
A Model Universal Newborn Hearing Screening Program for Hospitals and Birthing Facilities

Un programme-pilote de dépistage universel de la surdité chez les nouveau-nés dans les hôpitaux et les centres de naissance

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Abstract

Universal Newborn Hearing Screening (UNHS) is the first component of an early hearing detection and intervention program. Sustaining early hearing detection and intervention will prove difficult without a plan and the ability to document progress towards achieving the plan. This paper describes the multiple steps in planning a successful UNHS program for a birthing facility. They include: (a) defining the target hearing loss, (b) identifying hospital and community stakeholders, (c) conducting a site readiness survey, (d) developing a quality-monitoring plan, (e) selecting information management and screening technology, (f) establishing training and daily protocols, (g) defining consent, communication, and reporting policies for families and physicians, and (h) establishing a mechanism for tracking and follow-up. Careful planning helps assure a successful program that meets the needs of our families. UNHS program evaluation is ongoing and quality should never be taken for granted. One should work to improve each component of screening, diagnosis, and evaluation and the links between the components.

Abrégé

Le dépistage universel de la surdité chez les nouveau-nés (DUSN) est le premier élément d'un programme de dépistage auditif et d'intervention précoces. Défendre le dépistage auditif et l'intervention précoces peut toutefois se révéler difficile sans un plan détaillé ni des moyens de suivre et de documenter les progrès réalisés. Cet article décrit les diverses étapes nécessaires à la planification d'un programme de DUSN efficace pour un centre de naissance. Parmi ces étapes, on peut noter : a) l'établissement d'un critère pour déterminer le déficit auditif, b) l'établissement d'une liste des hôpitaux et des intervenants de la collectivité, c) l'évaluation de l'état de préparation de l'établissement, d) l'élaboration d'un plan de contrôle de la qualité, e) la sélection d'un système de gestion de l'information et d'une technologie de dépistage, f) la détermination des protocoles quotidiens et de formation, g) l'élaboration de politiques sur le consentement, la communication et l'établissement de rapports à l'intention des familles et des médecins, et h) la mise au point d'un mécanisme de contrôle et de suivi. Une planification minutieuse permet d'assurer la mise en œuvre d'un programme de qualité capable de répondre aux besoins des familles. L'évaluation des programmes de DUSN devrait se faire sur une base continue et la qualité ne devrait jamais être prise pour acquis. Chacun devrait travailler à l'amélioration de toutes les composantes du dépistage, du diagnostic et de l'évaluation, et tenter de renforcer les liens entre ces activités.

Key words: universal newborn hearing screening, early hearing detection and intervention, Joint Committee on Infant Screening, targeted hearing loss, benchmark, quality indicator

Clinicians and educators share a common vision - to improve language and literacy for children who are deaf and hard of hearing. Early Hearing Detection and Intervention (EHDI) is the detection and connection process that is used to achieve this vision. This process encompasses *detection* in the birthing facility, tracking, and follow-up to assure timely medical and audiologic evaluations, and *connection* to developmental services and interdisciplinary early intervention.

While this vision of improved communication serves as

the basis for provincial/state and federal EHDI initiatives, even a vision as worthwhile as this is not sufficient. Provinces, states, communities, elected officials, and the families served demand that progress toward that shared vision is measured. "Accountability" is the watchword in health and education, and this includes EHDI programs - without it, one cannot expect public financial support for our efforts. According to the Agency for Health Care Research and Quality (U.S. Department of Health and Human Services, 1995), a consensus is emerging in health care delivery and health care

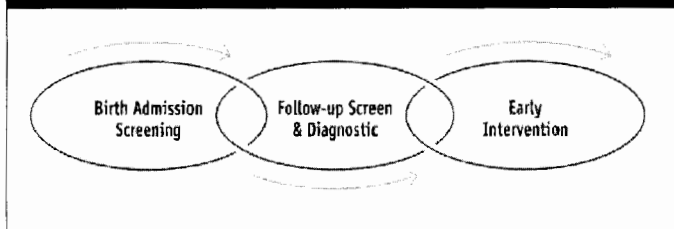


financing on four essential issues:

1. Quality of care is not a given.
2. There should be full public accountability for the outcomes of care.
3. Accountability requires measuring the quality of care provided to populations of patients.
4. Public policies should promote continuous improvement in the quality of care.

