OKLAHOMA UNIVERSAL NEWBORN HEARING SCREENING & INTERVENTION
Reducing Loss to Follow-up after Failure to Pass Newborn Hearing Screening
HRSA-14-006; CFDA 93.251
Oklahoma Work Plan Table: April 1, 2014 through March 31, 2017

Goal/Aim 1: By April 1, 2017, the NHSP will reduce loss to documentation by utilizing quality improvement strategies to reduce the total # of screenings not reported, to the NHSP, by Oklahoma birthing hospitals by a total of 50%.

Objective/Aim 1.1: Monitor all Oklahoma birthing hospitals to ensure a 15% annual reduction in Not Reported Rates.

Changes / Activities (sequence as needed)	Start Date	Estimated Completion Date	Lead Staff and Partner Support (where applicable)	Process Measures	Outcome Measures
1. Continue to disseminate quarterly Not Reported Rates to all birthing hospitals	One report per hospital each quarter from 4/1/13 to 3/31/17		NHSP QA/DC	• # of results not reported to NHSP by each hospital • Total # of results not reported to NHSP by all Oklahoma hospitals • # of babies Not Reported due to: - Mechanical issues - No Supplies - Parent Refusal - Discharged prior to screening	• Average Not Reported Rate per hospital • % of children screened and reported prior to discharge • Differentiate between # of babies Not Reported (loss to documentation) vs. # of babies Not Performed • Customized parent support based on reason child was not screened
2. Continue to monitor quarterly Not Reported Rates to determine which hospitals need additional training to improve the accuracy of reporting all hearing screening results to NHSP	1 month following creation of each Not Reported Rate Report quarterly cycle		NHSP QA/DC NHSP FU/AC	• # of hospitals with Not Reported Rates higher than NHSP average of 1.67% • List of hospitals with Not Reported Rates higher than NHSP average of 1.67%	• % of individual hospitals demonstrating improved reporting to NHSP

3. Provide additional hospital training and/or technical assistance to Oklahoma birthing hospitals identified with poor reporting trends	Hospitals to be contacted within 1 month of being identified through trend analysis	NHSP FU/AC	• # of hospital in-services completed for hospitals with poor reporting trends	• % of hospitals that meet the NHSP average of 1.67%

Objective/Aim 1.2: Reduce the Not Reported Rate at Oklahoma State University (OSU) Medical Center by a total of 50% over a 3 year period.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Develop a Quality Improvement (QI) team to address Oklahoma's highest Not Reported Rate at OSU Medical Center	4/1/14	5/1/14	NHSP Coord. NHSP FU/AC NHSP QA/DC	• # of NHSP staff, hospital staff, and other related partners (ie. Newborn Bloodspot Screening Quality Assurance Nurse Educator) represented	• Development of NHSP/OSU QI Team
2. Set up a meeting of the NHSP/OSU QI Team regarding OSU Medical Center Project	5/1/14	6/15/14	NHSP Coord.	• Meeting date, time, and location determined	• Meeting held
3. Create an Aim statement of desired goals to reduce Not Reported Rates at OSU Medical Center	5/1/14	6/15/14	NHSP/OSU QI Team	• Effective understanding of Aim statement to include: - What will improve - When will it improve - How much will it improve - For whom will it improve	• Aim statement developed
4. Develop an initial PDSA cycle to improve Not Reported Rates at OSU Medical Center	6/15/14	7/15/14	NHSP/OSU QI Team	• List of personnel involved from each entity • List of ideas (changes) proposed	• Initial PDSA developed (To include Data Collection Plan)
5. Continue to monitor	7/15/14	Cycles will be	NHSP/OSU QI Team	• Small tests of change	• Changes to OSU Not

and modify PDSA cycles until desired outcome achieved		1 month unless otherwise determined by team – 3/31/17		noted	Reported Rates

Goal/Aim 2: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce hospital Refer (did not pass) Rates by a total of 50%.

Objective/Aim 2.1: Monitor all Oklahoma birthing hospitals to ensure an average Refer Rate of 5% or lower.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Continue to disseminate quarterly Refer Rates to all birthing hospitals	One report per hospital each quarter from 4/1/13 to 3/31/17		NHSP QA/DC	• # of refers by each hospital • Total # of refers by all Oklahoma hospitals	• Average Refer Rate per hospital • % of children that referred on final screening prior to discharge
2. Continue to monitor quarterly Refer Rates to determine which hospitals need additional training to reduce hospital Refer Rates	1 month following creation of each Refer Rate Report quarterly cycle		NHSP QA/DC NHSP FU/AC	• # of hospitals with Refer Rates higher than NHSP average of 5% • List of hospitals with Refer Rates higher than NHSP average of 5%	• % of children passing hearing screening prior to hospital discharge

Objective/Aim 2.2: Reduce refers at Oklahoma birthing hospitals with a Refer Rate higher than 5 %.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Provide additional hospital training and/or technical assistance to	4/1/14	4/1/15	NHSP FU/AC	• # of hospital in-services completed at the five hospitals	• % of children passing a hearing screening prior to discharge

the five hospitals with the highest Refer Rates (all of which are over 15% annually)					• Average Refer Rate for all five hospitals
2. Provide additional hospital training and/or technical assistance to the second tier hospitals with the highest Refer Rates (all of which are between 10-15% annually)	4/1/15	4/1/16	NHSP FU/AC	• # of hospital in-services completed at the five hospitals	• % of children passing a hearing screening prior to discharge • Average Refer Rate for all five hospitals
3. Provide additional hospital training and/or technical assistance to the third tier with the highest Refer Rates (all of which are between 6-9% annually)	4/1/16	3/31/17	NHSP FU/AC	• # of hospital in-services completed at the fifteen hospitals	• % of children passing a hearing screening prior to discharge • Average Refer Rate for all fifteen hospitals

Goal/Aim 3: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the total # of babies not screened at Oklahoma birthing hospitals by a total of 50%.

