The current status of FM system usage among children with hearing impairment in Singapore primary schools

Research Presentation AUD 5224 Independent Study 2

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The aim of the study

To survey the current status of FM system usage among hearing impaired children attending the mainstream primary schools in Singapore, particularly looking at:

1. The motivation of students and teachers in utilising FM system in class
2. Motivation of audiologists in recommending the FM system to their paediatric patients with HA/CI*.

Information of the study

Background information

1) Learning for children happens most in classroom (Smaldino & Flexer, 2014)
2) Poor classroom acoustics (Crandell & Smaldino, 2000)
3) SNR* +10dB (Normal Hearing); +15dB (Hearing impaired) (Seep et al., 2003)
4) Limitation of HA & CI (Dillion, 2012)
5) Benefits of FM system in class (Crandell et al., 2005; Hawkins and Yacullo, 1984; K. L. Anderson and Goldstein, 2004).
6) Well established data in other countries usage, but these findings cannot be generalized easily to our polyglot country (Bess and Tharpe, 1986; K. Anderson & Matkin, 1996; K. L. Anderson and Goldstein, 2004)
7) No clear data seen in Singapore for FM system usage in Schools (perception & motivation of HI students & teachers)

Methodology

Procedure

Phase 1

Audiologist

Survey through online questionnaire platform (google form)

Phase 2

Hearing impaired student & Teacher

Survey through hardcopy questionnaire in government primary schools

*Only phase 1 was completed and data collection was not completed for phase 2 due to time constraint. For data collection, all responses were collected through an online platform.

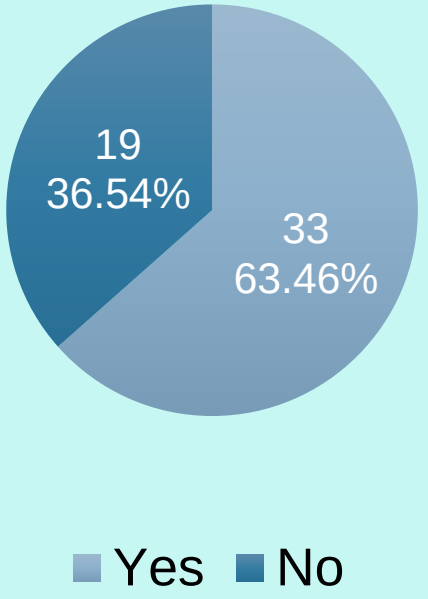
Participants

Predicted sample size
(Based on 5% CI*, 95% CL* & estimated population)
Students : **380**
Teacher : **124**
Audiologist : **80**

Audiologist
52 participants

- 33 audiologist who see children for HA/CI management
- 19 audiologist who do not see children for HA/CI management

A1_Do you see paediatric patients for hearing aid/cochlear implant management?



Methodology

Materials

The audiologist questionnaire is divided into 3 sections (A, B & C)

Section A
Patient Demographics

- 3 questions (A1-A3)
- **Work experience with children**
- **Working sector**
  - Public or Private
- **Working experience**
  - 10 years & less or more than 10 years

Section B
Motivating factors

- 9 questions (B1-B9)
- **Outcome benefits of utilising device** (speech perception)
- **Knowledge of device**
- **Other reasons possibly recommending the device** (monetary factor)

Section C
Factors (patient's information)

- 4 questions (C1-C4)
- Consideration before recommending FM system
  - **Type of HL**
  - **Degree of HL**
  - **Age group of HI children**
  - **Duration of usage**

Results

The aim: Motivation of audiologists in recommending the FM system to their paediatric patients with HA/CI.

Main motivating factors of audiologist to recommend FM system to the hearing impaired child:

1. **Child's listening needs for class lessons**
2. **monetary funding for the FM system**
3. **Age group**
4. **hearing profile of the paediatric patients**

Results

Further analysis using Fisher's exact test & McNemar test, to assess:

1. Fisher's Exact Test – Section B & C (B5, B7, B8, B9 & C2)
   - unable to find any significance influence caused by one's work sector or level of work experience
2. McNemar Test – Inter-comparison within:

   a) frequencies (Low to Mid frequency Vs. Mid to High frequency) & severity of HL
      - No significant difference for frequencies or severity of hearing loss

   b) Type of HL
      - Significant difference leaning towards recommending patient with SNHL as compared to CHL

Discussion

Question B2: Speech perception

"*I agree that FM system are necessary for paediatric patients who are fitted with the hearing aid/cochlear implant to function well in a noisy classroom environment*".

