Hearing impairment is one of the commonest congenital disabilities in the world. Incidence of hearing impairment in a standardized population of neonates at risk and not at risk to develop hearing impairment ranges from 6 to 60 per 1000 neonates with an average of 4 per 1000 neonates [4]. Early detection and management of hearing loss is crucial for the developmental period for auditory, speech, and language acquisition of these neonates. Numerous studies demonstrate that early diagnosis and intervention before six months of age is effective in allowing children with congenital hearing loss to acquire age appropriate cognitive and spoken language skills. In recent years, the technology and expertise have developed to allow screening to detect hearing loss in newborn babies. Early detection will also lead to earlier fitting of advanced hearing instruments combined with intensive services targeting communication development.

Hence, early intervention for permanent childhood hearing impairment (PCHI) has been shown to reduce the deleterious effects of impaired audition on language and cognitive and social skills of affected children. For identification of hearing impairment in newborns, universal neonatal hearing screening (UNHS) has been implemented in many parts of the Western world. Most of the neonatal facilities in the United States and European Union have enforced mandatory screening of all newborns.

As per WHO estimates in India, there are approximately 63 million people, who are suffering from significant auditory impairment; this places the estimated prevalence at 6.3% in Indian population. National Sample Survey Organization, an agency of government of India responsible for documentation of census in its 58th Round (2003) [6] estimated the population of persons with disability to be 18.49 million that equivalents to 1.8 percent of the total population of the country where 10 percent of this figure are likely to have hearing disability of moderate to
profound degree. Moreover, this number is likely to go up if we add lower degree of hearing disability. Considering such estimates, still there seems to be a dearth of any large scale incidence studies among the neonates in the Indian context [3] and the documentation of the various newborn hearing screening programs being conducted in the country.

In this background the objectives of the study were to find out the procedures followed for UNHS with reference to the parameters adapted, tools used, professionals involved in India.

1. Objectives of the study

The objectives of the study are to:

1. Figure out the status of new-born hearing screening program being conducted in India.
2. Estimate the use of different screening instruments used and tests practiced for the purpose of universal newborn hearing screening.
3. Study the role of various professionals and referral sources in the newborn hearing screening program.
4. Document the current practices of audiologists who provide services towards universal newborn hearing screening.

2. Method

2.1. Participants

A total of 185 institutions (165 medical colleges, 15 speech and hearing institutes and 5 private clinics for speech and hearing) distributed all over India were considered for the study. The medical colleges considered for participation were selected from the directory of colleges being governed by the Medical Council of India and the Speech and Hearing institutes were considered from the directory of Rehabilitation Council of India.

2.2. Tools

A questionnaire “Newborn Hearing Screening Survey” was designed (modified and adapted from National Centre for Hearing Assessment and Management, Utah University) [5] and given to 5 Audiologists who had 10 years of experience in the field of pediatric audiology. The questionnaire was rated based on 3 point Likert scale (0 - not relevant, 1 - relevant, 2 - very much relevant). Only items which was rated 2 were considered for the final questionnaire. The final questionnaire consists of 26 questions intended at gathering information on the various facts about the NBHS program being conducted at the institution/organization. The questions can be grouped under 6 categories:

1. Annual birthing status of the medical colleges.
2. Details of the newborn hearing screening program.
3. Methods/personnel/tests used for the screening procedure.
4. Reports of screening results to various groups.
5. Referral of sources post screening, and
6. Miscellaneous issues (such as funding, data management system).

2.3. Procedure

The questionnaire was simultaneously mailed and posted to the 185 institutions all over India between August 2007 and September 2007.

2.4. Statistical analysis

Statistical Package for social sciences (SPSS) version 10 was used and data was subjected to descriptive statistical measures.

3. Results

The results of the survey have been grouped under various sections which are discussed below.

- Section-I: number of surveys received

Table 1 provides number of surveys received from different types of institute. Out of the 185 institutions that the survey questionnaire was sent to, a total of 31 questionnaires were received back representing a 16.75% return rate. Out of the 30, 21 were received from medical colleges (MCs), 8 from speech and hearing institutions and 2 from private clinics. Henceforth the speech and hearing institutions and private clinics will be considered under one category speech and hearing centers (SHCs) (a total of 10 organizations).

