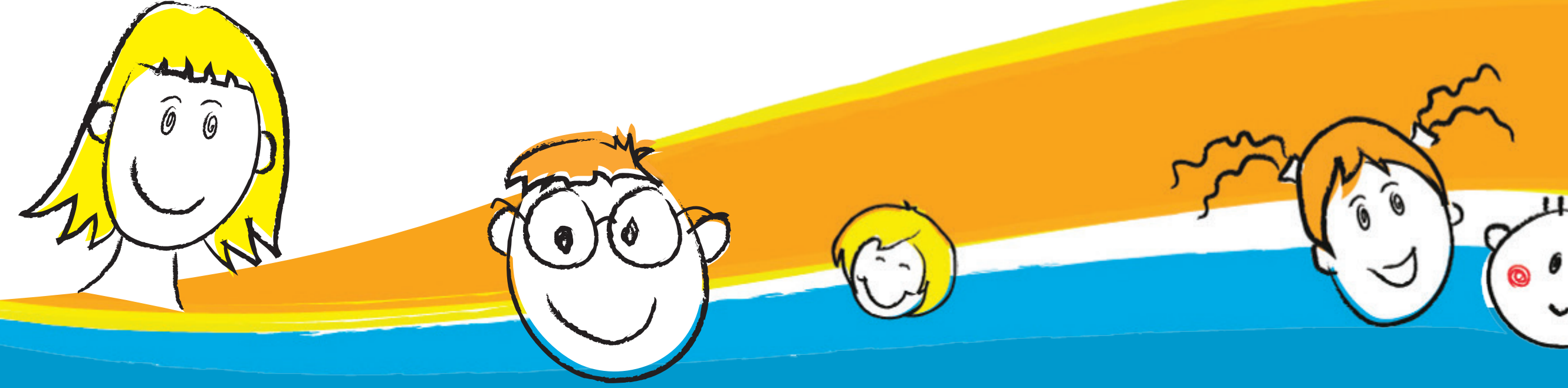


Managing Unilateral Hearing Loss (UHL) in Infants: Why one ear is not enough

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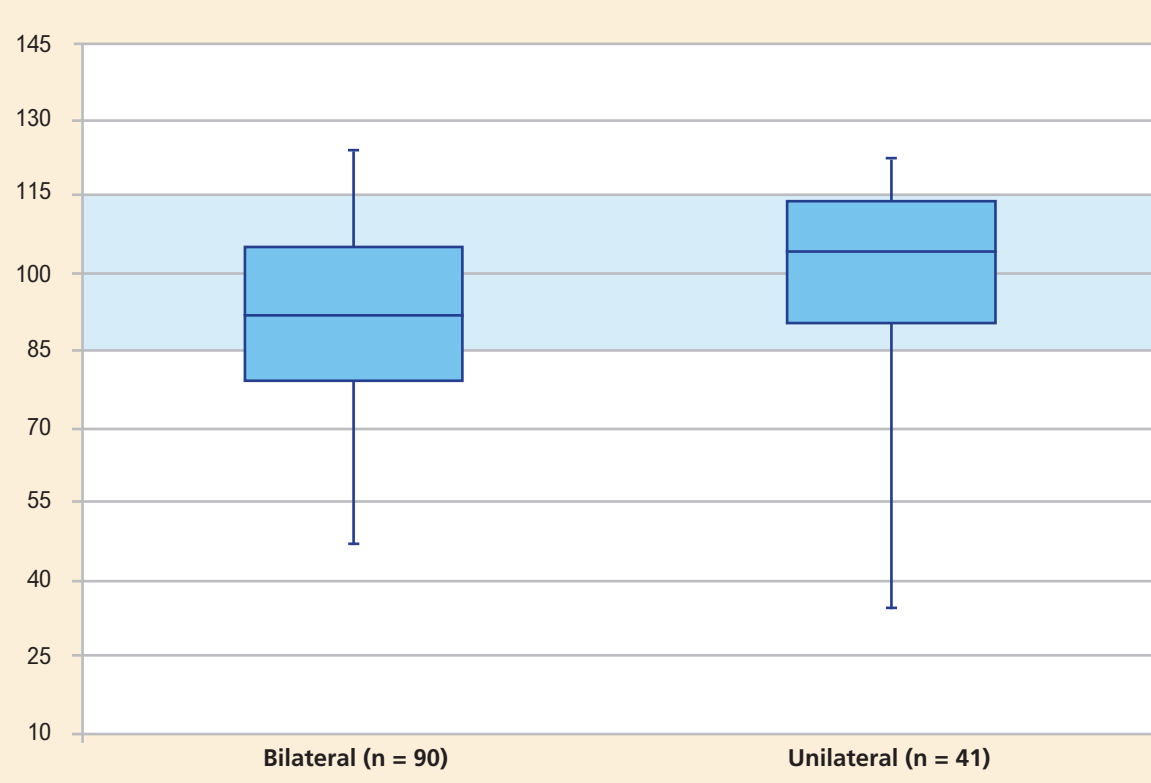
Family Centred Early Intervention Conference
 AUSTRIA 2016



