Harnessing Technology for Hearing Health: The HeLe Project

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DISCLOSURE

No financial conflicts of interest to disclose

Increasing the Rates of Newborn Hearing Screening with Novel Technologies and Telehealth

Development of a Cost-effective, Portable, Online, EMR-Integrated Automated Acoustic Brainstem Response (Tele-AABR) Device for Newborn Hearing Screening using Telehealth Strategies

BILATERAL PROFOUND CONGENITAL HEARING LOSS

1.38 in 1,000 births

(Chiong, Ostrea, Reyes, Llanes, Uy, Chan; 2007)

PROJECTED LONG-TERM SAVINGS FOR EVERY CHILD GIVEN INTERVENTION

₱ 4,300,000

(Santos-Cortez & Chiong; 2013)

WORLD HEALTH ORGANIZATION

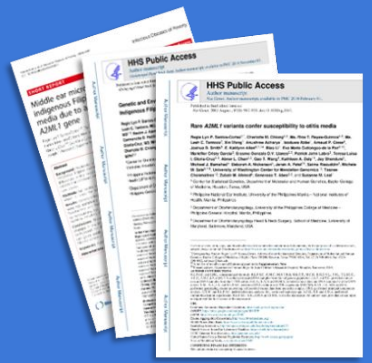
2000 CALL TO ACTION

World Health Assembly
4th Consultative Meeting
Geneva, Switzerland

"It is recommended that a policy of universal neonatal (hearing) screening be adopted in all countries and communities with available rehabilitation services and that the policy be extended to other countries and communities as rehabilitation services are established."

Republic Act of 9709 of 2009

Universal Newborn Hearing Screening & Intervention Act



RESEARCH & PUBLICATIONS

HEALTH LEGISLATION

PROGRAM DEVELOPMENT

POLICY IMPLEMENTATION

UNIVERSAL NEWBORN HEARING SCREENING:

ROADBLOCKS TO IMPLEMENTATION

Geographically

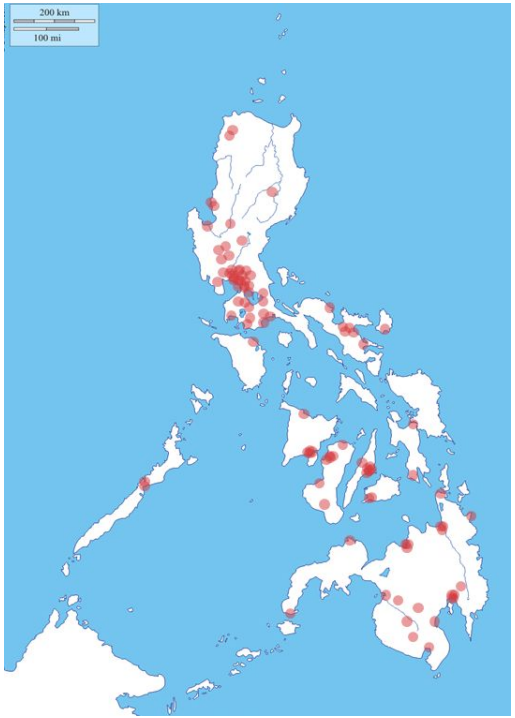
Isolated &

Disadvantaged

Areas

UNIVERSAL NEWBORN HEARING SCREENING:

ROADBLOCKS TO IMPLEMENTATION



Distribution of Services

- ➔ Cost of Equipment
- ➔ Cost of Providing Services
- ➔ Sustainability

UNIVERSAL NEWBORN HEARING SCREENING:

ROADBLOCKS TO IMPLEMENTATION

Professional	Number	Ratio to Population
Clinical Audiologists	91	1:1,100,000
Certified Screeners	932	1:107,000
Speech Pathologists	415	1:240,900

Human Resources

(2016 data)

UNIVERSAL NEWBORN HEARING SCREENING:

ROADBLOCKS TO IMPLEMENTATION

DATA REPORTING

REGISTRY UTILIZATION:

***39,309*/250,000**

electronic registry entries

***29,407*/250,000**

manual submission

(Sept 2017 data)

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PRODUCTS

HEARING FOR LIFE PROJECT

ELEARNING SYSTEM

Allows for remote training on newborn hearing screening, telehealth, and HeLe device and system use