- Majority (97%) of the participants agreed to the statement
- Findings consistent with other well documented studies on utilising FM system to improve speech perception as clear benefit for children with HA/CI in noisy classroom (Anderson & Goldstein, 2004; Hawkins, 1984; Zanin & Rance, 2016).

Based on prior study knowledge, possible assumption can be made:

- Participants may recognised benefits of utilising FM systems for school learning purposes

However, 3% of the participants had strongly disagreed to this statement.

- Findings do not tally with findings found in B3 – 100% disagreed with the statement

"The FM system does not seem to improve hearing impaired children's listening condition in class."

- Possible reason:
  - (3%) Participants may agree FM system improve listening condition for hearing impaired children in class but may not agree that it is useful under noisy conditions

*Although small fraction of participants disagree to this statement, **speech perception for the hearing impaired child to function in a classroom environment still remains as one of the motivating factors for audiologist to recommend the FM system.**

Discussion

Question B8 & C2: Reliance of FM system & Age group

B8 "*I do not want hearing impaired children to be overly reliant on the FM system which may cause the loss of ability to localise environmental cues or sounds.*"

- Majority (72.8%) of the participants disagreed to the statement

- Possible reason:
  - These participants may believe that the benefits of the FM system outweighs the ability to localise environmental cues or sounds.
    - These findings were contradicting to well-established theory indicating that children should not be overly reliant on the FM system at all times especially younger children as to not lose the ability to pick up incidental cues (Madell, 2014).
      - During **preschool age**, **environmental cues** play a large role for learning as children **pick up incidental learning** through their surrounding environments (Akhtar et al., 2001).
      - As hthe **cild grows older**, **learning is derived more through the dependence of a sole speaker** (mainly the teacher) and is more **linguistically loaded**, thus the child has to **depend more** on their **auditory skills.** With this reason, it give rise to the need for the Hearing impaired child to utilise an FM system to keep up with their teachers so as to capture as much information as possible for learning (Madell, 2014)

C2 "What is the age group that you will start recommending an FM system?"

- It was found that participants had mainly chose to start recommending an FM system to a child with hearing aids and/or cochlear implant when the child was either in nursery, kindergarten or primary school. **(30% - primary schools, 45% - kindergarten, 24% - nursery group)**

Discussion

Inter-comparison within types of hearing loss

- Participants are inclined towards recommending an FM system a child with sensorineural hearing loss as compared to conductive hearing loss

These findings were contradicting with other existing literature stating that children with constant and fluctuating middle ear conditions, would require a higher SNR in which FM system can provide (Anderson & Goldstein, 2004; Hawkins, 1984; Dillon, 2012; Thornton et al., 2012; Uclés et al., 2012; Zanin & Rance, 2016).

Conclusion

Limitation

- Questions were mainly general
  - In-depth interview can be given to obtain details of the underlying reasons behind their responses
    - To uncover reasons behind the participant's motivation to recommend FM system given that several key motivators (i.e. age group, type of hearing profile) are not consistent with existing studies.

- Due to time constraints, this study has only managed to uncover its first aim.
  - Further completion should hopefully **paint a better picture of FM system usage among these hearing impaired children**. This would then provide the grounds for **better solutions to improve utilisation rates and raise the consistency rate of usage.**

Conclusion

First phase of the study

- The study shown that audiologist recommend FM systems to their paediatric patients based on
  - Listening requirements for the child in class
  - Monetary funding for the FM system
  - Age group
  - Hearing profile of the paediatric patients

- These findings may **set the foundation** for better understanding the motivating factors of the audiologist so as to rectify and **possibly standardise a common standard** for **when and how we should recommend the FM system.**

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