



# **Statistical results of the cochlear implant case study using a database application software**

Ning Zhang<sup>1</sup>, Sha Liu<sup>2</sup>, Guohong Zhou<sup>1</sup>

1 Dept. of BME, Capital University of Medical Sciences, Beijing 100069, China

2 Beijing Otolaryngology Institute, TongRen Hospital, Beijing, 100730, China



# *Outline*

- *Aim of the study*
- *Introduction of the CI software*
- *Material and methods*
- *Statistical results*
- *Discussion and conclusion*



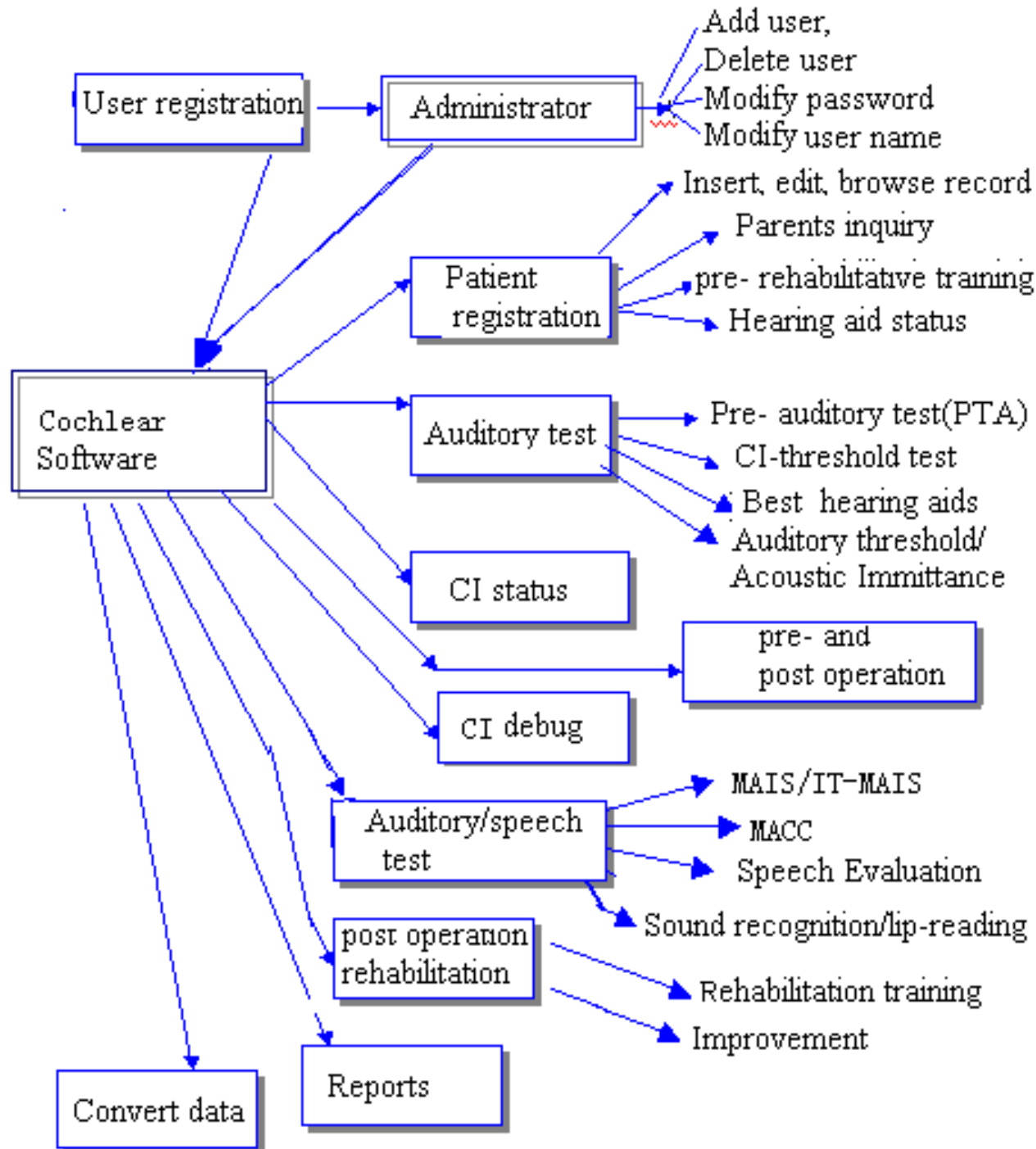
## *Aim of the study*

- ***Using the CI database application software and SPSS to process cochlear implanted patients' data, in order to know what factors influence the cochlear implant effects.***



## ***Introduction of the CI software***

- We have developed a database application software to manage patients' data with a cochlear implant.**
- The aim of the software is to help the decision-making for a cochlear implant, to develop a better pre-operative procedures that can predict how well a patient will perform with a cochlear implant, and also to reach a level by future research that will enable all implant patients to be "better-performing" patients.**



**Function  
modules  
Of the  
software**

# User interface for hearing level assessment

**听力检查**

文件(F) 关于(A)...