HELE SCREENING PROTOCOL

An Automated Auditory Brainstem Response (AABR) device capable of connecting to an EMR and submitting to the Registry

CAPACITY-BUILDING

Increases the number of NHS certified-screeners and telehealth-trained health providers

RESEARCH

Provides additional studies on piloting a community-based NHS program enabled by telehealth & telemedicine

TELEREFERRAL SYSTEM

Connects screening, confirmatory and intervention services through the National Telehealth Service (NTS) Website

EMR MODULE ON NHS

Capable of submitting data elements to the NHSRC Registry through the Community Health Information Tracking System (CHITS)

HeLe
HEARING FOR LIFE

PROJECT OBJECTIVES

- ❑ Develop a diagnostic device with telehealth capability for Automated Auditory Brainstem Response (AABR) for Newborn Hearing Screening
- ❑ Develop an efficient, scalable approach for on-boarding stakeholders and training health workers
- ❑ Develop scalable telehealth protocols and systems to support NHS with local health workers and institutions.

DEVICE DEVELOPMENT

raw ABR waves

AABR

PASS / REFER

DEVICE DEVELOPMENT: RAPID PROTOTYPING

Citris provided the necessary facility, tools and equipment in their Innovation Lab during the engineering team's visit in June 2017 and March 2018. Collaboration with the Citris team continued succeeding the June 2017 visit, through David Lindeman and Dan Chapman.

CITRIS AND THE BANATAO INSTITUTE

DEVICE DEVELOPMENT: USER-CENTERED DESIGN

- Industrial design playing a big role
- Intuitive design with the end-user in mind
- Improve on flaws of previous designs