- Section-II: characteristics of birthing programs (annual birthing census, average length of stay of newborns and presence of NICUs)

Out of the 21 medical colleges, 19 have the provision for birthing at their hospitals accounting for 90% of the total number of colleges those responded to the questionnaire. Table 2 provides information concerning the medical college respondents’ birthing status; reveal that almost half of the colleges have their annual birthing census more than 2000. The majority of sites (n = 12 sites (57.13%)) report an average length of stay for a vaginal delivery to be more than 24 h (between 24 and 48 h). The majority of sites (n = 15 sites (78.94%)) also report having a NICU of Level II/III type.

- Section-III: frequency of screening programs

As indicated in Table 3, only 38.09% of the medical colleges have a universal newborn hearing screening program (NBHS) in comparison to 80% of the speech and hearing centers conducting

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentage of sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Annual birthing census</td>
<td></td>
</tr>
<tr>
<td>1000–2000</td>
<td>5 (9.52%)</td>
</tr>
<tr>
<td>&gt;2000</td>
<td>11 (57.89%)</td>
</tr>
<tr>
<td>(b) Average length of stay delivered vaginally</td>
<td></td>
</tr>
<tr>
<td>≤24h</td>
<td>7 (33.33%)</td>
</tr>
<tr>
<td>&gt;24h</td>
<td>12 (57.13%)</td>
</tr>
<tr>
<td>No provision</td>
<td>2 (9.52%)</td>
</tr>
<tr>
<td>(c) Presence of NICU (level II/III)</td>
<td></td>
</tr>
<tr>
<td>No NICU</td>
<td>10 (47.62%)</td>
</tr>
<tr>
<td>NICU</td>
<td>11 (52.38%)</td>
</tr>
</tbody>
</table>
in their programs, followed by doctors (in medical colleges) and nurses (in speech and hearing set-ups) with 12.5%. One medical college and 3 speech and hearing centers did not report on their data management system, suggesting that they do not have a systematic way of keeping track of the outcomes of their newborn hearing screening survey. More than half (62.5%) of the medical colleges do not receive any funds for their program. Almost half of the speech and hearing centers also receive no funds for their projects and 37.5% of the speech and hearing centers depend on service organizations, hospital auxiliaries and others for their funding.

- **Section-V: Audiological Screening Procedures**

  Table 6 shows the percentage of institutions of various categories using different testing procedures for screening purposes. More than half (62.5%) of the speech and hearing centers use physiological tests like ABR, OAE or their combination to screen newborns followed by 50% of the medical colleges using none of the physiological tests or behavioral methods for screening.

- **Section-VI: Technology Used in Screening Procedures**

  Fig. 1 shows the technology protocols reported by sites with universal newborn hearing screening programs. The majority of sites (n = 7, 43.75%) report using OAEs in combination with ABR, followed by 4 sites using OAEs for screening purposes. Of sites using OAEs, 45.5% use transient evoked otoacoustic emissions (TEOAEs), 36.36% use distortion product otoacoustic emissions (DPOAEs) and 18.18% use both TEOAEs and DPOAEs.

  Fig. 2 shows the relationship between choice of technology and the presence of an audiologist on staff at the different set-ups. Nearly 11 (68.8%) sites using OAEs or OAEs in combination with ABRs have audiologists on staff. In contrast, only 1 of the institutions using ABR alone does not have an audiologist as staff. Hospitals without an audiologist usually conduct their screening programs, likely through their doctors or nurses.

  It is evident from Fig. 3 that for annual birthing census, less than or more than 2000, use of physiological techniques count almost the same for both groups indicating that the use of the techniques has been universally accepted by all the institutions despite the differences in birthing census.

