A home based model of cochlear implantation: The role of telepractice

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Acknowledgements

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Royal Institute for Deaf and Blind Children

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Emma Rushbrooke – *Hear and Say Centre*

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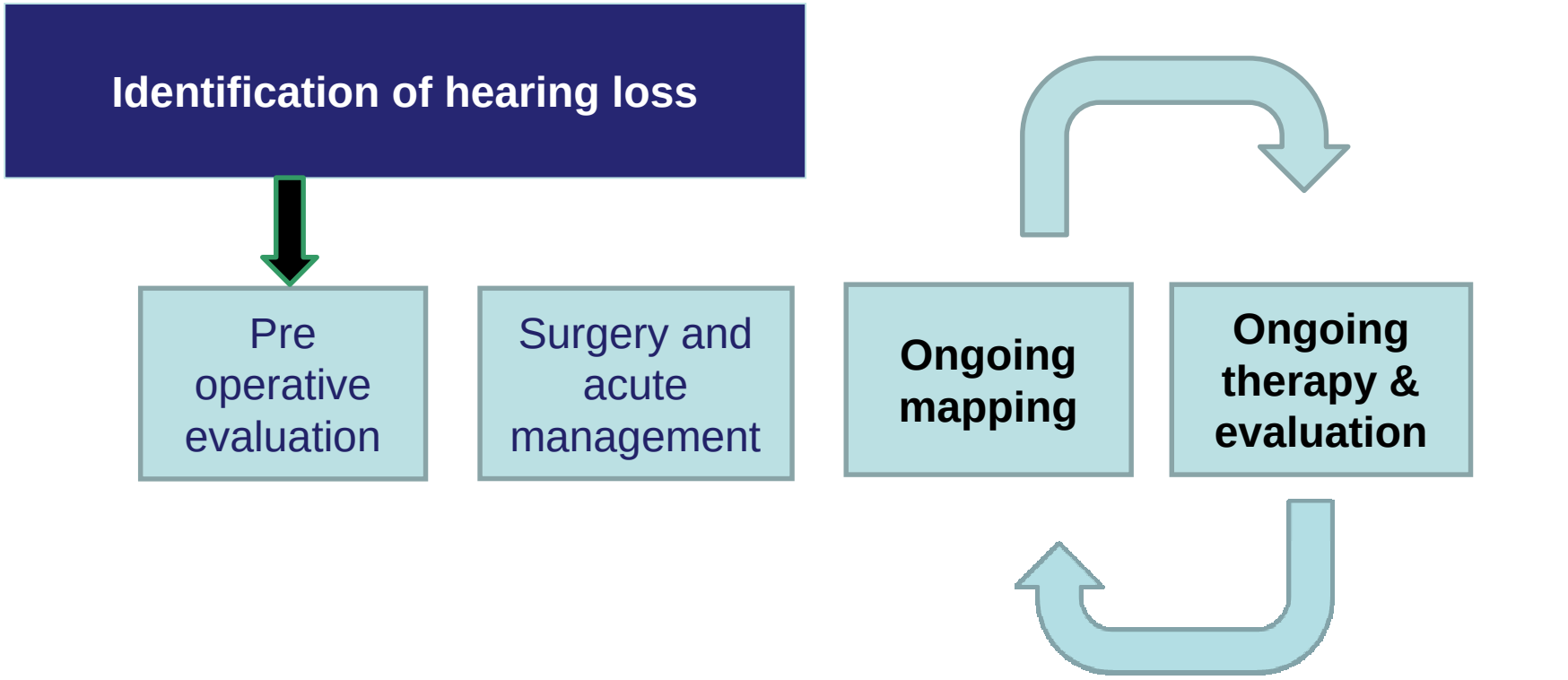
Cochlear implant models



Life long management with CI recipients

Why review cochlear implant models?

- To provide a high quality innovative and accessible program that seamlessly combines cochlear implant and educational services.
- Extend across the geographical reach
- Minimise disruption to family life
- Build upon evidence for telepractice and the tailoring of programs to provide a “blended service”

Developing telepractice

AAA in 2008 resolved that Audiology telehealth / telemedicine services should be:

- Equivalent to face to face services
- Validated before implementation
- Assure confidentiality and accuracy
- Evaluated for feasibility
- Particularly with difficult to test populations such as children

Overview:

A CI journey via “home based model”

- Validation and feasibility of remote teleaudiology for pure tone audiometry
- Telepractice for candidacy preparation
- Validation and feasibility study of remote cochlear implant mapping
- Telepractice for ongoing habilitation
- Proposed models for future management