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June 2016

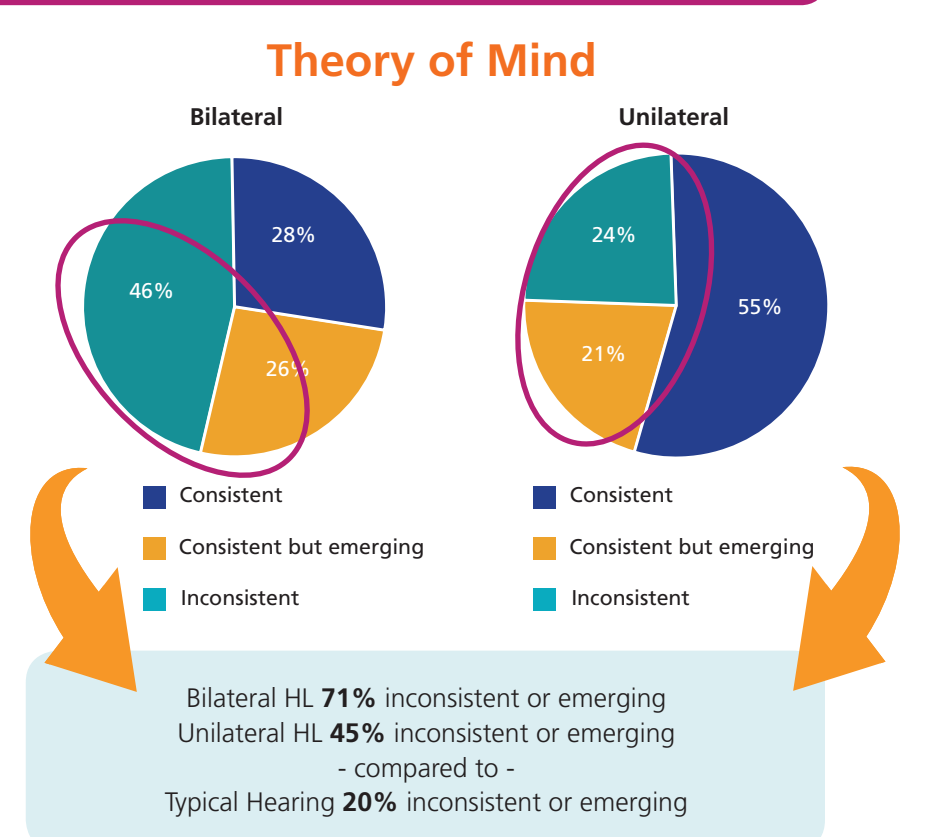
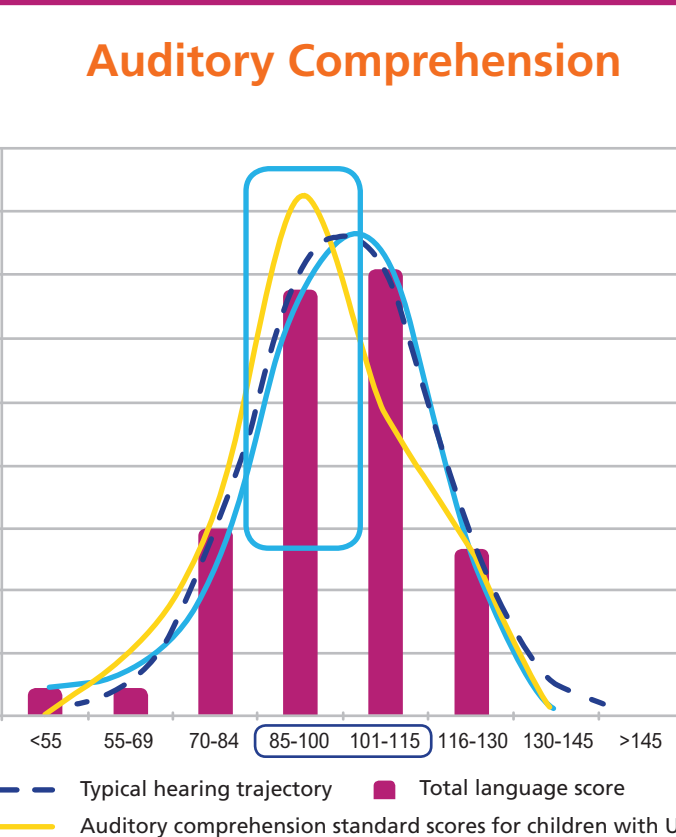
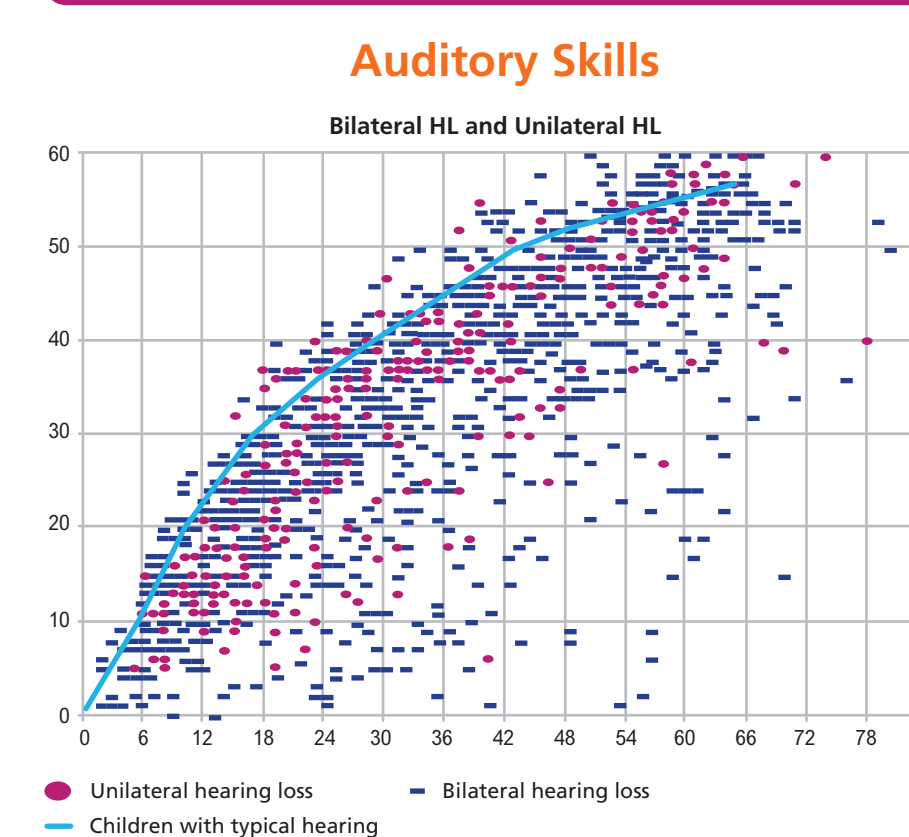
The Problem



Graduated language assessment results at 5 years indicate:
 - The median language results at 5 years indicate many children with UHL achieve language within the normal range (as with Bilateral children in the TSC program), HOWEVER
 - The lower quartile range for children with UHL is greater indicating the range of poor outcomes is worse than with bilateral hearing loss.