Sustaining EHDI will prove difficult without a plan and the ability to document progress towards achieving the plan. At a 1997 United States governors' conference, a Republican governor commented, "If you are going to ask any governor to spend money, even for a great cause, you better have a good plan for how you're going to account for your results" (Carpenter, Bender, Nash, & Cornman, 1996). In a world with limited financial resources and many needs, one owes it to our nations to be stewards of the healthcare dollars that one spends. In order for EHDI to succeed, each individual birthing facility should establish a universal hearing screening program that can demonstrate accountability. In this article, a review of how birthing facilities can achieve such a goal is presented.

Figure 1. Key components of early hearing detection and intervention programs. At each stage implement performance measures to assure quality.



Universal Newborn Hearing Screening (UNHS) is the first component of an EHDI program as shown in Figure 1. UNHS is the hospital-based component in which screening for hearing loss occurs. The requirements at this stage are to offer hearing screening to 100 percent of newborns during the birth admission and to furnish a mechanism for screening any babies missed during the birth admission before one month of age. In addition, facilities should provide parents with easy access to follow-up audiologic and medical evaluations. Finally, birthing facilities should not only monitor and document the quality of the UNHS program but should also be able to transmit their data to state departments of public health as required.

There are multiple steps in planning a UNHS program

for a birthing facility. They include: (a) defining the target hearing loss; (b) identifying hospital and community stakeholders; (c) conducting a site readiness survey; (d) developing a quality-monitoring plan; (e) selecting information management and screening technology; (f) establishing training and daily protocols; (g) defining consent, communication, and reporting policies for families and physicians; and (h) establishing a mechanism for tracking and follow-up.

The goal of UNHS is to identify hearing loss that may affect the normal development of speech and language. For the purposes of this article, the target hearing loss is consistent with the definition presented in the Joint Committee on Infant Hearing (JCIH) 2000 Position Statement (Joint Committee on Infant Hearing, 2000). The JCIH defines the targeted hearing loss for UNHS programs as permanent bilateral or unilateral, sensory or conductive hearing loss, averaging 30 to 40 dB or more in the frequency region important for speech recognition (approximately 500 to 4000 Hz). This target hearing loss has ramifications for infant development. It also acknowledges the limitations of current screening technologies. The incidence of this degree of hearing loss is between 1.96 and 2.15 per 1,000 newborns screened from various studies across the United States (Dalzell et al., 2000; Finitzo, Albright, & O'Neal, 1998; Vohr, Carty, Moore, & Letourneau, 1998).

While auditory neuropathy is not included in the target hearing loss, hospitals may elect to include auditory neuropathy in their target. Such a determination should be based on an assessment of the nursery population and nursery levels at a particular site. A review of literature that identifies infants at high risk for neuropathy is advised (Berlin et al., 1999; Corley & Crabbe, 1999; Sininger, Hood, Starr, Berlin, & Picton, 1995; Starr, Picton, Sininger, Hood & Berlin, 1996; Stein et al., 1996).

A successful UNHS program must gain the support of the people in the organization from administrators and physicians to nursing leadership. At the hospital level, administrative and nursery staffs (including neonatology) are stakeholders. Paediatricians, family practitioners, audiologists, early childhood educators, consumers, and families and individuals who are hard of hearing and deaf straddle the fence as both hospital and community stakeholders.