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DELL

Equipment placement

Consistent Audiograms – HI

Hearing impaired	Gold vs Test	Gold vs Noise	Test vs Noise
250Hz	± 2.5dB		
500Hz			
1000Hz			
2000Hz			
4000Hz			
8000Hz			

Consistent Audiograms –
Normal hearing

Normal Hearers	Gold vs Test	Gold vs Noise	Test vs Noise
250Hz	-6 to 3.5dB Most variability at 250Hz		
500Hz			
1000Hz			
2000Hz			
4000Hz			
8000Hz			

Duration

- The tele-audiology audiogram took significantly more time to complete than either of the face to face conditions (p=.000)

	Traditional (in booth)	Teleaudiology	Traditional (not in booth)
Time (minutes)	**10.36**	**16.74**	**11.00**

- There was no significant difference between groups on any condition

Tips and hints - teleaudiology

- Use a jellybean switch, not a button as makes responses more obvious and audible

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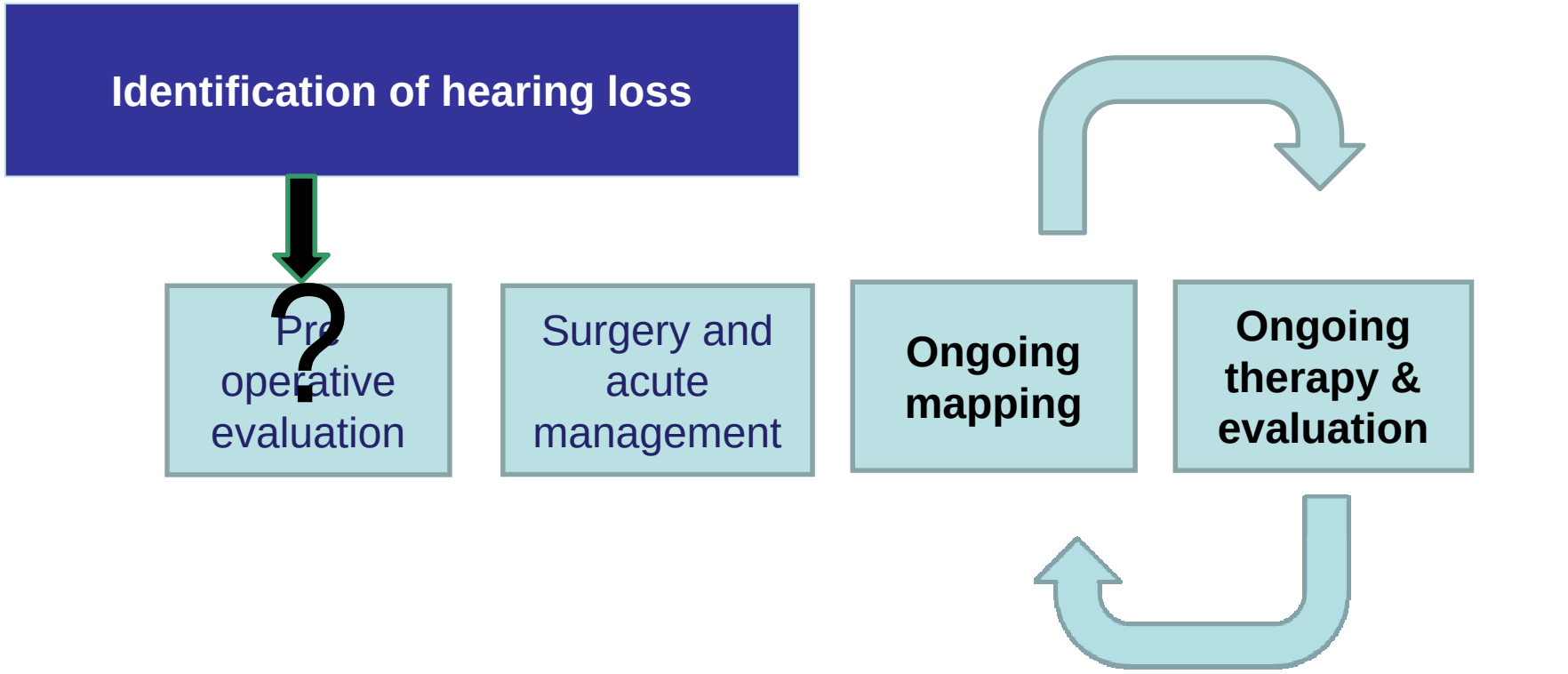
Preparation for CI