Parents are faced with a range of choices for their child with unilateral hearing loss.
 - The challenge for health professionals is knowing what advice to provide, and what is evidence based best practice recommendations for each child

Outcomes

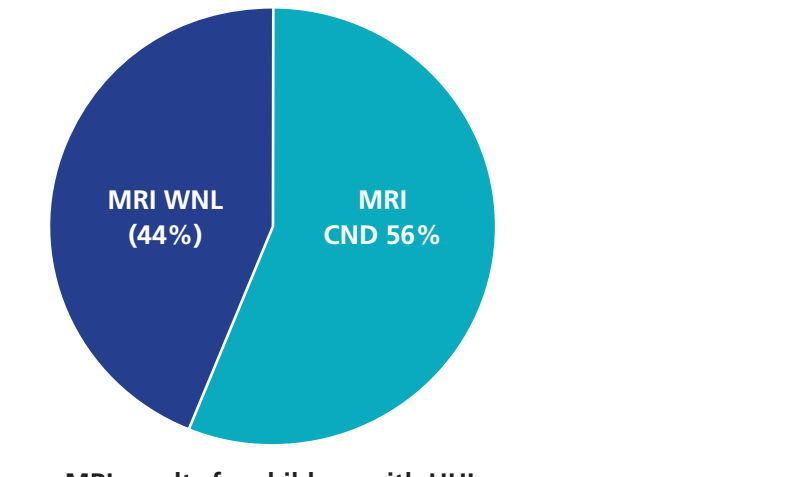
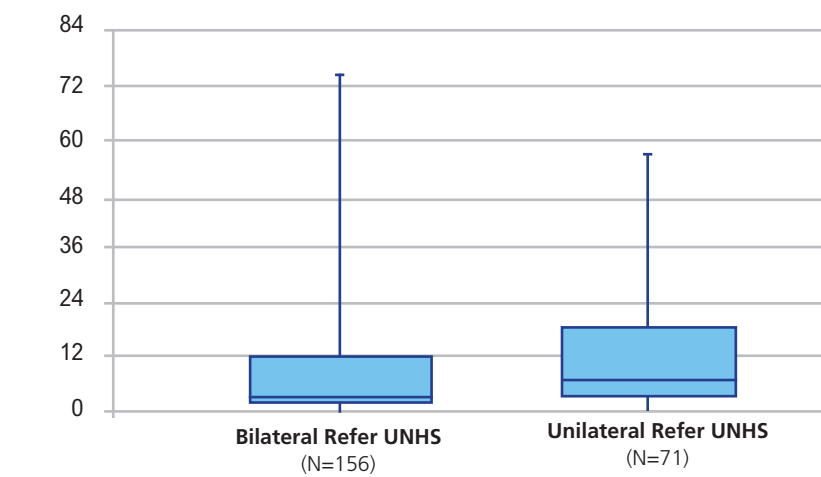
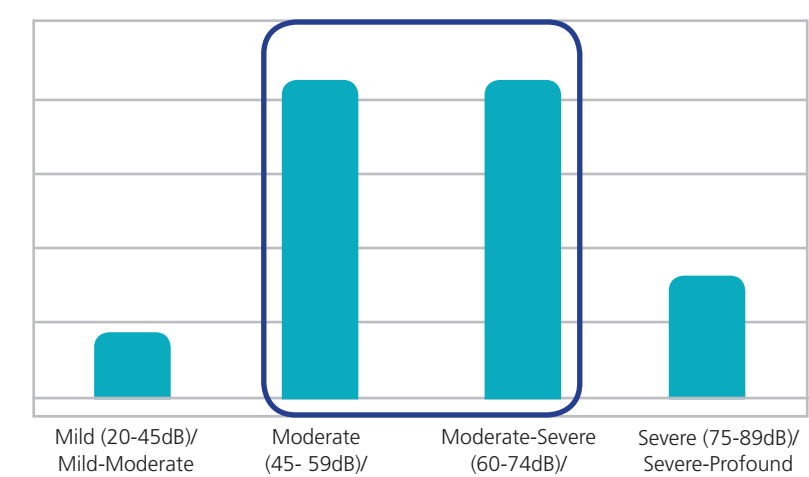
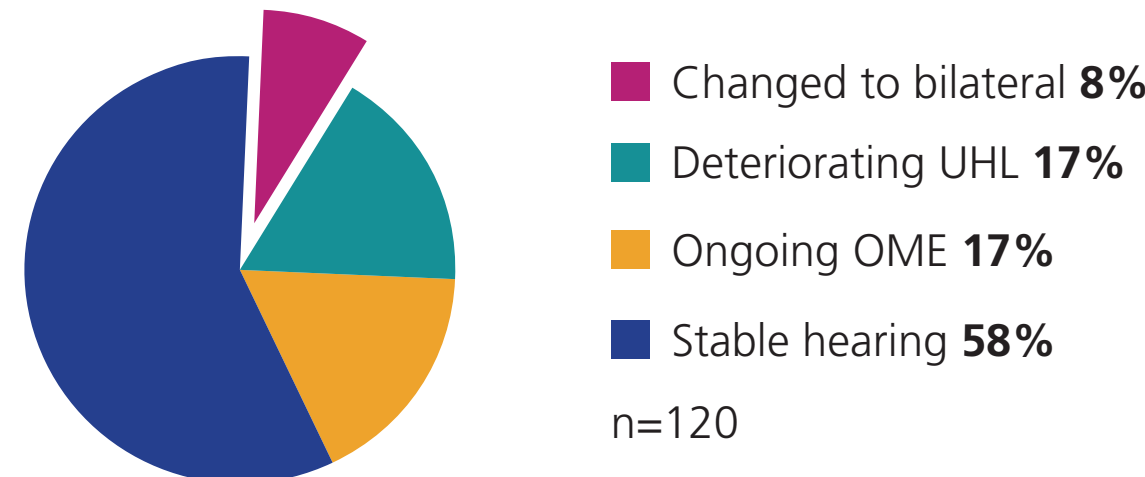
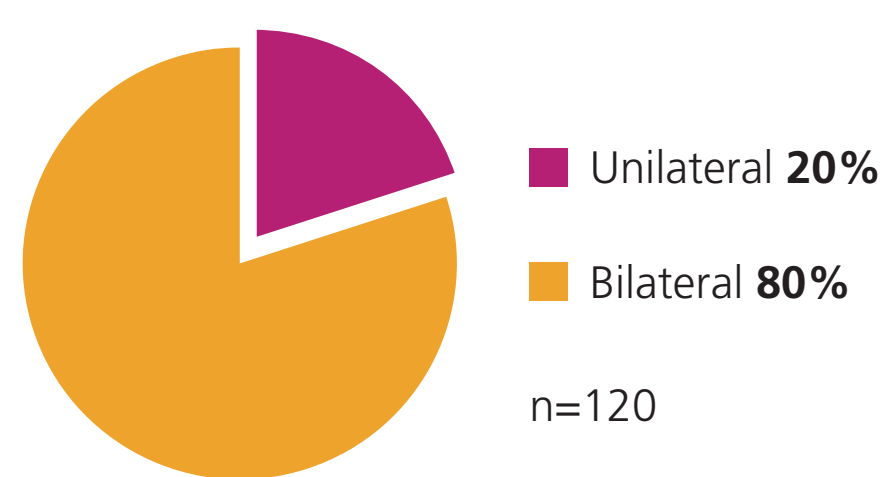