DEVICE DEVELOPMENT

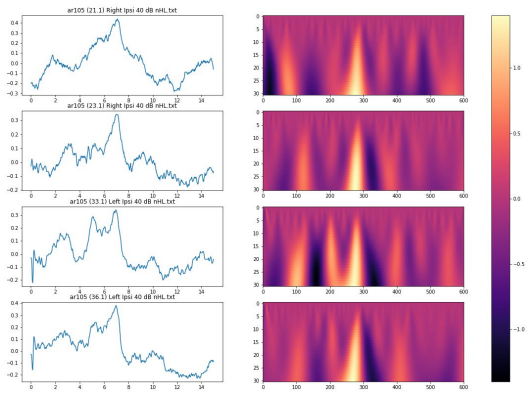
PROOF-OF-CONCEPT → **ALPHA** → **BETA**

- [x] PH FDA Registration: Investigational Device
- [x] Technical Specifications

- [x] Safety Testing
- [x] Bench Efficacy Testing
- [x] Pilot Testing

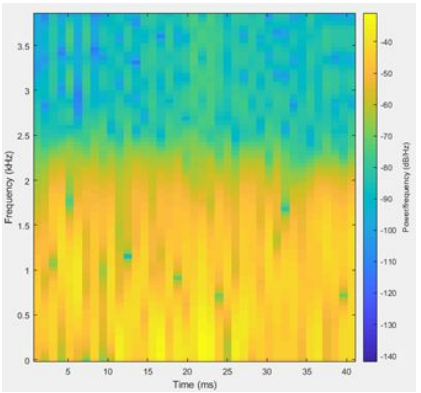