- Integrated into teleschool sessions
- Inclusion of other professionals and surgeons in sessions as required:

  LOCAL end: Educators and support team
  RIDBC end: Audiologist, Counsellor (as required) and Surgeon

Reference:
Melissa McCarthy and Jan North:
"RIDBC Teleschool: Guideline principles for telepractice"

Cochlear implant models



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Cochlear implant mapping

- Hearing CRC: 2 studies performed in parallel
- Feasibility of telepractice for CI mapping with recipients with range of ages (12 months to 85 years) and abilities (inc vision, CP, autism) using “off the shelf equipment” (SCIC)
- Validation of telepractice for CI mapping in school aged children using the eHAB system developed by University of Queensland (Hear and Say Centre)

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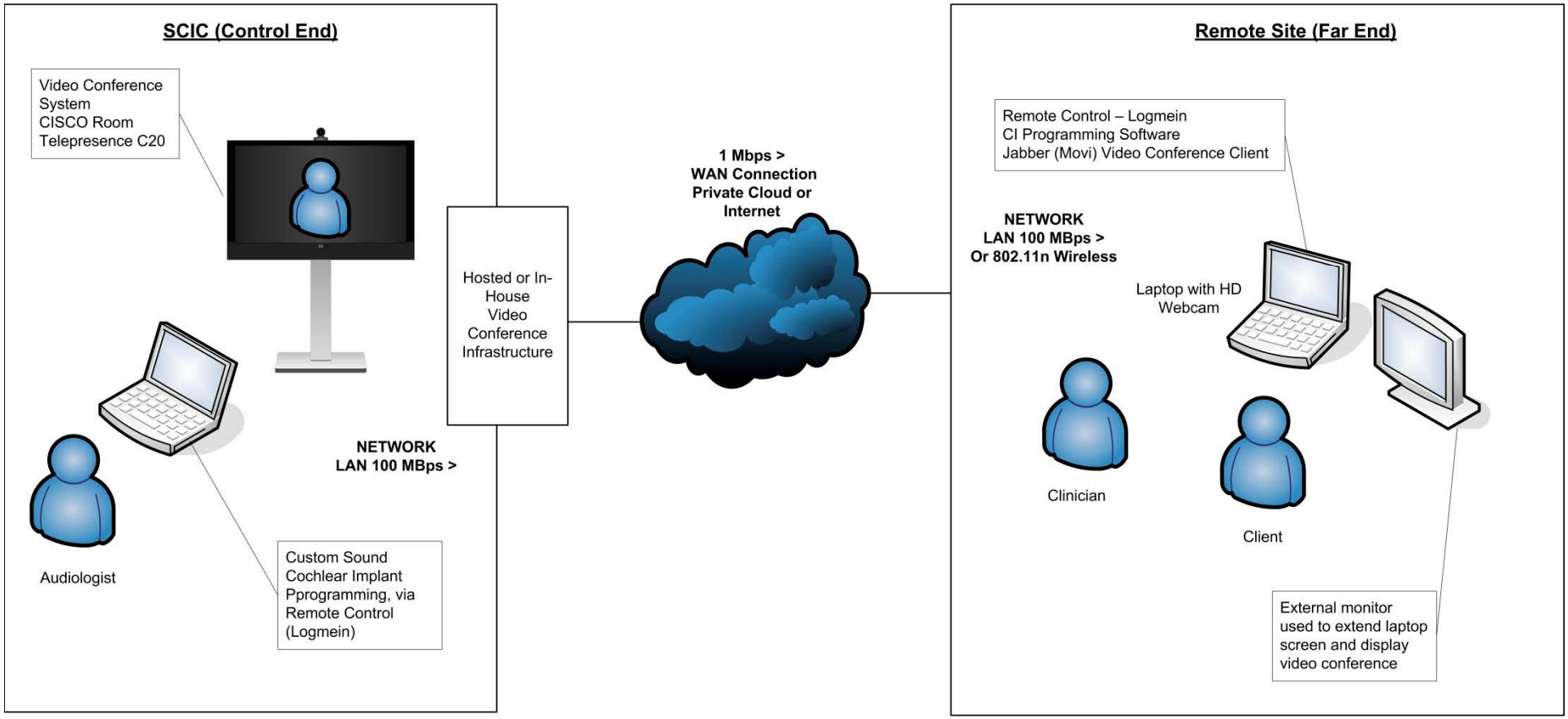
Feasibility study: SCIC



