

REPORT OF UNIVERSAL NEONATAL HEARING SCREENING PROGRAM
MINISTRY OF HEALTH, MALAYSIA (2013-2014)

INTRODUCTION

In 2011, Hospital Putrajaya has taken the initial stage to implement UNHS Program. Progressively, the other 6 hospitals had taken the same step by reinforcing their HRNHS and at the same time moving towards UNHS, albeit no specific budget had been allocated for this program. For these hospitals they focuses on increasing the proportion of newborns who are screened for hearing loss by 1 month of age, have a diagnostic audiologic evaluation by 3 months of age, and are enrolled in appropriate early intervention services by 6 months of age. These benchmarks are commonly referred to as the 1-3-6 Plan.

By 2013, 5 hospitals (state & district) have successfully implemented UNHS Program namely, Hospital Sultanah Bahiyah, Kedah; Hospital Taiping, Perak; Hospital Bukit Mertajam, Pulau Pinang; Hospital Putrajaya and Hospital Kuala Lumpur (Wilayah Persekutuan). While in 2014, this initiative was followed by 2 other hospitals; i.e. Hospital Miri, Sarawak and Hospital Raja Perempuan Zainab II, Kelantan. The objective of this report is to measure performance of all 7 MOH hospitals with UNHS program. In specific the measured parameters were coverage rate, return for follow up rate, refer rate, and loss of follow up rate. Details on the program, i.e. method of screening, quality indicators, strengths and challenges of the program from 2013-2014 also will be thoroughly discussed.

Methods:

Data from 7 participating hospitals were hand collected and submitted to the Audiology Technical Committee of MOH. The data from this source reported here refer to babies whose reports were created during the period from 1st January 2013 to 31st December 2014.

Results:

The total number babies screened from year 2013 to 2014 were 58 228 with average 64.8% capture rate. Overall, 78 (0.4%) hearing loss were diagnosed in 2013 while 104 (0.3%) babies were diagnosed in 2014. The initial failure rate was 17.2 in 2013 while 15.6% in 2014. The percentage of children referred who did not show for follow up was 34.1% in 2013 and 40% in 2014. The average age of detection for hearing loss was 4.4 month old in 2013 and 4.3 month old in 2014. The prevalence of hearing loss in 2013 is 1.5 meanwhile in 2014 is 1.0 in 1000 among babies screened.

OVERVIEW

The Audiological Technical Committee (JKTA) has prepared a documentation package purposely for this program. This package consists of 1)

Guidelines for Neonatal Hearing Screening (1st edition, 2007 and 2nd edition, 2015), 2) excel template for data tracking system and 3) excel template for data analysis. This package has been designed to gather standardized data on the screening, diagnostic and intervention status of all births occurrence in the respective hospitals.

According to JCIH 2000, the committee recognized the “Consensus Statement on Early Identification of Hearing Impairment in Infants and Young Children “concluding that universal hearing screening should be implemented for all infants within the first 3 months of life, using both OAE and AABR screening. All newborn babies should be screened with either OAE or AABR no later than 1 month of age. Those babies who failed the initial screening will be re-screened with AABR or OAE. Diagnostic audiologic assessment should be performed for those babies who failed subsequent hearing screen no later than 3 months old. All infants identified with hearing loss should receive appropriate intervention services before 6 months of age. All babies who passes hearing screening at any level or diagnosed with normal hearing will be discharged from ORL clinic and be given a pamphlet of hearing and speech milestone. (Refer Figure 1).

The most recent statement by JCIH (2007), the definition of targeted hearing loss has been expanded from congenital permanent bilateral, unilateral sensory, or permanent conductive hearing loss to include neural hearing loss (erg: auditory neuropathy/dys-synchrony) in infants admitted to the NICU. The quality indicators used in this program are as below:

Quality Indicators for Screening & Confirmation of Hearing Loss

1. Coverage rate in total live births

Definition: Number of neonates underwent hearing screening per total live births in a year.

Formula: Number of babies screened / totals live births

The recommended benchmark is $\geq 95\%$.

2. Coverage rate for screening \leq than 1 month

Definition: Percentage of neonates underwent hearing screening by one month of age.

Formula: Number of babies screened ≤ 1 month/ total number of babies screened

The recommended benchmark is $\geq 95\%$ (JCIH).

3. Refer rate :

Definition: Percentage of screened neonates who failed initial screening.

Formula: number of babies who failed (1st screening)/ number of babies screened

The recommended benchmark is $\leq 4\%$ (JCIH)

4. Loss to follow up:

Definition: babies who failed to turn up for subsequent assessment.