### Table 3

<table>
<thead>
<tr>
<th>Types of institutions</th>
<th>No. of colleges that responded</th>
<th>No. of colleges that have NBHS program</th>
<th>No. of colleges that do not have NBHS program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical colleges</td>
<td>21</td>
<td>8 (38.09%)</td>
<td>13 (61.90%)</td>
</tr>
<tr>
<td>Speech and hearing centers</td>
<td>10</td>
<td>8 (80%)</td>
<td>2 (20%)</td>
</tr>
</tbody>
</table>

### Table 4

<table>
<thead>
<tr>
<th>NBHS program</th>
<th>No. and percentage of sites reporting characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medical colleges (n=21)</td>
</tr>
<tr>
<td>(a) Yes</td>
<td>Do you have an audiologist?</td>
</tr>
<tr>
<td>Do you have an audiologist?</td>
<td>Yes 7 (33.33%)</td>
</tr>
<tr>
<td></td>
<td>No 1 (4.76%)</td>
</tr>
<tr>
<td>(b) No</td>
<td>Do you have an audiologist?</td>
</tr>
<tr>
<td>Do you have an audiologist?</td>
<td>Yes 4 (19.04%)</td>
</tr>
<tr>
<td></td>
<td>No 9 (42.85%)</td>
</tr>
</tbody>
</table>

### Table 5

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. and percentage of sites reporting characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medical colleges (n=8)</td>
</tr>
<tr>
<td>(a) Personnel used for screening</td>
<td></td>
</tr>
<tr>
<td>Audiologists</td>
<td>7 (87.5%)</td>
</tr>
<tr>
<td>Doctors</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Nurses</td>
<td>1 (4.76%)</td>
</tr>
<tr>
<td>(b) Manual data management systems</td>
<td></td>
</tr>
<tr>
<td>No funding received</td>
<td>7 (87.5%)</td>
</tr>
<tr>
<td>From the state health department</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td>Others</td>
<td>3 (37.5%)</td>
</tr>
</tbody>
</table>

### Table 6

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. and percentage of sites reporting characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medical colleges</td>
</tr>
<tr>
<td>(a) Screen all infants before discharge using physiological tests (ABR, AABR, and/or OAE)</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>(b) Screen only infants with high risk factors before discharge using physiological tests (ABR, AABR, and/or OAE)</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>(c) Noisestik, noisemakers and/or warblet on all infants before discharge</td>
<td>1 (25%)</td>
</tr>
<tr>
<td>(d) Others</td>
<td></td>
</tr>
</tbody>
</table>
Section-VII: test results and referral from a screening test

It is evident from Table 7 that in half (50%) of the medical colleges, both physicians and audiologists are responsible for intimating the “pass” result to the parents and again 50% of the speech and hearing set-ups prefer informing the parents about the result by an audiologist and simultaneously giving a written material concerning the same. For a “refer” result, almost 37.5% of the medical colleges seek audiologists help for the same and even give a written material to the parents. Fifty percent of the speech and hearing centers prefer the audiologists in giving the “refer” result to the parents.

So, to sum up, both the type of institutions (medical and speech and hearing centers) prefer the audiologist informing parents and even giving a written material regarding the results to the parents. All the institutions (100%) agree to the recommendation of an outpatient re-screen if the results from the initial screen is a “refer”. As indicated in Table 8, only 62.65% (n = 10) of the institutions refer less than 11% of their clients for further testing at the time of discharge, followed by 12.5% of the institutions referring almost 11–15% of their clients for further testing.

Section-VIII: reporting of results from screening

It is evident from Table 9 that in 50% of the medical colleges the results of a test are reported to the parents and primary care physicians/doctors and in 37.5% of the speech and hearing set-ups even giving a written material regarding the result to the parents may be due to the fact that they do not have a doctor in their set-up and work independently.

As indicated in Table 10, around 37.5% of the medical colleges prefer both the physician and audiologist in referring the newborn for a diagnostic evaluation following screening while 50% of the speech and hearing centers prefer the audiologists only. In 50% of the medical colleges audiologists ensures regarding the diagnostic process being conducted or not, whereas in all (100%) the medical colleges both physician and audiologists are concerned in the process of ensuring.