• Even though standardised language assessments may be normal, many children with UHL have poorer listening skills than children with typical hearing.
 • Listening with one ear may not be enough for these children to achieve their communicative potential

• Potential discrepancies become apparent once the standard score is broken into details
 • Skew of Auditory Comprehension scores for children with UHL lower than that of typical hearing

• Statistically significant amount of children with UHL have inconsistent or delayed patterns of theory of mind development than reported of typical hearing children

Demographics



• 20% children with UHL in TSC EI program (Incidence reported at 0.6:1,000 (WHO, 2009))
 • 92% referred for diagnosis at birth,
 • 10-22% will have a progressive bilateral loss

• 42% children with UHL had changing hearing levels
 • In line with reported figures of 37-58% deterioration of hearing threshold in that ear

• Majority of children fitted with hearing aid fall into moderate, mod-sev, mod-profound hearing loss levels

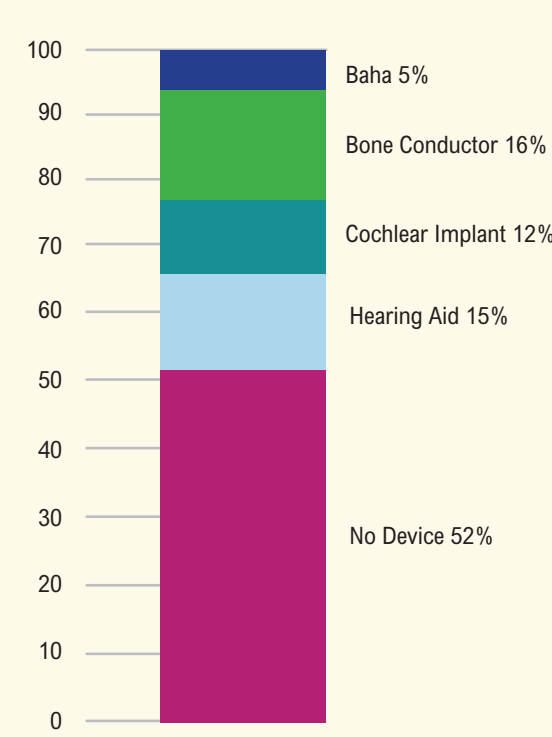
• Average age of entry to EI closer to 12mths, compared to 6mths for children with bilateral hearing loss

• 36/55 in group with MRI results
 • 20 of which showed to have Cochlear Nerve Deficiency (CND), including 5 (25% with ANSD)
 • 88% MRI WNL proceeded to Cochlear Implantation