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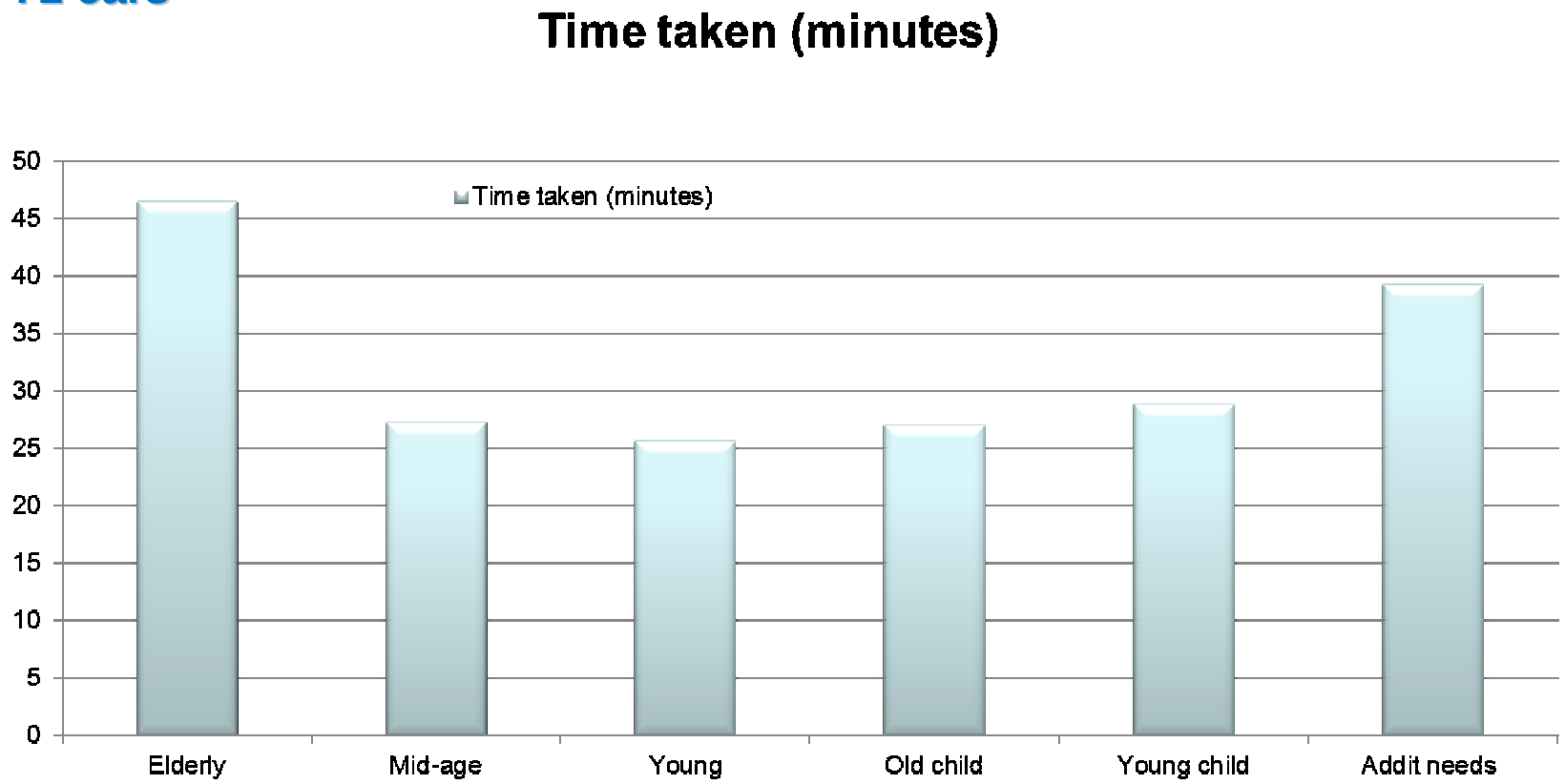
Time taken for remote mapping sessions

N=71 ears



Face to face sessions on average 1-1.5 hours allocated depending on unilateral bilateral and recipient complexity

