

# Automated Audiometry: Increasing access.

Reliability, Accuracy and Efficiency.

Hlolo Ramatsoma  
Audiologist: Research & Clinical



# History of Automation

- First Automated Audiometer: Dated back to 1947 (Békésy, 1947)
  - “The number of audiometric examinations made today has grown to such a magnitude that it is only natural that some of the techniques of measurement should become automated. (p. 30)” - (Jerger, 1963)
- Automation of audiological tests: OAE, ABR and Tympanometry.
- Automated Audiometry? An automated threshold seeking hearing assessment that can determine hearing thresholds as accurate as manual audiometry.

# Hearing Loss is on the rise!

- 466 million persons worldwide have a disabling hearing loss
  - 34 million of these are children.
  - 90% these children live in LMIC.
- WHO reports by 2030, there will be 630 million people with disabling hearing loss
- It is estimated that 900 million people will have disabling hearing loss by 2050

# Hearing Healthcare access

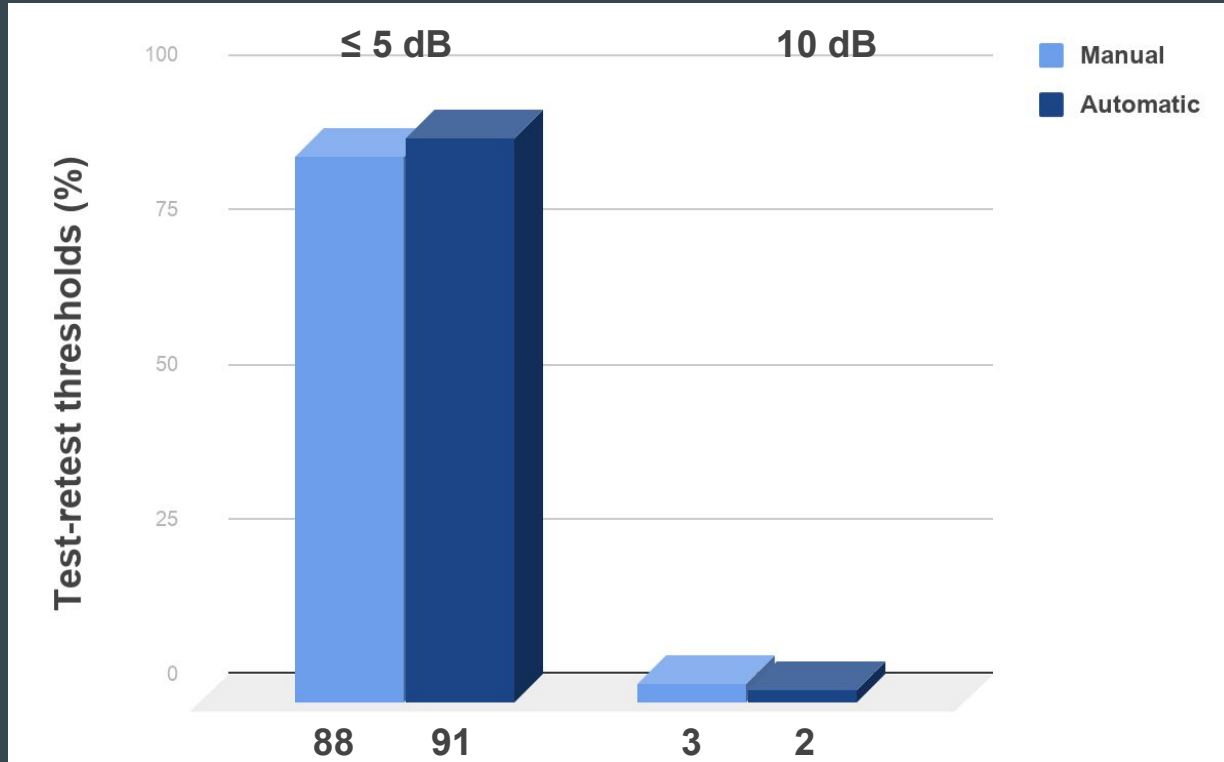
- In 2013, only 16000\* audiologists served the entire US population (Windmill and Freeman, 2013).
- In Sub-Saharan Africa, the ratio of practitioner to patient is less than 1:1 000 000.
- In South Africa, there are <3000 Audiologists to 55 million people.
- The majority of the African countries do not have audiology services available.