病人记录浏览-->

记录定位  
 按编码查询  
 按姓名查询

编码  查找  请填入姓名

编码: 000001 姓名: 余丝丝

听力检查 | 助听听阈、声阻抗 | 选配最佳助听器情况 | CI\_听阈检查 | ABR-40HZ-OAE-前庭-智测-心测-CTMRI

编码  姓名  病历号  测试日期  测试方式

左耳气导250Hz	左耳气导500Hz	左耳气导1KHz	左耳气导2KHz	左耳气导3KHz	左耳气导4KHz	左耳气导6KHz	左耳气导8KHz
▶ 1050	1200	1200	1200		1200		1100

右耳气导250Hz	右耳气导500Hz	右耳气导1KHz	右耳气导2KHz	右耳气导3KHz	右耳气导4KHz	右耳气导6KHz	右耳气导8KHz
▶ 100	105	105	1200		1200		1100

左耳骨导250Hz	左耳骨导500Hz	左耳骨导1KHz	左耳骨导2KHz	左耳骨导3KHz	左耳骨导4KHz
▶					

右耳骨导250Hz	右耳骨导500Hz	右耳骨导1KHz	右耳骨导2KHz	右耳骨导3KHz	右耳骨导4KHz
▶					

填表人  术前术后

# User interface for speech perception ability test

听觉功能/言语测试

文件(F) 关于(A)...

病人记录浏览-->

编码 000003 姓名 刘兆

记录定位

按编码查询  按姓名查询

请输入编码  查找

姓名  查找

MAIS/IT-MAIS/听觉康复评估 MACC 声音辨别、唇读

编码  姓名  病历号  测试日期  CI手术日期

测试方式:  术前术后  填表人

Test mode Minimal Auditory Capabilities In Chinese, MACC

汉语最低听觉功能测试: (MACCA)

vowel monosyllabic word

元音辨别	辅音辨别	噪声中言语	数词辨别	短句测试	同音单音节	同音双音节	单音节词	双音节词	环境声
I	51~75%	51~75%		26~50%					

噪声/噪音	男女声辨	唇读短句	唇读辅音	短文测试	重读辨别	扬扬格异同	语调辨别
		0					
		1~25%					
		26~50%					
		51~75%					
		76~100%					

spondees

返回

# Rehabilitation and progressive status records

**术后康复情况**

文件(F) 关于(O)...

病人记录浏览-->

编码 000001 姓名 余丝丝

**记录定位**  
 按编码查询  
 按姓名查询

请填入编码

姓名

术后康复训练 | 进展情况 |

编码  姓名  病历号 420507 测试日期

使用人工耳蜗后改善唇读能力了吗?

**术后唇读能力**

极好 (基本上所有的话都能理解)  
 很好 (能理解一部分话)  
 好 (对家人和朋友的话理解的好, 但对陌生人困难)  
 较好 (对家人和朋友说的简单话可以理解)  
 差 (对家人和朋友的话也不能理解)

**术后唇读测试得分**

0  20  40  60  80  100

**术后交流方式 (可以多选):**

正规手语  听觉言语  唇读  书写  
 非正规手语  噪音言语  其他

**术后2周培训情况**

A. 全天培训 (100%)  
 B. 经常参训 (75%)  
 C. 有时参训 (50%)  
 D. 很少参训 (25%)  
 E. 从未训练 (0%)

**术后1个月**

A  
 B  
 C  
 D  
 E

**术后3个月**

A  
 B  
 C  
 D  
 E

**术后6个月**

A  
 B  
 C  
 D  
 E

**术后12个月**

A  
 B  
 C  
 D  
 E

单位

累计培训时间

填表人

培训地点  省、市 培训机构





## ***Material and methods***

- **Software tool:** CI database application software
- **Questionnaire investigates**
  - Patient basic information
  - Ability of lip reading
  - Communion ability
  - Communion method
  - How satisfied by their parent
  - Where they go after CI operation



# ***Material and methods***

## **○ Subjects**

- 100 pre-lingual deaf adolescent who underwent cochlear implant in Beijing TongRen Hospital during the years 1997~2004
- Average age is 13 years old
- CI usage time was from 6 months to 8 years
- Insisted to use CI everyday



## ***Material and methods***

- **Data records:** Patient data and the questionnaire investigation results were input to the software.
- **Statistics analysis:** Make use of the statistics function module in the software, convert each data item which related with the statistic study to a text file formatted as a SPSS input file. Use SPSS11.5 to do data statistics and analyse.