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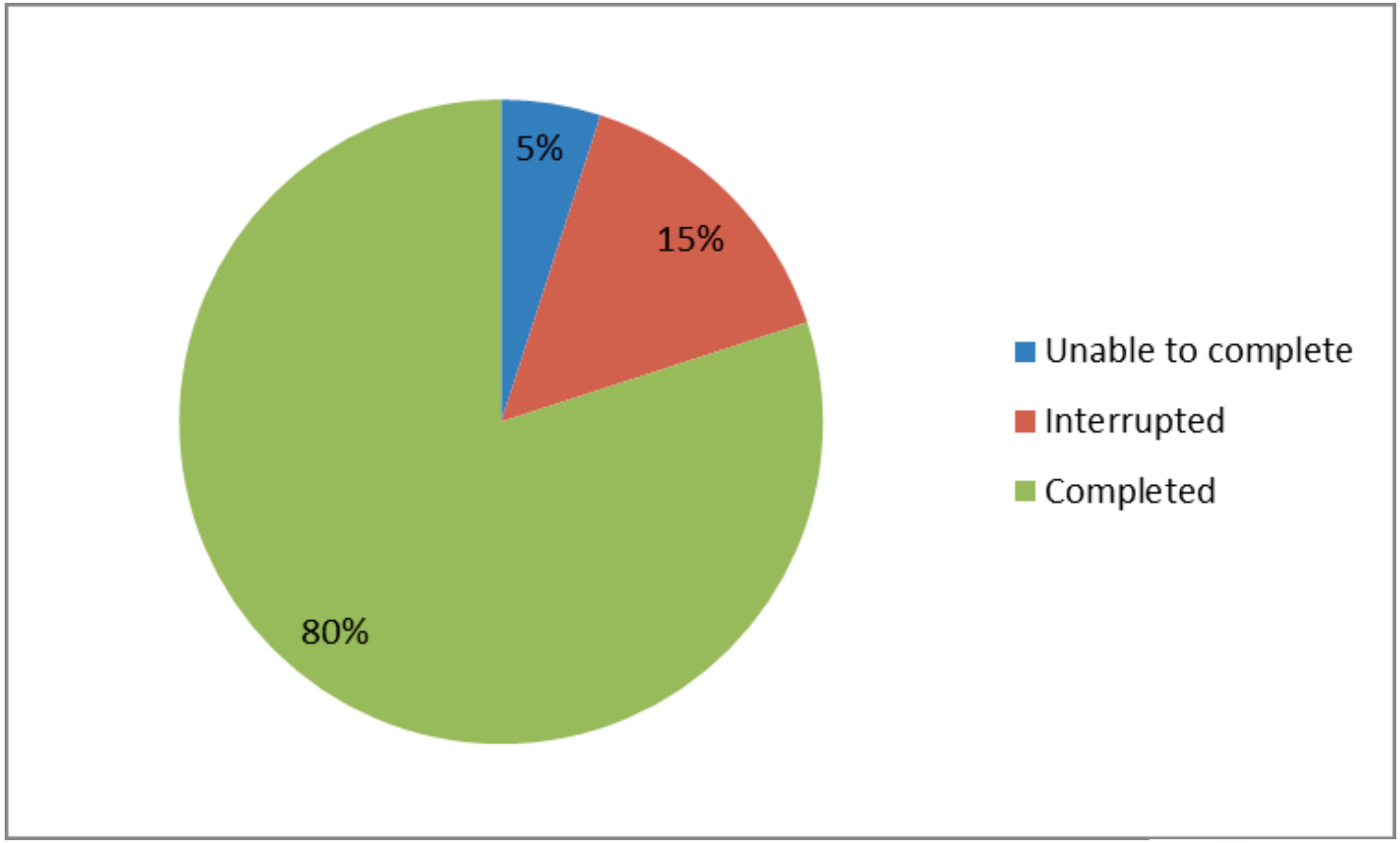
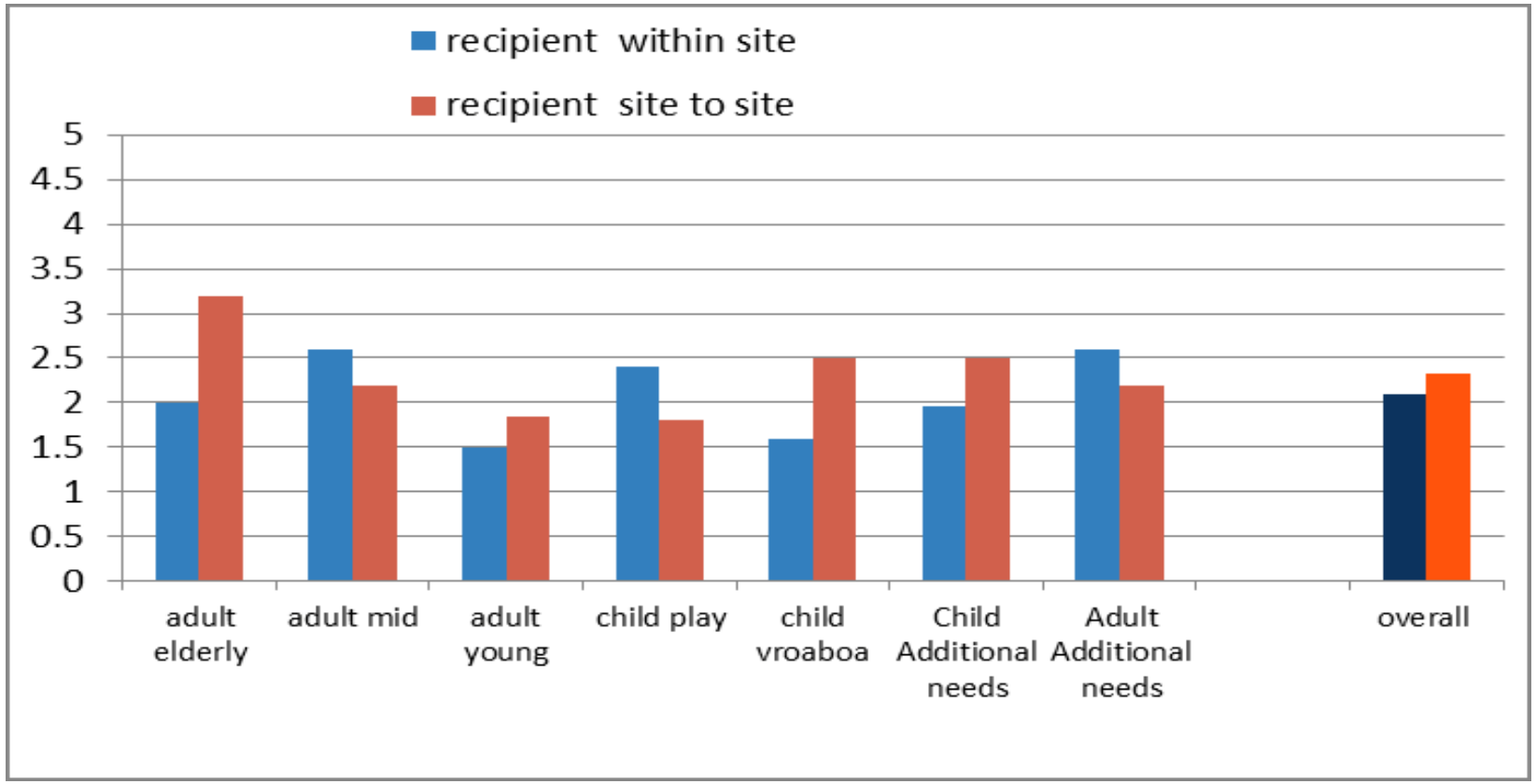
Ears mapped with remote mapping:
95% completed N=71 ears



