Pediatric hearing loss: A population-based survey in peri-urban Kumasi, Ghana

Larsen-Reindorf R, Otupiri E, Anomah E J, Edwards B, Frimpong B, Waller B, Basura G

For: Coalition on Global Hearing Health
Cape Town, South Africa; October, 2018

INTRODUCTION

- The World Health Organization (WHO) in 1948 defined health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."
- The current approach to disease prioritization tends to exclude nonfatal yet disabling conditions (Olusanya et al., 2006).
- According to WHO, 7% of the 466 million persons in the world living with disabling hearing loss are children (WHO, 2018).
- The prevalence of pediatric hearing loss in Ghana remains unknown.

OBJECTIVES

- Main study objectives:
  - Identify the rate of pediatric hearing loss in peri-urban Kumasi in children aged 3-15 yoa in our study
  - Determine feasibility of using a portable screening (ShoeBOX iPad) audiometer
  - Evaluate the practicality of use of LittlEARS questionnaire
  - Identify follow up rate of children who refer on initial pure tone hearing screening

METHODS 1/2

- This study was nested in the Family Health & Wealth Study (FHWS), an open-cohort population-based study in peri-urban Kumasi.
- Informed consent was sought from parents / caregiver and assent sought from children before enrollment.
- A pilot study was conducted previously; challenges identified helped to inform this study.

METHODS 2/2

- Enrolled participants completed
  - Validated LittlEARS Questionnaire (LEAQ) to assess auditory behavior
  - Otoscopic examination
  - Pure tone screening using ShoeBOX Audiometer in large mobile unit
    - Each child was conditioned with screening at 1, 2, 4 kHz monaurally at 25 dB HL
    - Refer = failure to respond to any screening pure tone

SHOEBOX iPad Audiometer

Clearwater Clinical SHOEBOX iPad audiometer

https://clearwaterclinical.com/

Clearwater Clinical SHOEBOX iPad Audiometer

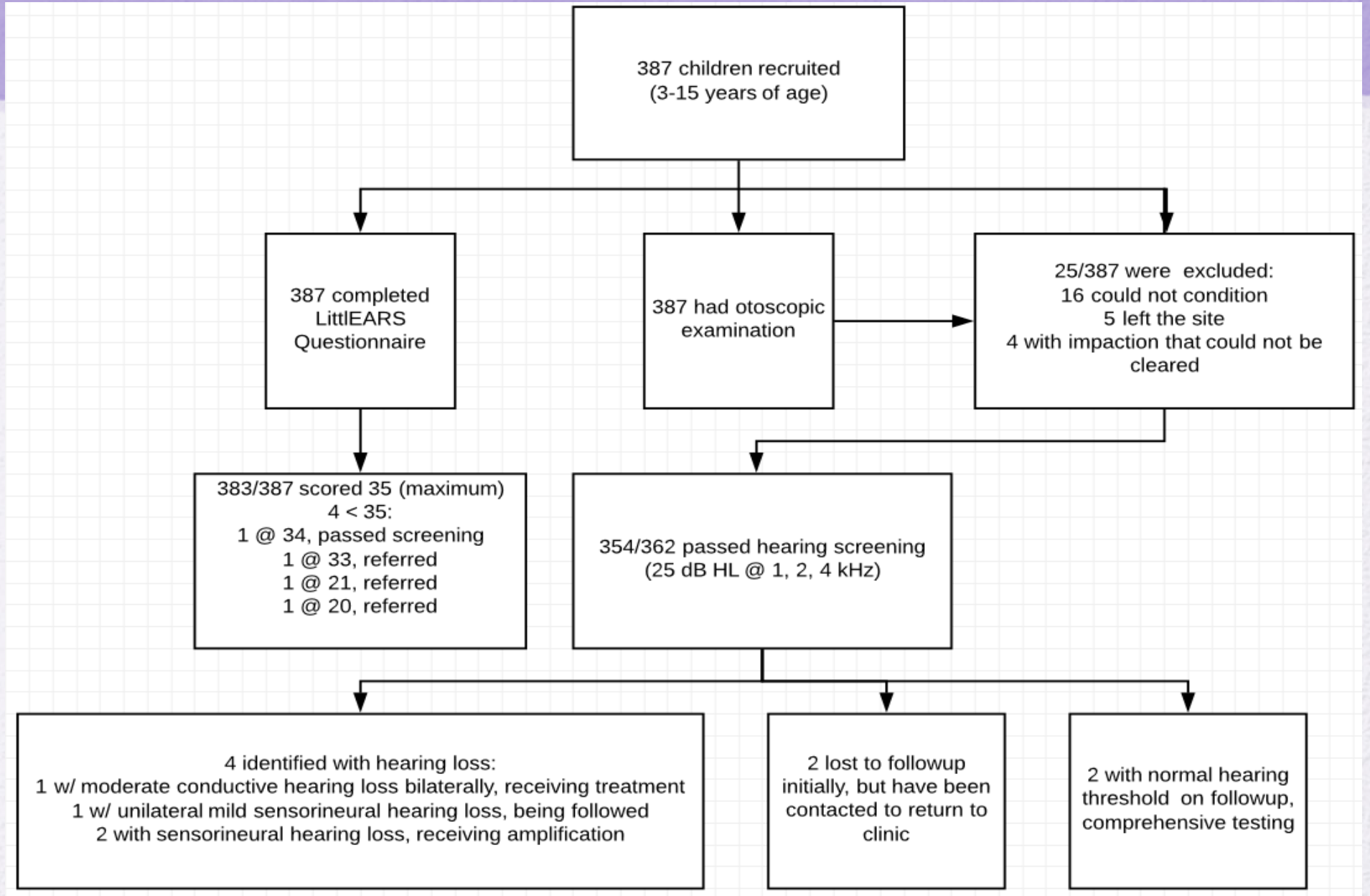
Clinical features:

