recommend an implant, or are hearing aids enough? Should we choose frequency-lowering technology or go with wideband amplification? Should we use sign support for a child with auditory neuropathy or only focus on spoken language?

Although the technologies and services we offer in pediatric hearing healthcare are leaps and bounds better than what were available just a decade or two ago, we undoubtedly will continue to face difficult questions surrounding the care we provide to our youngest patients.

With that in mind, our responses to these questions should be predicated upon principles that are tried and true. Long-standing democracies are governed based on a constitution, and successful businesses are buoyed by a plan that defines core values. Heck, we probably all have a set of family values that aim to lend some semblance of order to an otherwise dysfunctional unit. You can bet our kids know to look both ways before they eat all their vegetables.

Pediatric hearing healthcare should be no different. In that light, we propose the Ten Commandments of Pediatric Hearing Healthcare.

Tot 10 is a new column that will survey the state of the art in pediatric hearing healthcare.

Coming in October: Contemporary Techniques to Evaluate Middle Ear Function

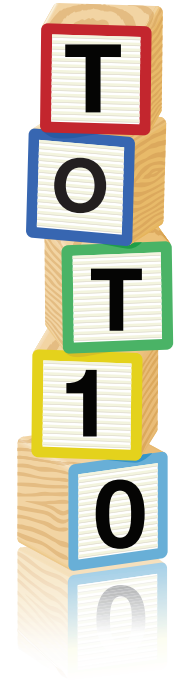
1. AUDIBILITY IS KING

Full-time audibility for all sounds throughout the speech range should be the most basic right of children with hearing loss. In fact, all of the remaining items on the list are tied to this first commandment.

Sure, one could make the case that audibility does not guarantee comprehension, but we most certainly CAN guarantee that there will be no comprehension without audibility for a child who attempts to develop spoken language through audition.

We should ensure that our youngest patients can hear the softest sounds that affect language development, with aided thresholds no higher than 25 dB HL. In addition, we should shoot to provide excellent speech recognition not only at average conversational speech, but also at soft speech.

We must remember where the "speech frequency range" stops as well. Patricia Stelmachowicz, PhD, and colleagues at Boys Town National Research Hospital have shown us that children must hear out to 9,000 Hz in order to identify all of the components of speech. To reach this goal, we must take advantage of advances in technology, including frequency lowering or, if needed, a cochlear implant.



2. THE EARLY BIRD GETS THE WORM

Ever since the groundbreaking Yoshinaga-Itano publication showing better outcomes for infants who received intervention prior to 6 months of age (*Pediatrics* 1998;102:1161-1171), it almost seems cliché to say that early intervention is essential for children born with hearing loss. With the accumulation of supportive literature since then, one would be hard-pressed to refute the benefits.

Our guiding principle for early intervention is one-three-six months—hearing screening by one month, audiological assessment by three months, and intervention by six months. As a profession, we still have room for improvement.

We propose a new standard. From our personal experience, hearing screening can definitely be completed within the first *week* of life, and prompt referral with strategic scheduling can allow for diagnostic assessment within the first three weeks. Once permanent hearing loss is identified using a contemporary, comprehensive battery of audiological procedures, a hearing aid loaner bank can allow for a fitting prior to six weeks of age.

Early identification and early intervention also apply to cochlear implantation. There is an emerging body of research demonstrating better outcomes for children who receive cochlear implants before their first birthday (Ching T; Dettmann S; both papers presented at Deaf Children Under One: Audiology & Communication Management; Dec. 6, 2012; virtual conference). At our practice, we have enjoyed success with cochlear implantation in the 8- to 10-month age range for children with profound deafness.

3. EYES OPEN, EARS ON

Early identification and provision of the best possible technology does absolutely no good without consistent and

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effective use. Mary Pat Moeller, PhD, and colleagues at Boys Town have shown that most families only keep hearing aids on for a few hours a day during the first year or two of life (*Am J Audiol* 2009;18[1]:14-23). A more recent multicenter study at Boys Town, the University of North Carolina, and the University of Iowa found similar results (Roush P; personal communication: June 17, 2012). What's behind these findings?

How about this as food for thought? Parents don't comply with full-time hearing aid use for their children because we have failed in our job as early interventionists. There may be no other example in healthcare in which an emergency is identified but proactive, early treatment is not aggressively pursued.

Our early discussions with parents should revolve around auditory brain development, the critical period of language development, the finding that children who have age-appropriate vocabulary have heard 46 million words by the time they are 4 (Hart B, Risley TR: *Meaningful Differences in the Everyday Experience of Young American Children*; Baltimore: Paul H. Brookes Publishing, 1995), the connection between listening and literacy, strategies to facilitate hearing technology retention, and the associations between lifelong outcomes and early hearing aid use.