Table 7

<table>
<thead>
<tr>
<th>Process of intimating parents about a pass/refer result from the screening</th>
<th>&quot;Pass&quot;</th>
<th>&quot;Refer&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MCS</td>
<td>SHCs</td>
</tr>
<tr>
<td>(a) Audiologists informs parents</td>
<td>1 (12.5%)</td>
<td>3 (37.5%)</td>
</tr>
<tr>
<td>(b) Audiologists informs and parents are informed through written material</td>
<td>1 (12.5%)</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>(c) Physician and audiologists informs parents</td>
<td>4 (50%)</td>
<td>–</td>
</tr>
<tr>
<td>(d) Others</td>
<td>2 (25%)</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 8

<table>
<thead>
<tr>
<th>Percentage of infants referred for further testing at the time they are discharged from the hospital.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical colleges</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>(a) Between 11% and 15%</td>
</tr>
<tr>
<td>(b) Between 16% and 20%</td>
</tr>
<tr>
<td>(c) &lt;11% or &gt;20%</td>
</tr>
</tbody>
</table>

Table 9

<table>
<thead>
<tr>
<th>Reporting screening results.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Report screening results to</td>
</tr>
<tr>
<td>Medical colleges (n = 8)</td>
</tr>
<tr>
<td>(a) Parents</td>
</tr>
<tr>
<td>(b) Primary care physicians</td>
</tr>
<tr>
<td>(c) Parents and primary care physicians</td>
</tr>
<tr>
<td>(d) Others</td>
</tr>
</tbody>
</table>

Table 10

<table>
<thead>
<tr>
<th>Personnel who refers for diagnostic evaluation following “screening/personnel responsible for assessing whether diagnostic evaluation is done.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Referral by&quot;</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>(a) Nurse staff</td>
</tr>
<tr>
<td>(b) Physician/ Doctors</td>
</tr>
<tr>
<td>(c) Audiologists</td>
</tr>
<tr>
<td>(d) Physician and audiologists</td>
</tr>
<tr>
<td>(d) Others</td>
</tr>
</tbody>
</table>
simultaneously. This is in accordance with the ‘JCIH (2007)’ [2]
37.5% of the total infants undergoing OAE and ABR screening test
methods (OAE and ABR) used for screening these infants reveal a
average length of stay of infants in the NICU and the physiological
NICU of levels II/III (78.94%). Of all the institutions conducting
allow an average length of stay of the infants for more than 24 h in
that the rate of hearing screening programs in infants has not taken
new-born hearing screening program while only 38.09% of the
brainstem response (ABR) included as part of their screening along
position statement updates’ which recommend that NICU infants
with the primary physiological test OAE.

Around 25% of the institutions provide information to the family
about their audiological services and simultaneously about the
available within their hospital followed by 18.8% of the institutions
providing family with a subset of audiologists in the community.
Eighty percent of the speech and hearing set-ups conduct a
standardized neonatal population of at risk and not at risk warrants
with the status of hearing tests among infants from 0 to 6 months of age has a significant positive impact on development.
In contrast, early identification and intervention prior to 6 months of age has a significant positive impact on development.
A discrete job distribution should be maintained and the concerned professional should be recruited for the purpose.
Successful systems for universal newborn hearing screening will depend on data management systems that include specific
fields of information (e.g., no. of babies screened, no. of babies referred, no. of babies returning for follow-up) that are reported to
state-agencies, department of health. Furthermore, a systematic mean of reporting infants who are referred from screening may
assist in successfully connecting infants and their families from screening process to diagnostic process.
Funding of screening programs should be undertaken by various
government and non-government organizations for ensuring the
smooth and effective administration of such programs all over the
country at primary, secondary and tertiary levels.
Finally, it is important to acknowledge that the results presented here are limited by the fact that they are based on
reports from a few number of organizations and may not hold true
for all the medical and nonmedical organizations of India.