Satisfaction with remote mapping

1 highly satisfied – 5 highly dissatisfied (N=71 ears)



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Validation study: Electrode Comparisons

Paired t- test of the electrode T and C current levels obtained in FTF and remote conditions in the 5 to10 years age group

Condition	N (electrodes)	Mean (SD)	t	df	*p*
T- level FTF	142	131.19 (24.31)	}-0.26		
T-level Remote	142	131.27 (24.10)		141	0.79*
C- level FTF	105	184.48 (27.15)	}-0.55		
C-level Remote	105	184.68 (27.40)		104	0.58*

Note. FTF = face to face; N= number of electrodes; CL= current level; SD= standard deviation; df = degrees of freedom; (* level of **no** significant difference = >0.05).

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Speech Perception Tests

Wilcoxon Signed Ranks Test ; CNC Words & BKB Sentences for Group 2 (5 to10 yrs)

	FTF				*Remote*					
Name of Test	*N*	*Mean Score %*	*SD*	*Range*	*N*	*Mean Score %*	*SD*	*Range*	Wilcoxon z	*p*
CNC Words Recorded 65dBA (Quiet)										
Phoneme Score	13	**80.15**	12.58	53- 94	13	**81.38**	12.25	56- 93	-1.348	.178
Vowel Score	13	**85.38**	19.85	28- 100	13	**85.92**	18.24	28- 100	-.179	.858
Consonant Score	13	**76.38**	13.09	52- 96	13	**77.84**	14.65	50- 94	-1.101	.271
Word Score	13	**60.76**	22.08	24- 92	13	**61.38**	22.98	20- 92	-.238	.812
BKB Sentences Recorded 65dBA (Quiet)										
	13	**82.15**	14.24	52- 100	13	**84.46**	14.00	50- 100	-.940	.347