Each stakeholder has different objectives. Hospital administrators, for instance, must often make hard choices and choose one program over many others. One must be able to sell the UNHS program to administration. Without a simple mechanism for covering screening costs, UNHS advocates must first capitalize on support from other sources. Departments of health should be explored as sources of support for

EHDI through grants or contracts. Departments of health can send letters to hospital chief executives that advocate implementing newborn hearing screening. Philanthropic funding opportunities from local community supporters are often available.

The hospital's chief financial officer, risk managers, and quality assurance personnel are interested in standard-of-care issues, because they face risk and liability daily. Assessing whether or not UNHS is a standard of care requires answering two questions: Is UNHS what "reasonably prudent practitioners do" in a given region? Is UNHS mandated by statutory regulations (Tharpe & Clayton-Wright, 1997)?

As of July 2000, more than two-thirds of the U.S. states have laws requiring EHDI programs, with legislation pending in seven more states. Federal legislation exists that provides technical assistance and grants to states to establish EHDI services.

If there are no statutory regulations regarding EHDI, birthing facilities can use UNHS programs as marketing and public relations tools that demonstrate quality care in maternal and neonatal services. EHDI advocates should hold press conferences, host parties when benchmarks are achieved or exceeded, and invite department of health staff members to applaud hospitals for their efforts.

As stakeholders, paediatricians, and family physicians are quality and data-driven. They want answers to questions that affect their new patients and families:

1. Is hearing screening good for the baby?
2. Do test results cause undue parent anxiety? Does the hearing screening meet the standard of care?
3. Can screening be completed on all infants within the short period of birth admission?
4. What is the referral or failure rate for the birth admission screen?
5. How many infants have hearing loss that is present at birth or acquired during the perinatal period?

Paediatricians and families collaborate in a "medical home" to identify and access services that help children reach their potential (American Academy of Pediatrics, 1992; Joint Committee on Infant Hearing, 2000). Due to their responsibility for screening, paediatricians need to know whether it would be more efficient to screen in their offices (Finitzo & Crumley, 1999). Several questions need to be answered in this context. What is the cost of the hearing screening to the family? What are the next steps for the family if an infant fails the

screening? Finally, how can program quality be judged?

Nursery leadership and staff are important stakeholders. Buy-in from nursery leadership is essential to ensure that programs develop in the nursery. Nurses will support UNHS if they understand the benefits that hearing screening has for babies. Hearing screening is only one aspect of neonatal care that the nursery staff must address. At times, screening takes a backseat to other clinical care. Nursery leadership must understand the time involved in running a quality, optimal UNHS program. In a hospital with approximately 2,000 annual births, it is often more cost effective to maintain a dedicated screening staff or at least a nursery staff whose first responsibility is to complete the daily tasks surrounding UNHS. Note that one does not emphasize screening the babies - there is more to UNHS than screening.

A site readiness survey or an environmental assessment can be used to determine a hospital's readiness to establish a newborn hearing screening program and to make and maintain decisions on important issues. Possible uses of the site readiness survey include the following: (a) defining the target hearing loss; (b) clarifying the hospital and community stakeholders and resources; (c) determining benchmarks and quality indicators; and, (d) selecting technology and information management. The stakeholders may wish to produce a written report to document issues discussed and decisions made. Clearly, the scope of the document and the issues addressed are site-dependent. Additional topics may be added as needed.

Site-readiness planning should also identify UNHS leadership at the birthing facility. In keeping with the JCIH 2000 Position Statement, a physician (often a paediatrician or neonatologist) may be designated as the medical director of the UNHS program and the audiologist should be the program manager. At this time, there are only anecdotal data to suggest that audiology-run programs are superior to programs run by other professionals. The National Outcomes Measurement System under the direction of the American Speech Language Hearing Association is attempting to gather data that demonstrate audiology's effectiveness (American Speech-Language-Hearing Association, 2000). Such information is of vital importance to those of us who believe that audiology should manage UNHS components of EHDI programs. Nevertheless, managing a UNHS program requires skills that no single profession can claim. The audiology scope of practice includes knowledge of the physiologic screening technologies, pass/refer criteria, implications of hearing loss, and counseling on the medical, audiologic, and educational rami-



Table 1. Common universal newborn hearing screening established benchmarks, state model demonstration project performance numbers, and position statement suggestions.