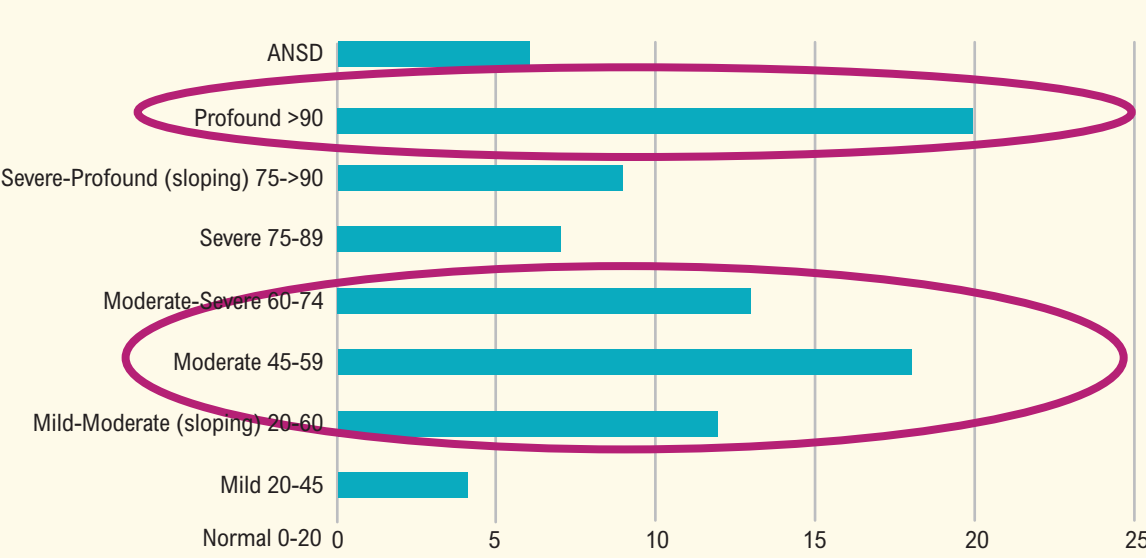
The Challenge



Device options



HL in the worse ear



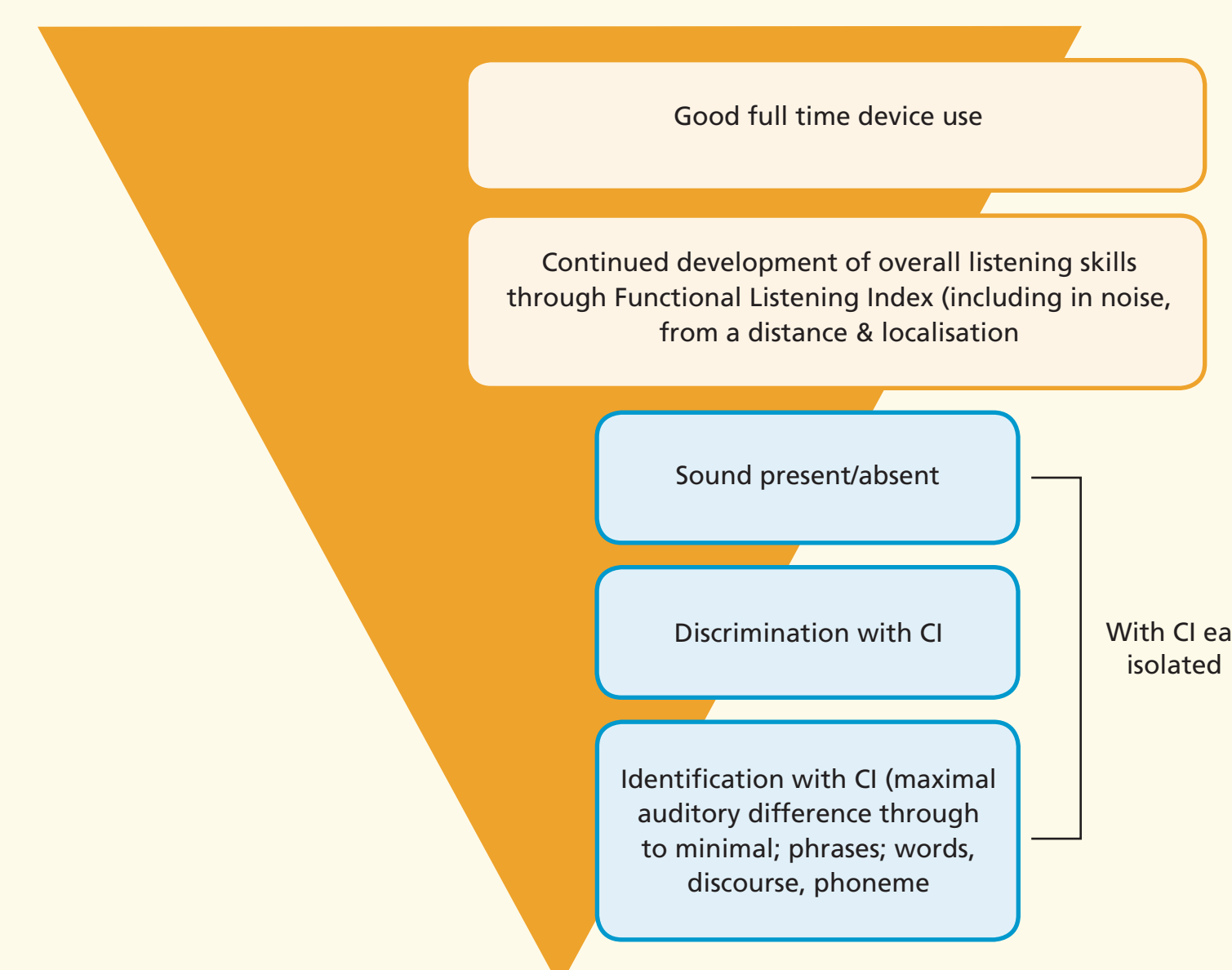
• Highest percentage age in central cohort (mod/mod-sev)
 • 55/89 (63%) hearing levels within traditional CI range

"I've been told my child has enough hearing to develop typical speech and language"
 "I can't get funding as the level of my child's hearing loss isn't significant enough"
 "To us it's simple. If our baby only had one arm, we'd do anything to make sure she had another one. It's the same with her ears"

Audition goals: UHL & CI

1. Measurable Improvement in access to sound
2. Changes in listening ease and confidence

• For children with bilateral HL, CI development focusses on building individual listening and auditory skills.
 • In children with UHL, this is reversed, with most work on integrated development of listening skills with only a small focus on individual CI work.