# Is change reliable and accurate?

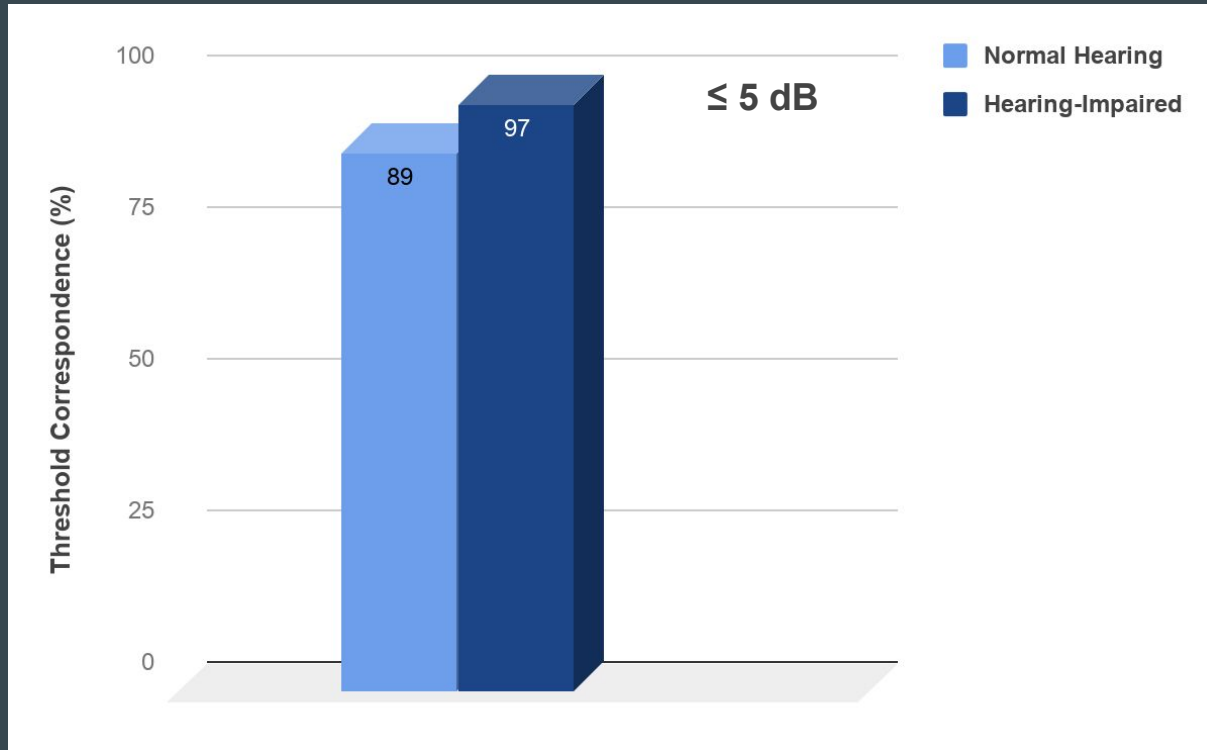
- **Objective:** This study investigated the reliability, accuracy, and time efficiency of automated hearing assessment.
- **Subjects:** 30 normal-hearing subjects and 8 hearing-impaired subjects.
- **Methods:** Each subject was tested twice (Manual & Automatic).
  - With pure-tone air conduction audiometry (125-8000 Hz).
  - Test-Retest Reliability



# Research Findings



# Research Findings



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- Both methods were time efficient: average of 7.2–7.7 min required to test both ears for manual and automated audiometry
- 63% of subjects preferred automated threshold seeking method.



# Benefits of Automated Audiometry

- Audiometry can be performed using any threshold seeking method.
- Automated audiometry results in fewer errors than human testers.
- It yields accurate and reliable results: measurement of subject response time, test-retest reliability, false-positive responses, response consistency.

# Benefits of Automated Audiometry

- Audiologists time can be freed to work with more difficult cases.
- More patients can be seen in environments with limited or no hearing healthcare professionals.
- Best option for tele-audiology, especially asynchronous principle.