- Pure tone air & bone with masking
- Speech reception threshold, word recognition testing
- Manual, assisted, automated test modes
- REACT™ algorithm for background noise
- Extended high frequencies (to 16kHz)
- Embedded inventory, surveys, customized questionnaires

Data management:

- Web portal, accessible from browser
- Automatic back-up from iPad
- Secure, HIPAA-compliant storage
- Flexible search/filter capabilities for viewing data
- Electronic data transfer/export of patient test results
- Administrative control for assigning user access

RESULTS 1/2


387 children recruited
(3-15 years of age)
387 completed
LittlEARS
Questionnaire
387 had otoscopic
examination
25/387 were excluded:
16 could not condition
5 left the site
4 with impaction that could not be
cleared
383/387 scored 35 (maximum)
4 < 35:
1 @ 34, passed screening
1 @ 33, referred
1 @ 21, referred
1 @ 20, referred
354/362 passed hearing screening
(25 dB HL @ 1, 2, 4 kHz)
4 identified with hearing loss:
1 w/ moderate conductive hearing loss bilaterally, receiving treatment
1 w/ unilateral mild sensorineural hearing loss, being followed
2 with sensorineural hearing loss, receiving amplification
2 lost to followup
initially, but have been
contacted to return to
clinic
2 with normal hearing
threshold on followup,
comprehensive testing

RESULTS 2/2: Notable on Otoscopy

- Zero children with active ear infection
- 5/387 (1%) with foreign body in ear
- 151/387 (39%) with occluding wax in one/both ears

CONCLUSIONS/NOTES

- Study goals were met
  - Established feasibility of portable hearing screening and questionnaire
  - Have capacity to identify pediatric hearing loss in community
    - In current study based on limited pool, 2.21%
    - Larger cohort required to establish true prevalence
- Follow up rate was 75% (6/8 children)
- Further followup for 25 excluded children being conducted currently
- Environmental noise levels outside of sound booth affect hearing screening

RECOMMENDATIONS

- Hearing loss in Ghanaian children should be investigated on a wider scale.
- Portable hearing screening devices could be useful in that effort.
- Background noise in area is a significant impediment to successful in-community hearing screening.
- Long term goal - establish a national program of pediatric hearing screening and identification.

ACKNOWLEDGEMENTS

- Study population at Asokore Mampong
- Ghana Health Service
- Department of Otolaryngology/Head and Neck Surgery @ University of Michigan
- School of Public Health, Kwame Nkrumah University of Science & Technology
- Family Health & Wealth Study coordinators

REFERENCES

- United Nations Treaty Collection: Constitution of the World Health Organization, New York, 1948; @ http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IX-1&chapter=9&clang=_en

- Olusanya BO, Luxon LM, Wirz SL. Ethical issues in screening for hearing impairment in newborns in developing countries. *J Med Ethics* 2006; 32:588-91

- WHO, Deafness and hearing loss, key facts, 2018; @ http://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss

- Edwards B, et al. Pediatric hearing loss in Kumasi, Ghana: a pilot validation study using in community metrics to establish feasibility of testing. 8th Annual Coalition for Global Hearing Health Conference, Coral Gables, FL, USA, October, 2017