Suggested values	95%	96%	1-2%	<1 %	95%
Finitzo et al., 1998	97%	97%	<1%	Na	69%
Dalzell et al., 2000	97%	96%	<1%	<1%	72%
JCIH 2000	95%	*	4%	<1%	95%
AAP 1999	95%	*	4%	*	95%
Note. * not available.					

fications of hearing loss. While audiologists do not have experience in statistical process control (Wheeler & Chambers, 1986) and quality monitoring, the skills of audiologists are closest to those needed to manage and supervise UNHS programs. Thus, audiologists willing to learn new skills are best suited to serve as program managers or, at a minimum, as consultants to establish the programs and provide ongoing monitoring.

A *benchmark* is a target or goal. A *quality indicator* is a measure of how a hospital is performing relative to the target. Benchmarks and quality indicators should be data-driven. Hospital teams should bear in mind the criteria suggested by Moore (1998) regarding benchmarks to monitor. Teams should monitor criteria of value to the infants and families, issues of use to the screeners, and/or issues that assist the hospital to save money. Moore notes that if you cannot measure it, you cannot monitor it. Once a hospital team has selected the quality indicators, they should decide how and when to track program progress. Monthly statistics should be generated in order to recognize problems early.

During the initial six months, a new UNHS program is not expected to achieve the level of quality of an effective, established program. A newly trained screener will have a higher referral rate than an experienced screener. The number of screeners can also affect the referral rate. Hospitals that have multiple staff members perform screenings and that have few monthly birth admissions tend to have a higher referral rate because no single screener becomes proficient at screening the infants.

Unlike some of the other components of EHDI, there are available data on achievable benchmarks in UNHS. The

common UNHS quality indicators and established benchmarks are based on established state programs, state model demonstration projects, and position statements (American Academy of Pediatrics, 1999; Joint Committee on Infant Hearing, 2000; see Table 1). A reasonable benchmark for the percent of babies screened on birth admission is 95%. This percentage of newborns screened during their birth admission can be achieved within six months of program initiation.

There are data to suggest that 98% to 99% of infants can be cleared for hearing loss before being referred for the more costly audiologic or medical evaluation. Achieving such a high percentage may require that a two-stage screening be used with otoacoustic emissions (OAEs) followed by an automated auditory brainstem response, or that an outpatient rescreen be completed before referral to an audiologist. As noted in Table 1, less than 1% of parents refused screening in the New York project (Dalzell et al., 2000). If parental refusal is substantially higher at a site, hospital personnel should be re-educated on how to explain to families the hearing screening and the implications of not screening.

While benchmarks from state programs in New York (Dalzell et al., 2000) and Texas (Finitzo et al., 1998) show that 70% of infants who needed follow-up received follow-up, individual hospitals report significantly higher follow-up of 80 to 90%. Geographic and financial barriers to service will influence the percentage of infants who have access to follow-up care. Hospitals on the Texas-Mexico border have a lower follow-up rate than hospitals in large urban areas with adequate resources.

The collection and analysis of health data and the construction of reliable health data systems are of central concern in the state or federal government's struggle to improve the health of the public (Fox, 1998). Proving that money spent solves problems requires objective, well-collected data. "Dollars follow data" is practically a mantra in public health care today (Fox). This philosophy marks a substantial change from the evidence-gathering project conducted by the JCIH (Finitzo & Diefendorf, 1997). In this study, the JCIH surveyed hospitals, hospital systems, and state governments on how data were being collected and used in newborn hearing screening programs. Essentially, half of the responding programs did not have a systematic approach to data collection, tracking, and follow-up. A manual approach was the most common data management technique among the programs that did have a systematic approach. In 1999, the Marion Downs National Center (MDNC) reported that 22 percent of hospital sites did not have a systematic way of tracking program outcomes and