<table>
<thead>
<tr>
<th>Information provided</th>
<th>No. and percentage of sites reporting characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Family is informed about audiological services available</td>
<td>MCs  2 (12.5%)</td>
</tr>
<tr>
<td>(b) Family is given a referral list of a subset of audiologists in the community</td>
<td>SHCs 3 (18.8%)</td>
</tr>
<tr>
<td>(c) Family given information about public health/state supported audiology services</td>
<td>MCs  2 (12.5%)</td>
</tr>
<tr>
<td>(d) Family informed about audiological services available within the hospital and</td>
<td>SHCs 1 (6.3%)</td>
</tr>
<tr>
<td>about the public health/state supported audiology services</td>
<td></td>
</tr>
<tr>
<td>(e) Others</td>
<td>MCs 2 (12.5%)</td>
</tr>
<tr>
<td></td>
<td>SHCs 2 (12.5%)</td>
</tr>
</tbody>
</table>

Table 11
Information provided to families regarding their options for obtaining diagnostic audiological services.

indicators established by the Joint Committee on Infant Hearing. In 60% of the institutions, the audiologists monitor the outcomes of a
diagnostic referral.
It is evident in Table 11, around 31% of the various institutions provide information to the family about the audiological services
available within their hospital followed by 18.8% of the institutions providing family with a subset of audiologists in the community.
Around 25% of the institutions provide information to the family about their audiological services and simultaneously about the
Public Health audiology services and regarding the subset of audiologists in the community.

4. Discussions
Although the response from the institutions is not adequate, but
basing on the results of the survey some representative conclusions can be drawn about the status and procedures of the NBHS
program held in India. Almost half of the medical colleges have an
annual birthing census more than 2000 (mostly 5000–6000) which is extremely high in comparison to the annual census of births in the
States which is mostly less than 300 in most of the primary
health centers [1]. More than half of the medical colleges (57.13%)
allow an average length of stay of the infants for more than 24 h in
NICU of levels II/III (78.94%). Of all the institutions conducting
newborn hearing screening programs 43.75% of them use ABR
along with OAE for the purpose of screening. A cross tab analysis of
average length of stay of infants in the NICU and the physiological
methods (OAE and ABR) used for screening these infants reveal a
37.5% of the total infants undergoing OAE and ABR screening test
simultaneously. This is in accordance with the ‘JCIH (2007)’ [2]
position statement updates’ which recommend that NICU infants
admitted for more than 5 days are necessarily to have auditory
brainstem response (ABR) included as part of their screening along
with the primary physiological test OAE.

Eighty percent of the speech and hearing set-ups conduct a
new-born hearing screening program while only 38.09% of the
medical colleges conduct the program. Hence, it can be concluded
that the rate of hearing screening programs in infants has not taken
up good hold in the various medical set-ups in India as yet. In such cases intervention programs cannot be implemented.
Fifty percent of the institutions have an audiologist as a staff or for
the purpose of the newborn hearing screening program. But an
increased number of the audiologists can be recruited in the
hospitals to ensure an effective and smooth conduct of the newborn hearing screenings and also in the diagnosis and intervention
purposes of the hearing impaired instead of appointing nurses,
anganwadi workers (for screening purposes) or doctors for the same.
A discrete job distribution should be maintained and the concerned professional should be recruited for the purpose.
Successful systems for universal newborn hearing screening will depend on data management systems that include specific
fields of information (e.g., no. of babies screened, no. of babies referred, no. of babies returning for follow-up) that are reported to
state-agencies, department of health. Furthermore, a systematic means of reporting infants who are referred from screening may
assist in successfully connecting infants and their families from screening process to diagnostic process.
Finally, it is important to acknowledge that the results presented here are limited by the fact that they are based on
reports from a few number of organizations and may not hold true
for all the medical and nonmedical organizations of India.

5. Conclusions
Late identification of hearing loss presents a significant public
health concern. However, without screening, children with hearing
loss are usually not identified until 2 years of age, which results in
significant delays in speech, language, social, cognitive and emotional
development. In contrast, early identification and intervention prior
to 6 months of age has a significant positive impact on development.
A high incidence of hearing impairment of 5.60 per 1000 in a
standardized neonatal population of at risk and not at risk warrants

Fig. 4. Procedure followed by institutions in identifying/monitoring infants at risk for progressive hearing loss.
the urgent implementation of universal hearing screening of all the neonates in India [3]. Early identification is the first step in ensuring successful outcomes for children who are deaf or hard of hearing. The Joint Committee on Infant Hearing (JCIH) endorses early detection of and intervention for infants with hearing loss. The goal of early hearing detection and intervention (EHDI) is to maximize linguistic competence and literacy development for children who are deaf or hard of hearing. Without appropriate opportunities to learn language, these children will fall behind their hearing peers in communication, cognition, reading, and social-emotional development. Such delays may result in lower educational and employment levels in adulthood. To maximize the outcome for infants who are deaf or hard of hearing, the hearing of all infants should be screened at no later than 1 month of age. Separate protocols are recommended for NICU and well-infant nurseries. NICU infants admitted for more than 5 days are to have auditory brainstem response (ABR) included as part of their screening so that neural hearing loss will not be missed.