Formula: a) 2^{nd} Screening = number of babies defaulted 2^{nd} screening / number of babies failed 1^{st} screening

b) Diagnostic = Number of babies defaulted diagnostic appointment/ number of babies failed 2^{nd} screening

5. Return for follow up rate

Definition: Percentage of neonates who return for follow up services;

a) For 2^{nd} screening

Formula:

2^{nd} Screening = number of babies return for f/up / number of babies failed from 1^{st} screening

Recommended benchmark is $\geq 70\%$ (JCIH 2000)

b) Diagnostic of babies who failed hearing screening and complete comprehensive audiological evaluation by 3 month of age

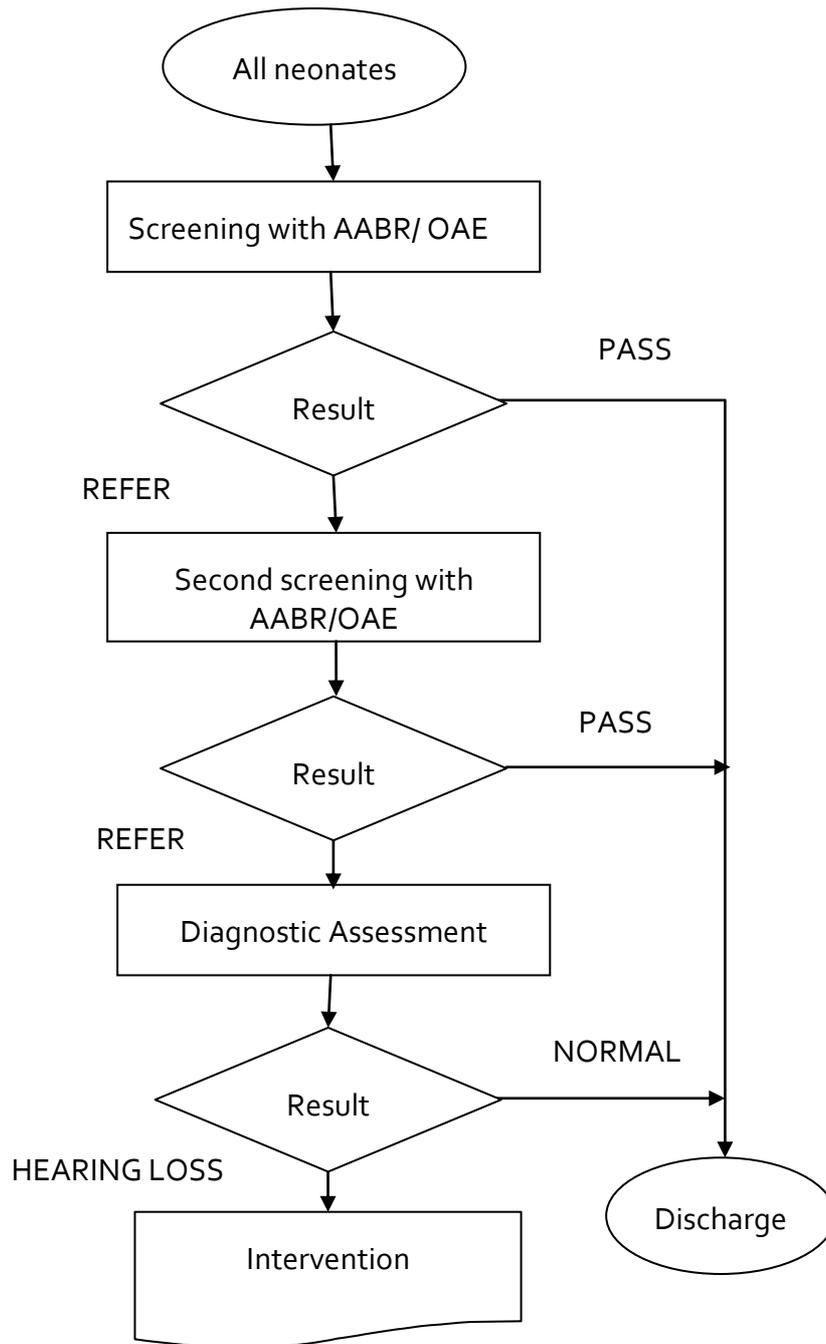
Formula:

Diagnostic = number of babies return for diagnostic f/up / number of babies failed from 2^{nd} screening

Recommended benchmark is $\geq 90\%$ (JCIH 2007)

Figure 1; FLOW CHART FOR NEWBORN HEARING SCREENING





For the entire 2 years period, all newborns screened with an OAE or AABR. Hearing Loss of 40 dBnHL was defined as significant hearing loss and use as screening level. All screening was performed by an Audiologist and/ or trained nurses respectively depending on hospital. The technology of newborn hearing screening is using either 1 stage or 2 stage screening. As shown in Table

1, one stage and two stage protocols were used in 4 and 3 hospitals, respectively. One stage screening is defined as only 1 technology is used during initial and subsequent rescreening, for example OAE-OAE or AABR-AABR. Meanwhile two stage screening is defined as 2 technologies are used during initial and follow up such as OAE - AABR.