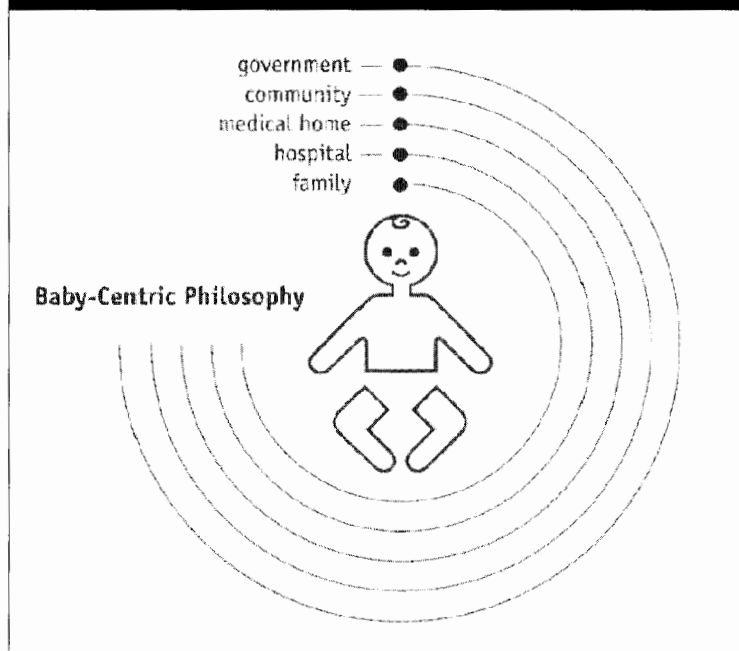
that 50 percent still used a paper-and-pen approach to data collection. The MDNC notes that this has led to problems transitioning infants from screening to intervention. An effective information management system lies at the core of the performance measures that justify EHDI programs, yet few programs consider information management in the same way that they consider technology decisions.

In the Texas Demonstration Project, a “baby-centric” philosophy of information management was outlined (Finitzo, 1998a; see Figure 2). When the baby and the baby’s needs are at the centre of a management system, the needs of all other stakeholders, including the bedside screener, the audiologist, the hospital, the paediatrician, the state, and even the nation can be met. It was concluded that data and documentation must be accurate and available in real time - not months, weeks, or even days later - in order for a system to meet the needs of the baby. For practical implementation purposes, the database that would assure patient outcomes should be the same system that tracks infants. Tracking is a part of the baby-centric approach to information management which should be automated, allow for prospective monitoring, and answer four essential questions:

1. What is going on with the baby?
2. How are the screeners performing?
3. Who are the babies who need something?
4. How is the program performing?

Figures 3 and 4 are examples of an approach to population tracking or program tracking shown for a small sample of 333 infants. This is, practically speaking, an “aging baby analysis.” Data become information to help the audiologist determine program quality. As an audiologist you want to know whether infants are being screened. Note that 295 infants received

Figure 2. A baby-centric approach to information management.



a hearing screen within one day of birth (88.6%). Four received a screen between one and two days. Seven infants were screened between two and four days; 17 between four and

Figure 3. An example of an aging baby analysis for initial hearing screening with a sample of 333 infants.

Aging Analysis Report

Age At Birth Admission Screen (Days)								
Age	Less than 1	1 to 2	2 to 4	4 to 7	7 to 28	Over 28	In Process	Missed
Number	295	4	7	17	7	1	0	2
Percent	88.6%	1.2%	2.1%	5.1%	2.1%	0.3%	0.0%	0.6%
Cumulative Number	295	299	306	323	330	331	331	333
Cumulative Percent	88.6%	89.8%	91.9%	97.0%	99.1%	99.4%	99.4%	100.0%
Mean Age Began	1.8		Median Age Began	0.0		Mean Age In Process	0.0	
S.D. Age Began	2.8		90% Began By Age	2.8		S.D. Age In Process	0.0	
Lowest Age Began	0		95% Began By Age	5.0		Lowest Age In Process	0	
Oldest Age Began	38		99% Began By Age	15.0		Oldest Age In Process	0	

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seven days, seven between seven and 28 days and one infant was more than 28 days of age when screened. Note that two infants were missed.