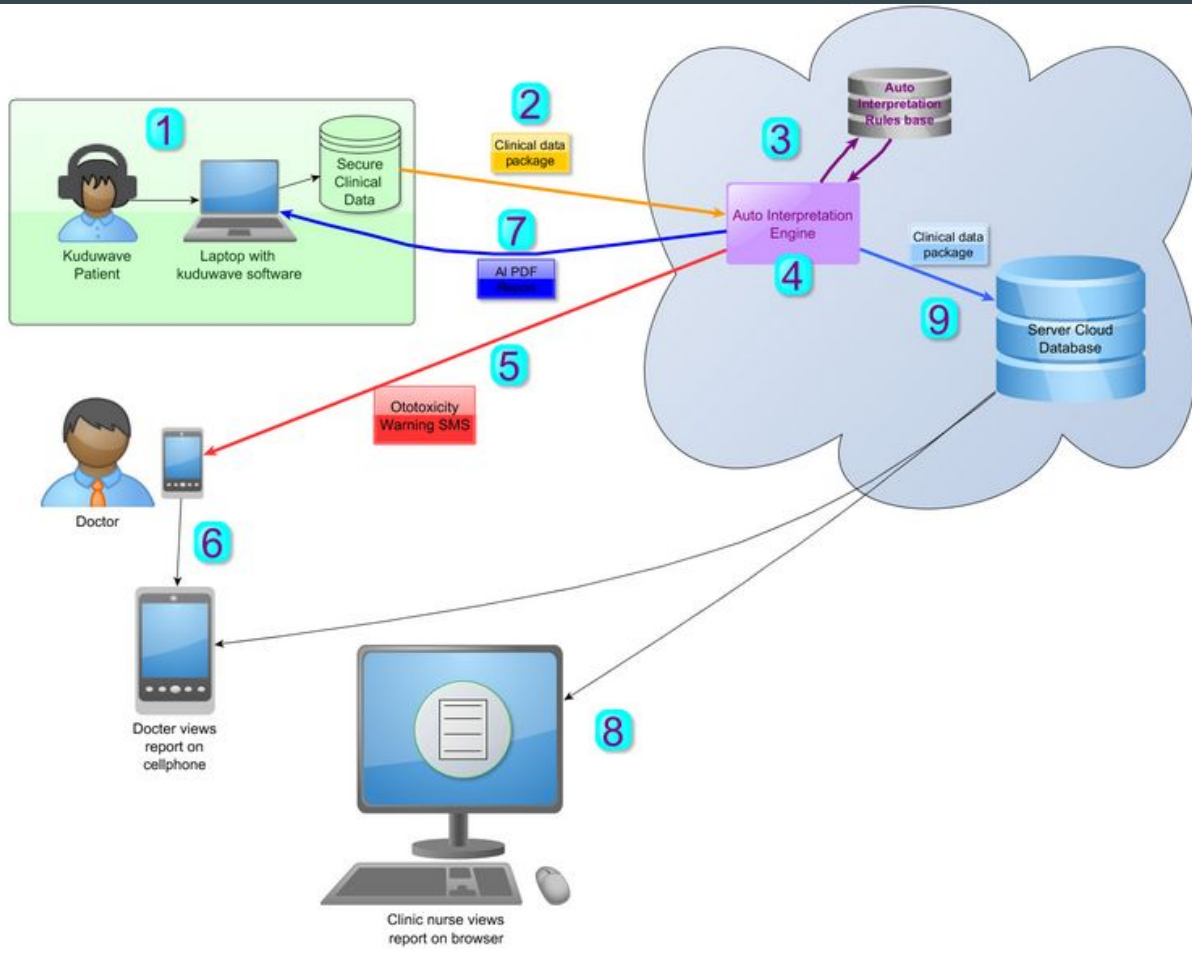
# Automation in Clinic

Room 1



Room 2





# References

- Békésy, V. G. (1947). A new audiometer. *Acta Oto-Laryngol*, 35, 411–422.
- <http://www.who.int/deafness/world-hearing-day/whd-2018/en/>
- Windmill IM, Freeman BA. (2013) Demand for Audiology Services: 30 Year Projections and Impact on Academic Programs. *Journal of the American Academy of Audiology* 24:407-416.