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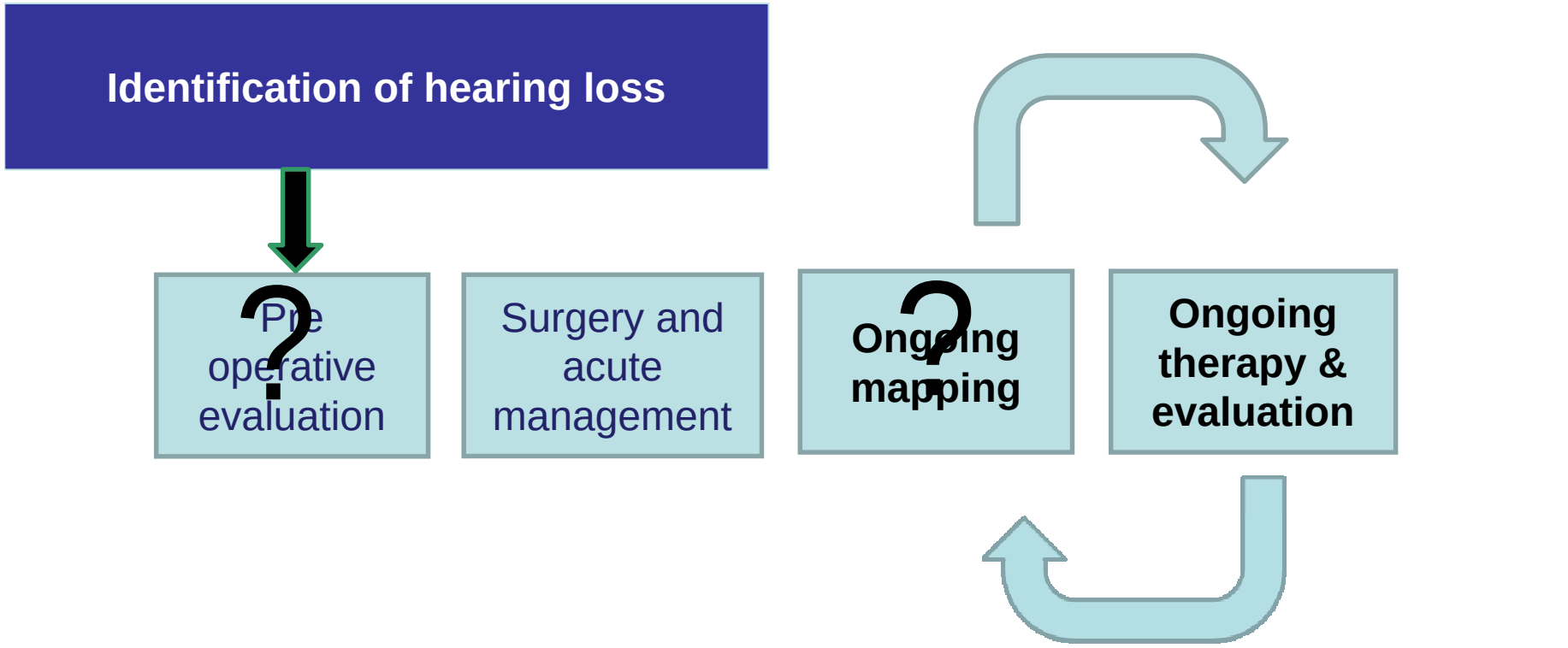

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Ongoing management

- Habilitation – RIDBC teleschool
- Mapping – use of teleaudiology using Custom Sound
- Speech and language evaluations – through RIDBC teleschool in collaboration with local professionals when necessary
- Case conferencing – setting goals, training on equipment use, review meetings