As an audiologist you want to know whether babies are getting to follow-up service on time. Note in Figure 4 that eight babies needed rescreening and five received follow-up before 30 days. One baby received follow-up between 30 and 60 days, and two were lost at this stage. If there is integration of a hospital tracking system with diagnostic centres and the intervention centres, one can evaluate the entire EHDI system from detection to connection to service. One could determine the minimum and maximum ages of diagnosis and intervention, as well as the mean, median, and standard deviations.

Few governments have yet made decisions on information management in hearing screening. The state of California conducted a feasibility study (California Department of Health Services, 1999) before making a decision on its information management needs for its newborn hearing screening program. The California statute required that a data management system provide information for planning, establishing, monitoring, and evaluating the NHSP, including screening, follow-up, and a comprehensive system of services for newborns and infants who are deaf or hard-of-hearing and

for their families. Providers of audiologic follow-up and diagnostic services are required to report accordingly. The statute provides that information reported and maintained within the system must be treated as medical information, which requires the program to adhere to confidentiality regulations and laws.

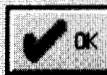
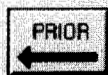
The California data management system required the following functional capabilities: (a) record user information related to hospitals, in-patient screeners, and Hearing Coordination Centers (HCC) monitoring personnel; (b) record birth information at approved hospitals; (c) record newborn demographics; (d) record parent and provider information; (e) record insurance/payer information; (f) identify infants that need screening; (g) set ticklers for in-patient screeners that an infant needs screening; (h) record appointments that are scheduled for screening or follow-up services; (i) capture/record newborn hearing screening and re-screening results; (j) document appointment and provider information related to referral for re-screening, diagnostic, or early intervention services; (k) document information related to scheduled follow-up dates for outpatient initial or re-screen, diagnostic, and early intervention services; (l) document information related to results of follow-up diagnostic and early intervention services; (m) record ticklers for required case management activities by HCC staff; (n) alert HCC staff when information related to follow-

up services has not been received/recorded; (o) generate correspondence to parents and providers regarding screening results, referrals, scheduled follow-up, and failure to obtain services; and print advisories regarding need for follow-up activities; (p) generate routine and user-configured reports; and, (q) archive and retrieve individual and event information until the child has reached the age of twenty-one years.

Information management needs among different hospitals and among government agencies will vary and may not be this extensive. While the Cali-

Figure 4. An example of an aging baby analysis for follow-up hearing screening with a sample of eight infants.

Age At Follow-up Screen (Days)								
Age	Less than 30	30 to 60	60 to 90	90 to 180	180 to 365	Over 365	In Process	Missed
Number	5	1	0	0	0	0	0	2
Percent	62.5%	12.5%	0.0%	0.0%	0.0%	0.0%	0.0%	25.0%
Cumulative Number	5	6	6	6	6	6	6	8
Cumulative Percent	62.5%	75.0%	75.0%	75.0%	75.0%	75.0%	75.0%	100.0%
Mean Age Began	13.5	Median Age Began	6.5	Mean Age In Process	0.0			
S.D. Age Began	17.4	80% Began By Age	49.0	S.D. Age In Process	0.0			
Lowest Age Began	5	95% Began By Age	49.0	Lowest Age In Process	0			
Oldest Age Began	49	99% Began By Age	49.0	Oldest Age In Process	0			



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fornia solution was to obtain commercially available Screening and Information Management Solution[®] software from OZ Systems, information management solutions should be based on information needs. Information systems should simply meet the buyer's identified needs.