The result of the survey which requested information regarding services offered and populations served provided a baseline on the status of Universal newborn hearing screening program in India.

A committee run by the central government would prove effective in keeping a track of the hearing screening programs already existing and the programs that are newly undertaken in various hospitals. Moreover, hearing screening programs can be collaborated with screening programs of varied fields (communicative diseases, ophthalmology, etc.) intending towards a team-approach and time-saving issues.

Hence, there is an urgent need to incorporate universal neonatal hearing screening in all the neonatal health care facilities in India. While considering the facts like infrastructure limitations of our country where basic needs are in shortage, there is a need to employ cost-effective behavioral observation methods using calibrated noise making toys to screen all new-borns. At the same time, private institutions may use the Otoacoustic emission technology to screen hearing impairment, for example, an automated screener can be used by the pediatrician and if the infant fails the screen twice then referral to the audiologist can be considered. In this way a provision to administer hearing screening in all the infants born in India can be implemented and effectiveness of the newborn hearing screening program be monitored thereof.

### Appendix A

#### NEWBORN HEARING SCREENING SURVEY

**Demographic Information**

**1. Hospital/Birthing Center:** ____________________________________________

**Title of Contact Person:** ____________________________________________

**Address:** _________________________________________________________

City: ___________________ State: _____________ Pin: _________________

**Phone Number, including area code: (___)__________ extension: ________

**Fax Number, including area code: (___)__________________________

Email Address: ______________________________________________________

**2. Do you birth babies at your hospital?**

___ Yes  __ No

**3. What was your birthing census in 2006?**

__ babies were born in our facility in 2006.

**4. What types of nurseries are available in your hospital/center?**

___ Level I (well-baby care)

___ Level II (Neonatal Intensive Care Unit, NICU)

___ Level III (NICU)

**5. What is the average length of stay for infants who were delivered vaginally?** (Check one)

___ 12 hours

___ 24 hours

___ 48 hours

___ other, please describe

**6. Does your hospital have an audiologist (Bachelor/Master degree/PhD) on staff?**

___ Yes  ___ No

**7. Does your hospital have a newborn hearing screening program?**

___ Yes. Please continue  ___ No

**8. If your hospital does not currently have a newborn hearing screening program, are you interested in starting a newborn hearing screening program?**

___ Yes  ___ No

**9. **

___ Audiologist on staff of hospital and/or affiliated with Newborn Hearing Screening Program

___ No. audiologist is on staff or affiliated with our program.

**Name of Audiologist:** ____________________________________________

**Address:** _______________________________________________________

City: ___________________ State: _____________ Zip: _________________

**Phone Number, including area code: (___)__________ extension: ________

**Fax Number, including area code: (___)__________________________

Email Address: ______________________________________________________

**Please note the abbreviations used in the remainder of this survey:**

OAE: Otoacoustic Emissions

TEOAE: Transient Evoked Otoacoustic Emissions

DPOAE: Distortion Product Otoacoustic Emissions

ABR: Automated Auditory Brainstem Response

**10. What methods of newborn hearing screening does your hospital/center use before discharge? Check all that apply.**

___ Screening deferred to outpatient setting.

___ High Risk Register using a questionnaire on all infants before discharge

___ High Risk Register using a questionnaire on NICU infants only before discharge

___ Screen all infants before discharge using physiological test (ABR, AABR, and/or OAE)

___ Screen only infants with high risk factors before discharge using physiological test (ABR, AABR, and/or OAE).

___ Screen NICU infants only with physiologic test (ABR, AABR, and/or OAE) before discharge

___ Noisistik, noisemakers and/or warblet on all infants before discharge

___ Noisistik, noisemakers and/or warblet on NICU only before discharge

___ Noisistik, noisemakers and/or warblet on HRR only before discharge

**11. If you screen using a physiologic-based technology, which procedure(s) do you use on all babies you screen? Check all that apply.**