Cochlear Implant Experience with UHL

Gender	Age at CI	Age at diagnosis (months)	CI ear	CI ear	Non-CI ear	HA/Baha	CI type	SP	Duration of CI (yrs)	Data logging	Con/Acq	MRI
M	2.5	0	L	80	20	no	0522	CP910	0.1	5.0	Congenital	WNL
M	3.3	1	L	89	12	no	0522	CP920	0.9	8.7	Congenital	WNL
F	3.8	0	L	81	20	yes	0522	CP920	0.0	na	Congenital	WNL
M	3.9	35	L	90	13	no	0248E(CA)	CP910	1.6	7.6	Congenital	WNL
M	4.0	0	L	88	20	no	0422	CP920	1.6	7.6	Congenital	WNL
F	4.7	44	R	99	21	no	0422	CP910	2.8	na	Congenital	WNL
M	5.2	0	R	101	10	no	0248E(CA)	CP920	1.1	6.7	Congenital	WNL
M	5.6	21	R	100	9	no	0422	CP920	2.0	10.8	Acquired	Fused/Common VON
F	6.0	51	R	62	13	yes	0422	CP920	1.6	7.0	Congenital	WNL
M	6.4	1	L	120	13	yes	0422	CP920	2.8	7.0	Congenital	WNL
M	6.7	0	R	120	15	no	0422	CP920	1.7	4.6	Congenital	WNL
M	6.9	79	R	120	15	no	0248E(CA)	CP920	2.2	2.8	Acquired	Cochlear fracture
F	7.1	59	L	73	15	no	0522	Not fitted	na	na	Acquired	Ossification
M	10.0	88	R	113	5	no	0248E(CA)	CP920	1.6	2.7	Congenital	WNL
F	10.4	36	R	120	30	yes	0512	CP920	0.4	7.0	Acquired	WNL
F	10.7	48	R	98	20	yes	0512	CP920	5.0	na	Congenital	EMAS
F	11.2	1	L	112	12.4	no	0248E(CA)	CP910	1.0	na	Congenital	WNL
F	43.9	Adult (43 years)	L	95	19	no	0422	CP910	1.8	12.4	Acquired	WNL

CHILDREN CURRENTLY UNDER EVALUATION												
M	2.0	12	R	>120	5	yes					Congenital	WNL
F	16.1	48	L	89.0	14.0	no					Acquired	WNL
M	0.8	0	L	>120	<20	no					Congenital	WNL
F	4.2	0	L	86.0	14.0	no					Congenital	TBC

Gender	Median Age at CI (years)	Median Age at Diagnosis (months)	Median HA/BA (dB HL)	Median CI Age (months)	Median CI Age (years)	Median CI Duration (years)	Median CI Duration (years)	Median CI Duration (years)	Median CI Duration (years)	Median CI Duration (years)	Median CI Duration (years)	Median CI Duration (years)
N 55%	3.5	2.5-11.5	99dBHL (60-120dBHL)	80	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
F 45%	3.5	2.5-11.5	99dBHL (60-120dBHL)	80	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6

References: Screening guidelines for principles and practice, Force & Force (2008); Joint Committee on Infant Hearing of the American Academy of Pediatrics, et al., (2013); Ross et al., (2008); WHO, (2009); Fitzpatrick, Whittingham, & Durieux-Smith (2014); Lieu, Tye-Murray, & Fu (2012); McKay, Gravel, & Tharpe (2008); Martinez-Cruz, Poblano & Conde-Reyes (2009); Fischer & Lieu (2014); Fitzpatrick et al., (2014); Holstrom, Gaffney, Gravel, Oyler, & Ross, (2008); Tharpe, (2008); Ead, Hale, DeAlwis & Lieu, (2013); Abel & Lam (2008); Johnstone, Nabelek, & Robertson (2010); Tavora-Vieira & Rajan (2015); Goberis et al., (2012); Firszt, Reeder, Dwyer, Burton, & Holden (2015); Johnstone et al., (2010); Van Deun et al., (2010); Yoshinaga-Itano, (2013); Lieu, Tye-Murray et al. (2015); Propst et al (2010); Tibbetts et al (2011); Sharma (2014); Heggdal et al. (2016)