DEVICE DEVELOPMENT: ANALYSIS OF WAVES

ABR



raw ABR waves

AABR



PASS / REFER

- ☑ Novel Methods of Analysis
- ☑ Comparable Sensitivity and Specificity

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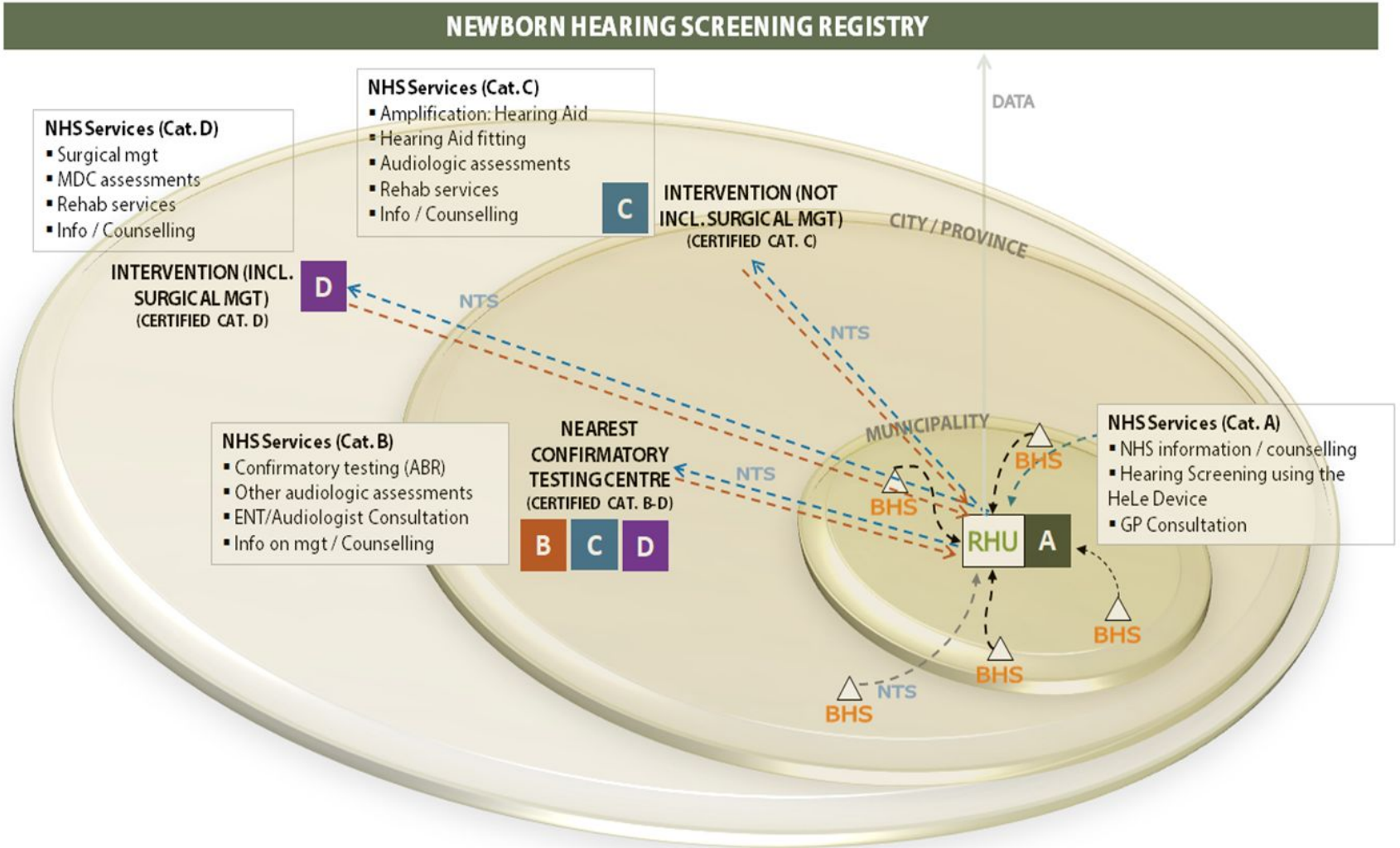
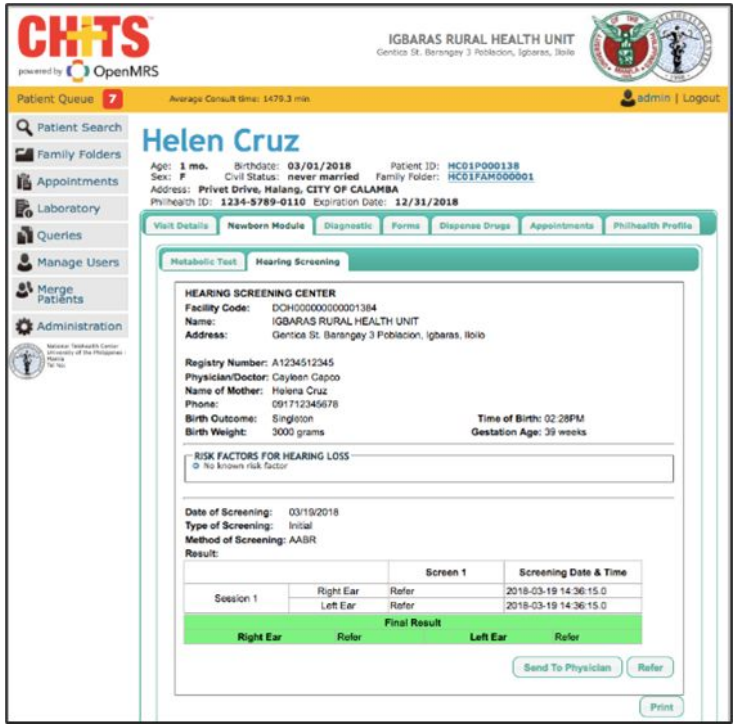
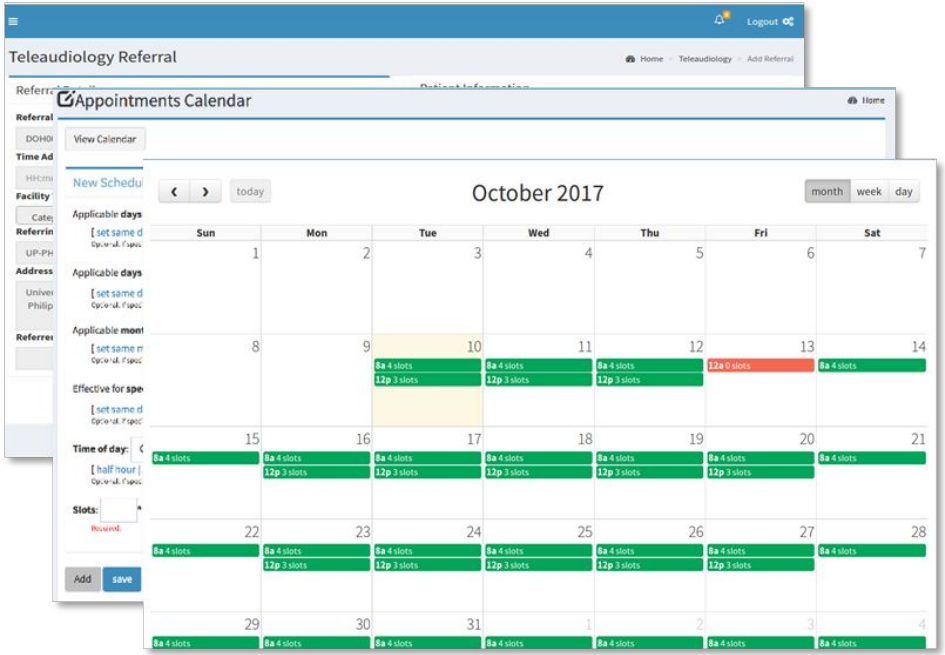