Technology decisions are affected by a number of variables. The annual birth census in a birthing facility will affect the number of units needed as well as the cost of the program. With 2,000 births per annum or more, two units are recommended. It is always advisable to have a back-up system. Not all manufacturers have technical support available 24 hours per day, seven days a week. Even with such a schedule, manufacturers that have loaner units available still need 24 hours to ship the loaner unit to a birthing facility. If a small site elects to purchase a single piece of technology due to financial or other reasons, a plan should be written to obtain follow-up for infants who are missed for any reason, including equipment malfunctions. The cost of the equipment and of the supplies needs to be balanced with the referral rate and the ease of use.

Information management decisions may affect technology selection. Medical record review at one project hospital with close to 5,000 births revealed one data entry error per week on average prior to the implementation of an electronic link between the screening technology and the information system (Finitzo, 1998b). Direct electronic links to the screening technology minimize the potential for data entry errors.

The defined target hearing loss will affect whether screening auditory brainstem response (SABR), with automated wave V detection, is the selected technology. If the defined target includes auditory neuropathy, SABR must be the first-level technology, as OAEs will not identify infants at risk for neuropathy. Some hospitals use SABR in their Neonatal Intensive Care Unit (Level 3) nurseries and use OAE in the normal newborn (Level 1) nurseries.

Whichever technology is used, an automated algorithm should be selected. The program manager's role is to make decisions that facilitate the screeners' day-to-day work while improving quality for the infants. We compared OAE screener interpretations at a single hospital to automated interpretations. Screeners made inadvertent errors, especially screeners responsible for screening 20 to 40 babies per day. Audiologists also made interpretation errors. For consistency and reliability, a technology with an effective automated algorithm should be selected. This is not to imply that all interpretive algorithms are the same. As the program manager, one of the roles of the audiologist is to review and select an effective

algorithm. The technology's algorithm must be based on empirical or statistical data.

It is necessary to identify who is available to screen the newborns on a daily basis. Nursery screeners can be EEG technicians, nurses, licensed vocational nurses, respiratory therapists, unit aides, or audiologists, but there should be a limited number of personnel responsible for screening in a nursery. A maximum of six to eight screeners is recommended in a hospital of 5,000 births. Smaller facilities should have fewer screeners, although the goal is to have the fewest screeners who can successfully staff the nursery daily (weekends and holidays included). While audiologists profess a desire to screen newborns, as well as to manage programs, screening entails a commitment to work on weekends.

While screening hearing in a newborn is relatively easy, the process becomes complicated in the hospital by a number of factors: (a) the number of staff who need training; (b) the varying skill levels of staff members; (c) staff turnover rates; and, (d) the recognition that screening is only one step in a UNHS program.

In the Texas Project, our audiology staff trained nursery personnel to screen newborns and run their programs on a daily basis. In one birthing facility, 29 staff members left the nursery in one year. Staff turnover rates of 30 percent per year were common. As we face the issues of training in a cost-effective and optimal manner, we are exploring a Computer-Based Training (CBT) program as an adjunct to instructor-led training. Clearly, hands-on practice with an experienced audiologist is vital; however, given the issues of staff turnover and retraining, CBT or Web-Based Training (WBT) may be solutions. We recently learned of a commercially available CBT program developed by Bioweb Interactive Training, St Petersburg, FL (J. Stockard, personal communication, September 25, 2000). Stockard brings extensive experience to her CBT program development as she has functioned as screener, program manager, and trainer, overseeing multiple birthing facilities. CBT allows workers to study and learn at their own pace and to access review sections as needed. CBT addresses some of the issues of staff turnover as it provides a mechanism for screeners to learn basic information. A good CBT program also has a method for evaluating the knowledge acquired by screeners. Such documentation of performance is in line with the emphasis on quality and accountability emphasized throughout this article.