___ AABR

___ ABF

___ other, please specify

**12. What personnel does your hospital use for screening? Check all that apply.**

___ Nurses

___ Technicians

___ Doctors

___ Audiologists

___ other, please specify

**13. How is consent for screening obtained from parents? Check all that apply.**

___ Consent is implied as part of routine neonatal admission

___ Verbal permission is obtained.

___ Written information provided for parent but no specific consent is obtained.

___ Verbal information is provided for parent but no specific consent is obtained.

**14. Check all of the following that apply to your screening program:**

___ Screening is a standing order from all physicians

___ Screening is not a uniform standing order: some physicians order screening for some babies

**15. How are parents informed about a “pass” result from the screening? Please check all that apply.**

___ Screening personnel inform parents.

___ Physician informs parents.

___ Audiologist informs parents.

___ Parents are informed verbally before hospital discharge.

___ Parents are informed through written material before hospital discharge.

___ Parents are not informed of a test “pass” result.

**16. How are parents informed about a referral? Please check all that apply.**

___ Screening personnel inform parents.

___ Physician informs parents.

___ Audiologist informs parents.
___ Parents are informed verbally before hospital discharge.
___ Parents are informed through written material before hospital discharge.
___ Parents are not informed about a referral.

17. When an infant refers from the screen, do you recommend the baby return for an outpatient re-screen?
___ Yes
___ No

18. What type of hospital based data management system(s) do you use? Check all that apply.
___ We use a manual data management system.
___ Other, please specify___________________________________________

19. To which of the following individuals/agencies do you report screening results? Check all that apply.
___ Parents
___ Primary Care Physicians
___ Early Intervention Services in Rehabilitation Centers
___ other, please describe_________________________________________

20. Who refers the family for a diagnostic evaluation following the “screening” process? Check all that apply.
___ Nursery Staff
___ Physician
___ Audiologist
___ Coordinator of Newborn Hearing Screening Program
___ Other, please describe_________________________________________

21. Who is responsible for assuring that an infant who is referred from screening receives a diagnostic evaluation? Check all that apply.
___ Nursery Staff
___ Physician
___ Audiologist
___ Other, please describe_________________________________________

22. How do you identify/monitor infants at risk for progressive hearing loss? Please check all that apply.
___ No comments
___ We do not identify infants at risk for progressive hearing loss.
___ High risk indicators established by the Joint Committee on Infant Hearing/our own hospital
___ Provide parents with information regarding progressive hearing loss
___ Refer for audiological monitoring
___ Other, please describe_________________________________________

23. For babies referred from screening, what information do you provide families regarding their options for obtaining diagnostic audiological services? Check all that apply.
___ No comments
___ No specific information is given regarding diagnostic audiological services.
___ Family is informed about audiological services available within our hospital.
___ Family is given a referral list consisting of all audiologists in the community.
___ Family is given a referral list consisting of a subset of audiologists in the community.
___ Family is given information about Public Health/State supported audiology services.
___ Other, please describe_________________________________________

24. Who monitors the outcomes of diagnostic referrals? Please check all that apply.
___ Outcomes are not monitored at this time
___ Outcomes are monitored by a hospital-based system.
___ Outcomes are monitored by an audiologist.

25. Please check all of the following that apply to outside funding used to support your program.
___ We do not receive outside funding.
___ We receive outside funding from service organizations.
___ We receive outside funding from hospital auxiliaries.
___ We receive outside funding from the State Health Department.
___ Other:___________________________________________

26. If you have a universal newborn hearing screening program, what percentage of infants are referred for further testing at the time they are discharged from the hospital?
___ 1% or less
___ between 2% and 3%
___ between 4% and 5%
___ between 6% and 10%
___ between 11% and 15%
___ between 16% and 20%
___ greater than 20%

References