Table 1: List of participating hospitals according to the technology used in UNHS program

| HOSPITAL | 1 STAGE | 2 STAGE |
|-----------------------------------|-------------|------------|
| Hospital Kuala Lumpur | AABR - AABR | |
| Hospital Putrajaya | AABR - AABR | |
| Hospital Sultanah Bahiyah | | OAE - AABR |
| Hospital Taiping | | OAE - AABR |
| Hospital Bukit Mertajam | OAE - OAE | |
| Hospital Miri | OAE - OAE | |
| Hospital Raja Perempuan Zainab II | | OAE - AABR |

RESULTS:

Table 2 shows that total number of babies screened, percentage of screened neonates who failed initial screening and percentage of babies who failed to turn up for subsequent assessment from respective hospitals in year 2013 and 2014.

Table 2: Findings of UNHS program in year 2013 and 2014

| Hospital | Total Babies Screened | | Refer Rate (fail initial screening) (%) | | Loss to follow up (%) | |
|-------------------------|-----------------------|-------|---|------|-----------------------|------|
| | 2013 | 2014 | 2013 | 2014 | 2013 | 2014 |
| Kuala Lumpur | 7052 | 10127 | 20 | 2.5 | 51 | 37 |
| Putrajaya | 2708 | 4331 | 22 | 14 | 22 | 24 |
| Sultanah Bahiyah, Kedah | 6961 | 9680 | 8.9 | 4.7 | 28 | 77 |
| Taiping, Perak | 1913 | 3137 | 18 | 20 | 35.3 | 30 |

| | | | | | | |
|------------------------------------|-------|-------|------|------|------|------|
| Bukit Mertajam, Pulau Pinang | NA | 888 | NA | 32 | NA | 24 |
| Miri, Sarawak | NA | 4452 | NA | 6.5 | NA | 31 |
| Raja Perempuan Zainab II, Kelantan | NA | 6979 | NA | 30 | NA | 57 |
| Total | 18634 | 39594 | 17.2 | 15.7 | 34.1 | 40.0 |

In all, the percentage of newborns screened under this program in 2013 is 53% capture rate. The percentage increases to 72% in 2014. All newborns included babies in post natal wards and Neonatal Intensive Care Unit (NICU). 86% babies were screened at age of 1 month old in 2013 and 93% in 2014. Overall, 78 hearing loss were diagnosed in 2013 while 104 babies were diagnosed in 2014. (Table 3).

Table 3: Newborn Hearing Screening Data 2013 and 2014

| Year | Population (live birth) | Screened | Coverage Rate (%) | Coverage rate by ≤ 1 month old (%) | Diagnosed (%) |
|----------------|-------------------------|----------|-------------------|---|---------------|
| 2013 | 34884 | 18634 | 53 | 86 | 78 (0.4%) |
| 2014 | 54999 | 39594 | 72 | 93 | 104 (0.3%) |
| Total/ Average | 89 883 | 58228 | 64.8 | 89.5 | 182 (0.3%) |

Table 4: Types of hearing loss diagnosed 2013 and 2014

| Year | Sensorineural Hearing Loss (SNHL) | Conductive Hearing Loss (CHL) | Mixed Hearing Loss (MHL) |
|--------------|-----------------------------------|-------------------------------|--------------------------|
| 2013 | 18 | 51 | 9 |
| 2014 | 32 | 70 | 2 |
| Total | 50 | 121 | 11 |

Conclusion

The initial failure rate was 17.2% in 2013 while 15.7% in 2014. The decreasing referral rate was related to increasing experience level of each screening personnel as well as increasing additional screening technologies.

However the percentage is still high as compared to JCIH standard probably due to technology used in this program. Referring to the table 1, most of the hospitals are using OAE technology due to limited AABR equipment, as we know OAE testing may lead to false positive result when the vernix/ debris accumulated in the ear canal. In addition limitation from OAE testing may increase concerns about missing auditory neuropathy (AN) diagnosis. The percentage of loss to follow up was 34.1% in 2013 and 40% in 2014. This increasing pattern may be due to weakness of our tracking system to track babies who did not come to complete hearing screening procedure. As a conclusion, 182 babies were confirmed having hearing loss in both years. The prevalence of hearing loss is estimated to be 1-2 babies out of 1000 babies.

Report prepared by

Audiology Technical Committee (JKTA)
Ministry of Health

Acknowledgement,

Dr Patimah bt Amin
Senior Principal Assistant Director & Public Health Physician
Surgical and Emergency Medical Services Unit
Medical Development Division, Ministry of Health

Associate Professor Dr. Rafidah Mazlan, PhD (QLD)
Head of the Audiology Programme
School of Rehabilitation Sciences
Faculty of Health Sciences
Universiti Kebangsaan Malaysia