NEWBORN HEARING SCREENING REGISTRY
NHS Services (Cat. D)
▪ Surgical mgt
▪ MDC assessments
▪ Rehab services
▪ Info / Counselling
NHS Services (Cat. C)
▪ Amplification: Hearing Aid
▪ Hearing Aid fitting
▪ Audiologic assessments
▪ Rehab services
▪ Info / Counselling
C
INTERVENTION (NOT INCL. SURGICAL MGT)
(CERTIFIED CAT. C)
DATA
CITY / PROVINCE
INTERVENTION (INCL. SURGICAL MGT)
(CERTIFIED CAT. D)
D
NTS
NTS
NHS Services (Cat. B)
▪ Confirmatory testing (ABR)
▪ Other audiologic assessments
▪ ENT/Audiologist Consultation
▪ Info on mgt / Counselling
NEAREST CONFIRMATORY TESTING CENTRE
(CERTIFIED CAT. B-D)
B C D
NTS
MUNICIPALITY
BHS
BHS
NHS Services (Cat. A)
▪ NHS information / counselling
▪ Hearing Screening using the HeLe Device
▪ GP Consultation
RHU A
BHS
BHS
BHS
NTS

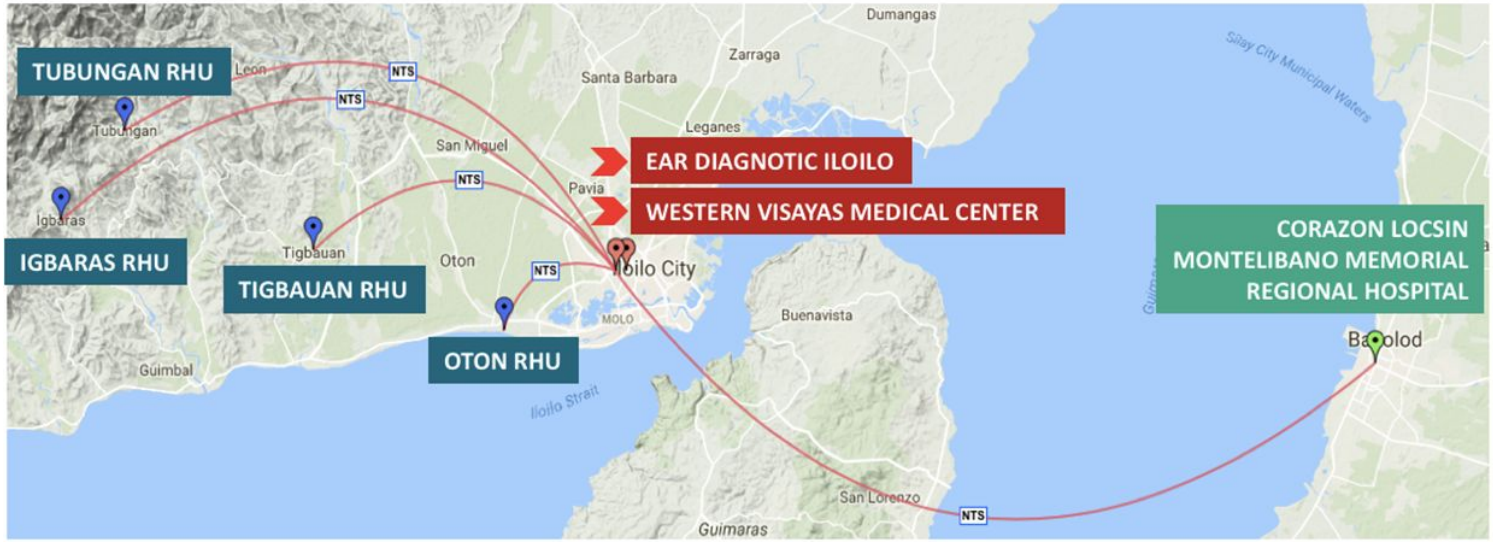




- [x] EMR for Newborn Hearing Screening
- [x] Tele-Referral System via National Telehealth System (NTS)

HeLe NHS SDN for Visayas

[4 RHUs, 1 Category A, 2 Category B]



SCREENING CENTERS

- ❑ CLMMRH (Cat A – Bacolod)
- ❑ Oton RHU (Iloilo)
- ❑ Tigbauan RHU (Iloilo)
- ❑ Tubungan RHU (Iloilo)
- ❑ Igbaras RHU (Iloilo)

CONFIRMATORY CENTERS

- ❑ Western Visayas Medical Center (Iloilo)
- ❑ Ear Diagnostic Iloilo (Iloilo)

INTERVENTION CENTER

- ❑ Philippine General Hospital (Manila)