## ***Statistical results***

- Communion ability after using CI
  - 63% parents thought that their children can make simple communion.
  - 8% parents thought that their children can attain normal communions basically.
  - All quizee expressed that the patients still rely on the help of lip-reading and can't attain normal person's level.



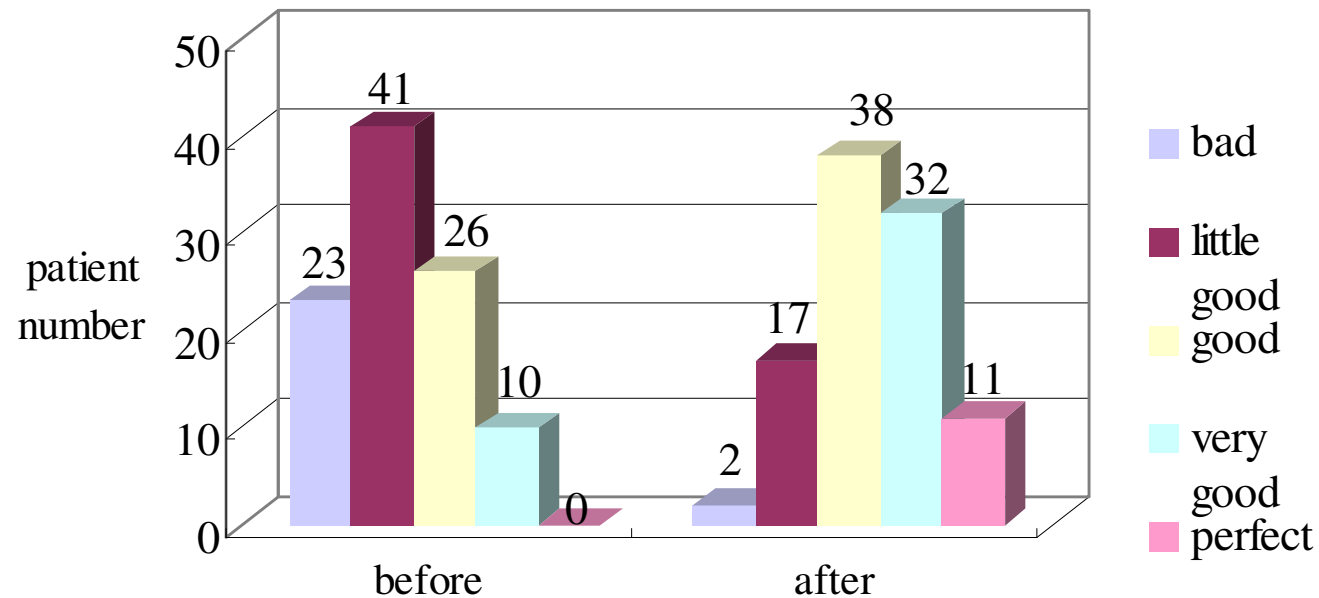
## Changes of communion method

- Before accepting CI, 67% patients used lip-reading to communicate, the rest adopted hand language.
- After using CI, 98% patients used lip-reading, and 22% use listening and speaking as a main communion method, another 2% patients still mainly used hand language.



# Changes of communion method

- 98% patients had improved their ability of lip-reading. There is significant difference between ability points before and after using CI ( $p < 0.01$ ).



**The distribution of the lip-reading ability**



## Approval of comprehension ability

- 58% parents thought that their children got more assistance in understanding environmental sounds than understanding speech by using CI.
- The ability of distinguishing 10 kinds of environment sounds is divided into 5 grades, including telephone bell ring, knock on a door, car hoot, etc. One point means never recognized, 5 point means always recognized. 36% patients got full points of the 10 items.



# Using of CI

- 96% patients could insist to use CI over 10 hours everyday, 4% patients used CI 2~ 9 hours per day because of noisy feeling, psychological stress etc.
- 36% patients could use telephone, but feel difficult to understand.
- 49% patients had been used to watch TV with CI, but need help of reading screen caption to understand the conversation content.