“A home model” of CI management

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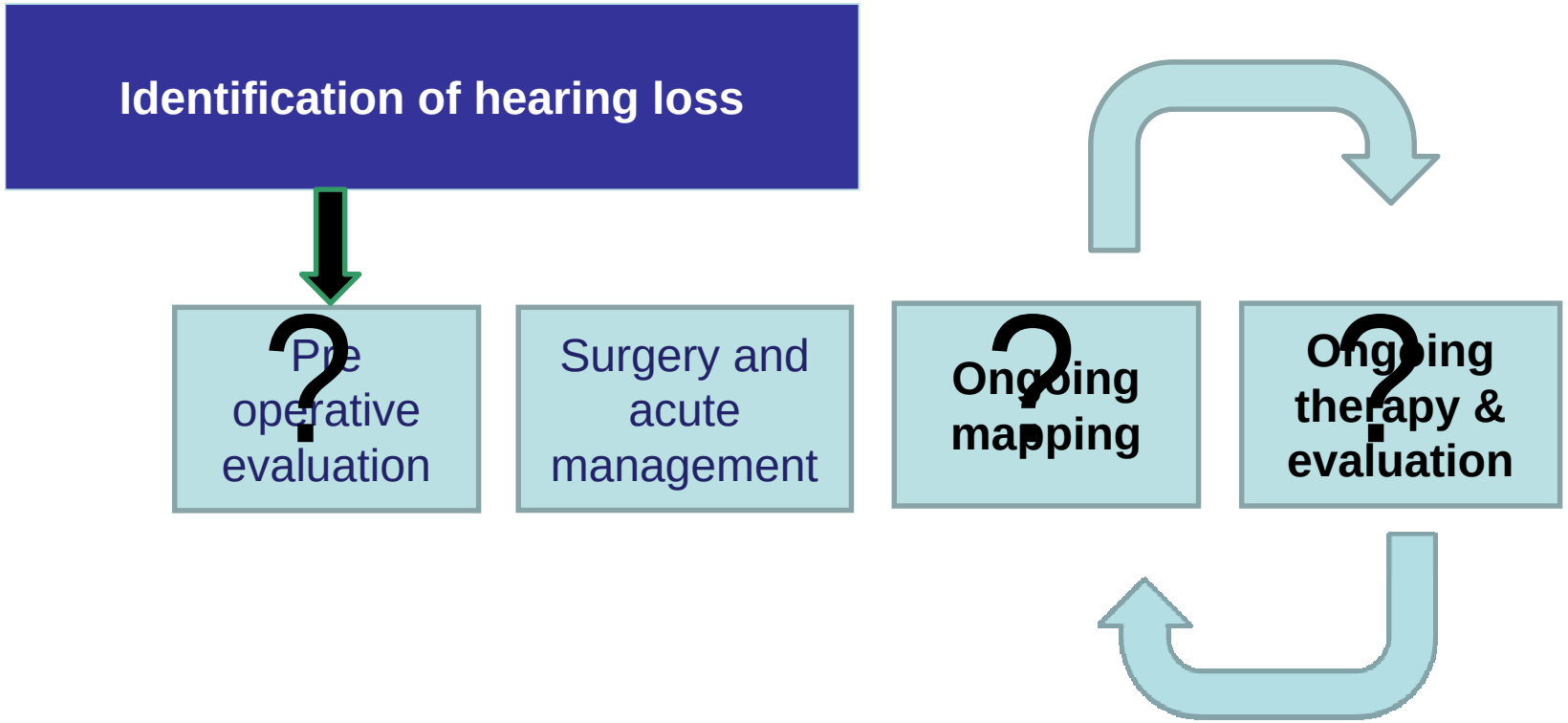
Future research

- Validation of **speech perception testing** to enable preoperative evaluation and post operative management
- Hearing CRC collaborative study with Hear and Say, SCIC and RIDBC to develop a gold standard of practice

Some precautions

- Validation for CI mapping has been with professionals at the other end. Need to develop new guidelines when family members involved.
- It is hypothesised that newborns and infants will require a more blended service for aspects of their cochlear implant journey, however use of telepractice can reduce the amount of stress involved in attending appointments

Cochlear implant models



Life long management of CI recipients

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- For Professional Development Opportunities, see **www.ridbc.org.au/renwick**

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CRC

The HEARing CRC is established and supported under Cooperative Research Centres Program, an Australian Government Initiative.

Ter-Horst, K., Leigh, G., & Cook, G. (2012, July 26). Application of tele-audiology to screening and assessment of school-age children. Paper presented at 11th Asia Pacific Congress on Deafness/6th NUH-NUS ENT Head Neck Surgery Conference, Singapore.

Ter-Horst, K., Leigh, G., & Cook, G. (2012, July 26). A comparative investigation of tele-audiometry and conventional audiology with school-age children. Paper presented at 11th Asia Pacific Congress on Deafness/6th NUS–NUH ENT Conference, Singapore.