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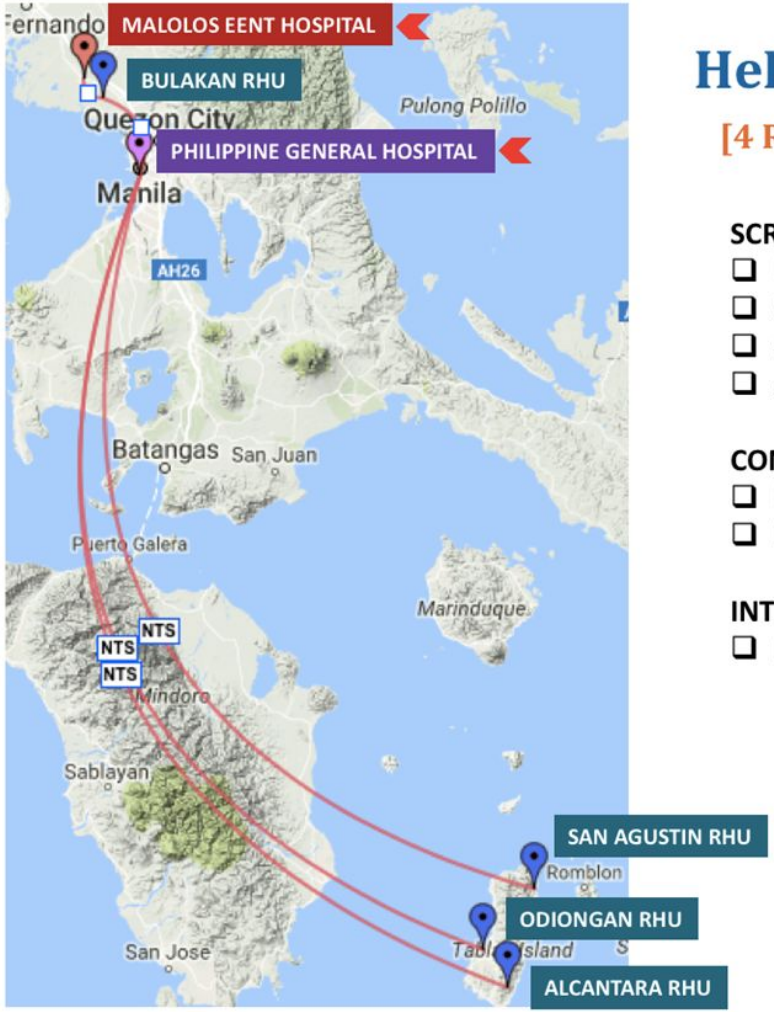
http://www.hele.ph



HeLe NHS SDN for Luzon

[4 RHUs, 1 Category B, 1 Category D]

SCREENING CENTERS

- ❑ Bulakan RHU (Bulacan)
- ❑ San Agustin RHU (Romblon)
- ❑ Odiongan RHU (Romblon)
- ❑ Alcantara RHU (Romblon)

CONFIRMATORY CENTERS

- ❑ Malolos EENT Hospital (Bulacan)
- ❑ Philippine General Hospital (Manila)

INTERVENTION CENTER

- ❑ Philippine General Hospital (Manila)

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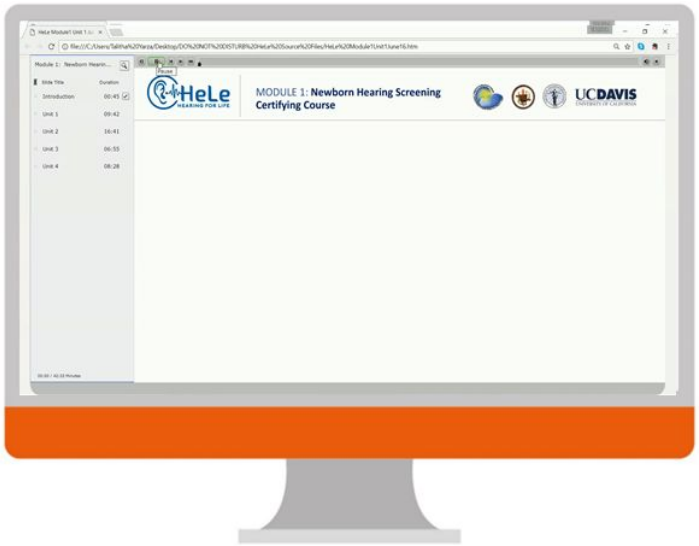
COMPUTER-BASED TRAINING MODULES



TECHNOLOGY in PROGRAM DEVELOPMENT

1. Identifying gaps are important in finding the right solutions.
2. Collaboration is key.
3. Data-driven decisions.

HeLe

HEARING FOR LIFE

NATIONAL TELEHEALTH CENTER

Philippine National Ear Institute
National Institutes of Health, University of the Philippines Manila

THE UNIVERSITY OF CALIFORNIA
DAVIS

Berkeley
UNIVERSITY OF CALIFORNIA

CITRIS
THE BANATAO INSTITUTE

UCDAVIS