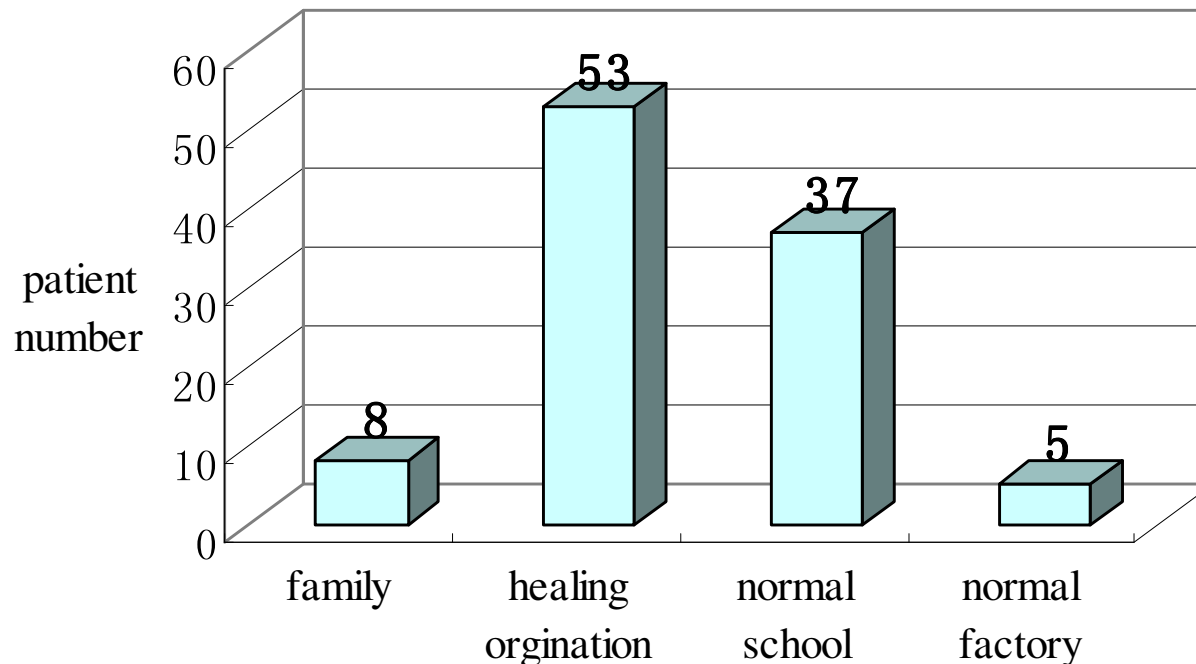


# Patients' psychology

- 13% parents said that as age increased, their children had increasingly psychological stress. They did not like to communicate with other people, consequently they did not like to use CI to learn speaking.
- 12% parents thinking that their children would like to communicate with others, and thought themselves are just like a normal person.
- 75% parents thought that the personalities of their children were not changed obviously after using CI.

## Places where patients went after CI operation

- Before using CI, 25% children had gone to a normal school, 64% had been trained in deaf school or hearing organization. 2% had never accepted speech training.
- After CI operation, all patients accepted speech training, 50% of them were in the hearing organization, 8% were trained in family, 42% entered normal school or factories.



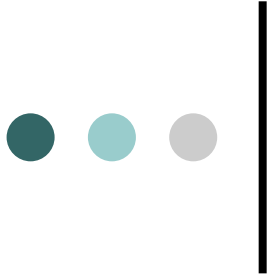
## Other factors that influence CI's effect

Grp	Factors	Example	Num	Score ( $\bar{x} \pm s$ )	Result
1	Sex	Boy	49	$3.83 \pm 0.57$	P>0.05
		Girl	51	$3.73 \pm 0.74$	
2	CT result	Ear abnormality	13	$3.85 \pm 0.80$	P>0.05
		No ear abnormality	87	$3.76 \pm 0.65$	
3	Age at operation	9~10	26	$3.87 \pm 0.56$	P<0.05
		20	7	$2.29 \pm 0.95$	
4	Place went after operation	Normal school or factory	42	$4.07 \pm 0.53$	P<0.05
		Still be trained	58	$3.54 \pm 0.67$	
5	Intervening time	Before 5-year-old	41	$3.94 \pm 0.73$	P<0.05
		After 5-year-old	59	$3.67 \pm 0.60$	



## ***Discussion and conclusion***

- There are various benefit for elder age pre-lingual deaf adolescent who took a CI operation. After complete evaluation, patients can be suggested to choose CI.
- The factors which influence curative effects of CI are various. Parents should think over before deciding to choose CI for their children.
- CI database application software can bring convenience to implant center specialists.



Thank you !