As part of program protocol development, hospitals should follow the philosophy in their policies and procedures manuals. Some hospitals espouse a highly-detailed policies and



procedures manual, while others prefer general guidelines. Whichever is selected, the day-to-day protocols should address when and where to screen, infection control, obtaining consent, and providing security for medical information.

In deciding when to screen, one must consider access to the infant. An audiologist in a large urban hospital told us recently that she had decided to screen between 5 p.m. and 8 p.m. every evening. She had ruled out the early a.m. hours because of the impact of paediatrician's exams on her ability to screen an infant. The early evening hours seemed ideal until she realized the effect of family and friends visitations during those hours.

In deciding where to screen, one must consider the acoustics of the test space. In our experience, an audiologist can usually stand in the screening space to evaluate the acoustics of the test space, informally. Listen and look. Listen for nearby sources of noise from a procedure room, elevators, or nursing station. Listen for internal sources of noise from ventilating systems or fans. Look for hard reverberant surfaces that in small spaces may impact the screening environment. Screen infants in the space. The environment has less affected SABB than some of the OAE units we have used.

If one elects to screen in the mother's room, one must recognize the effects of visitors, and television viewing on screening. Screening with family and friends involved may increase anxiety levels for both mother and screener.

Consent decisions require two perspectives - *consent for screening* and *consent for the release of information*. Decisions regarding screening consent need to be situation-based in each hospital, region, or even the national philosophy. Are all parents required to consent to hearing screening? This approach is known as an "opt-in" approach; it is time-consuming and requires a knowledgeable staff member to explain the rationale of screening to each family. Are parents required to "opt-out" of screening? In this case, parents must understand the risks of not screening their infant for hearing loss and sign a waiver that acknowledges that they understand these risks.

The second form of consent concerns the release of medical information on a screened infant. In 1996, the United States passed the Health Insurance Portability and Accountability Act that addressed the issues of consent, security, and the privacy of medical information. The implications of this Act have yet to be fully understood. In the United States, risk management personnel should review the Act, since faxing a letter to a referral source without consent or transferring data in ASCII format may put medical personnel or entire hospitals at risk. Any health plan, health care clearing house, and

healthcare provider that transmits any health information in electronic form needs to be cognizant of the issues surrounding patient privacy. Such issues would include newborn hearing.

Parental education and good counseling can reduce anxiety caused by a failed birth-admission screen. Tharpe and Clayton-Wright (1997) state that communication of screening results is fundamental to an effective and efficient program. Early detection and intervention programs should offer information to parents through hospital and community Lamaze and parent education classes. In addition, the screening and nursery staff should be given information regarding the screening procedure and the appropriate language to be used when counseling a parent on hearing screening results. Counseling a parent whose infant has failed the birth admission screening is challenging. One needs to provide the information so that the parent is concerned enough to bring the infant for a follow-up screening, but at the same time is not overly alarmed. Communication with parents whose infants do not pass the screening should include information on what to do next. It is particularly important to arrange an appointment for the next rescreening or assessment. Parents are more likely to keep an appointment that you give to them than they are to identify a provider, call the hospital, and make an appointment on their own. Over the three years of the Texas demonstration project, return for follow-up improved from 47 percent in 1995 to 68 percent in 1998. Although the follow-up attendance is not yet satisfactory, we attribute the improvement in part to providing follow-up appointments.

Families and family physicians should receive a letter with screening results. In addition, brochures that a parent can carry home about the screening and referral process increase the likelihood of compliance without undue anxiety. A preferred practice would also be to see that communication on screening is a component of the discharge plan for mother and baby.

Enough cannot be said for the importance of a redundant system for tracking and following infants in need of service. Consider quarterly reports to paediatricians and family practitioners that inform about young patients who need follow-up and who have not received care. This communication would be in addition to individual letters mentioned above.

In summary, careful planning helps assure a successful program that meets the needs of our families. UNHS program evaluation is ongoing. Quality should never be taken for granted. One should work to improve each component of screening, diagnosis and evaluation and the links between the

components.

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