It is our responsibility to make certain this information is assimilated by the families we serve through repeated discussions at follow-up visits and the provision of written materials.

4. MOTHER KNOWS BEST

Leave It to Beaver, The Andy Griffith Show, Green Acres—each was an American television institution during the 1960s that is still readily available as cable television reruns. *Father Knows Best* was on during the same time period, but, while the show possessed some parallels to *Beaver*, it has not enjoyed the same longevity. We contend that's because it's really mom who knows best.

A great mom can overcome long odds. We've seen late-identified children with common cavity cochleae become superstar listeners and talkers because of all-star moms. In contrast, we've also seen a number of children without proper support at home who have not reached their full potential.

We must fully equip parents with the information and resources they need. As a profession, we must determine systems and strategies to encourage a total buy in from all parents with whom we work.

5. TURN UP THE RADIO

So, we already know that children have trouble hearing in noise and listening in on sounds from a distance. We also know that children live in a noisy world and learn 90 percent of what they know about it through incidental listening.

To address this challenge, all children with hearing loss should be fitted with a personal radio-frequency (RF) system. Some of our most successful auditory-verbal graduates have been children whose mother routinely used a personal RF system in day-to-day life.

6. SHOOT FOR THE MOON

In *From Good to Great*, Jim Collins states that, in business, good is often the enemy of great. We think the same case can be made in pediatric hearing healthcare.

Too frequently, we are satisfied when outcomes are good. "Well, he scored 76 percent on single-syllable word-recognition testing, but that's pretty good for a child with a severe hearing loss." We should ask ourselves if we would be okay if our own children only understood 76 percent of what we said in an acoustically pristine room. Do we want our doctor to only understand 76 percent of what we report? How about our lawyer, our financial adviser, our spouse, or our child's teacher?

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Aided monosyllabic word recognition at a soft conversational level should be at least 80 percent in the best aided condition, as should aided sentence recognition at a typical signal-to-noise ratio (e.g., +5 dB). A child should make at least one year of speech and language progress a year, and standard scores should approach those of children with normal hearing.

Even when children's outcomes are limited by other factors, clinicians should shoot for the moon in setting goals with parents. When you shoot for the moon and miss, you still land amongst the stars.

7. V-SQUARED

We can choose the best hearing technology money can buy, but the desired outcome will only be achieved if we verify and validate it. Every audiologist should conduct real-ear-to-coupler and probe-microphone measures each time a hearing aid is fitted or reprogrammed and when a new earmold is fitted. Failing to do so is negligent.

Probe-microphone assessment does not provide one very important piece of information—the softest sound a child can hear. Future columns will discuss protocols and procedures to facilitate accurate aided-threshold measurements. For now, we should note that aided-threshold and probe-microphone measures should be used in conjunction with one another. Likewise, we discourage the use of functional gain as a tool to fit hearing aids.

Validation tools include questionnaires, parent reports, and speech and language assessment. Do yourself a favor and familiarize yourself with Marlene Bagatto's excellent work in this area (*AudiologyOnline* 2012; **http://bit.ly/Bagatto**).

8. WORK TOGETHER

The patients of the greatest pediatric audiologist in the world will not reach their full spoken language potential if they are not also served by a terrific listening and spoken language specialist. The same can also be said for the best therapists in the world.

Our own practice has succeeded in large part because pediatric audiologists and auditory-verbal therapists consistently work together in children's appointments to evaluate speech, language, and auditory skills and optimize hearing technology.

9. BE A TECHIE NERD

The amazing outcomes children with hearing loss enjoy today are only possible because of incredible advances in technology. Pediatric audiologists, in particular, must stay on top of these advances to ensure that we are using them to their full potential.

For example, frequency-lowering technology must be set appropriately for a benefit to be realized. Even worse, if it's used inappropriately, it may hinder a child's identification of speech sounds. The same can be said of just about every technology and assessment tool we use.

10. RIDE ON A SEA OF WORDS

In *Language and Learning*, educationist James Britton stated that "reading and writing float on a sea of talk," a quote Teresa H. Caraway, PhD, has referenced. Children have to listen to develop reading and writing skills.

Parents should be encouraged to go to extreme lengths to create a sea of intelligible words. We should discuss what is necessary to optimize the acoustics in a child's environment.

We should also teach parents to become radio commentators who verbally comment on each and every activity of life. "We're walking to the kitchen, and now we're opening the refrigerator. Now, we're going to get a drink. What should we get? Milk, water, or juice?" Radio commentators have children who hear at least 46 million words in the first four years of life.

We hope you enjoyed the first installment of the Tot 10. Upcoming columns will expand on these topics. Please let us know what you think or if you have any suggestions to help children shoot for the moon. HJ

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