Objective/Aim 3.1: Monitor all Oklahoma birthing hospitals to ensure a 15% annual reduction in Not Performed Rates.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Continue to disseminate quarterly Not Performed Rates to all birthing hospitals	One report per hospital each quarter from 4/1/13 to 3/31/17		NHSP QA/DC	• # of babies not screened by each hospital • Total # of babies not screened by all hospitals	• Average Not Performed Rate per hospital • % of children screened prior to discharge
2. Continue to monitor quarterly Not Performed Rates to all	1 month following creation of each Not Reported Rate Report quarterly cycle		NHSP QA/DC NHSP FU/AC	• # of hospitals with Not Performed Rates higher than NHSP average of 1%	• % of children screened prior to discharge

birthing hospitals to assist in determining reasons for missed hearing screens			• List of hospitals with Not Performed Rates higher than NHSP average of 1%	

Objective/Aim 3.2: Reduce missed screenings at Oklahoma birthing hospitals with a Not Performed Rate higher than 1%.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Provide additional hospital training and/or technical assistance to the five hospitals with the highest Not Performed Rates (all of which are over 5% annually)	4/1/14	4/1/15	NHSP FU/AC	• # of hospital in-services completed at the five hospitals	• % of children screened prior to discharge • Average Not Performed Rate for all five hospitals
2. Provide additional hospital training and/or technical assistance to the second tier hospitals with the highest Not Performed Rates (all of which are between 2-5% annually)	4/1/15	4/1/16	NHSP FU/AC	• # of hospital in-services completed at the five hospitals	• % of children screened prior to discharge • Average Not Performed Rate for all five hospitals
3. Provide additional hospital training and/or technical assistance to additional hospitals with a Not Performed Rates higher than 1%	4/1/16	3/31/17	NHSP FU/AC	• # of hospital in-services completed	• % of children screened prior to discharge • Average Not Performed Rate for all hospitals

Goal/Aim 4: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the # of children who are not born at an Oklahoma birthing hospital and do not receive a hearing screening by 1 month of age.

Objective/Aim 4.1: Create a baseline of the total # of babies who are not born at an Oklahoma birthing hospital.

Changes / Activities (sequence as needed)	Start Date	Estimated Completion Date	Lead Staff and Partner Support (where applicable)	Process Measures	Outcome Measures
1. Develop a Quality Improvement (QI) team to create a comprehensive list of homebirth/ midwifery sources in the state of Oklahoma	4/1/14	7/1/14	NHSP Coord. NHSP FU/AC NHSP QA/DC	• # and type of related partners represented	• Development of Home Birth QI Team
2. Set up an initial workgroup meeting of the home birth quality improvement team to gather information to regarding home birth/ midwifery sources in the state of Oklahoma	7/1/14	8/1/14	NHSP FU/AC	• Meeting date, time, and location determined	• Meeting held
3. Develop a comprehensive list of Oklahoma home birth/ midwifery sources in the state of Oklahoma	8/1/14	7/1/15	Homebirth QI Team	• List of providers identified as providing home birth/midwifery services in the state of Oklahoma	• Comprehensive list of home birth/midwifery sources in the state of Oklahoma developed
4. Develop Neometrics query to abstract bloodspots of initial newborn screens at county health departments	7/1/15	10/1/15	NHSP QA/DC	• # of babies identified with initial bloodspot screening completed at county health departments (and not Oklahoma birthing hospital)	• Identify possible home birth services
5. Develop Neometrics query to identify the #	10/1/15	1/1/16	NHSP QA/DC	• # of babies born outside of Oklahoma birthing	• Baseline % of babies born outside of Oklahoma

of homebirths utilizing the list created by Homebirth QI Team				hospitals	birthing hospitals on an annual basis
6. Modify Neometrics tracking hearing closure codes to differentiate home births from hospital births	1/1/16	6/1/16	NHSP QA/DC	• # of closure codes designated for use by the NHSP staff • # of babies pulled from query with midwife closure code	• Accurate reporting of home births • % of midwife babies pulled from database
7. Train staff and implement PDSA cycles to determine best method of tracking home births	6/1/16	3/31/17	NHSP Coord. NHSP FU/AC NHSP QA/DC	• # of staff trained to utilize new codes • # of charts closed with appropriate closure code	• Standardized use of home birth codes • % of home births closed using appropriate closure code

Objective/Aim 4.2: Ensure 80% of the babies born through Oklahoma's largest midwifery service receive a hearing screening prior to 1 month of age.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Identify the largest midwife group in Oklahoma utilizing preliminary data from Neometrics system	10/1/15	1/1/16	NHSP QA/DC	• % difference of babies born to midwife groups • # of babies born to each midwife group	• Identification of midwife group with the highest # of births
2. Develop loaner program to ensure availability of hearing equipment to midwife staff	10/15/16	1/1/16	NHSP Coord. NHSP FU/AC	• # of pieces of equipment loaned to midwife staff	• Increase in # of babies born outside Oklahoma birthing hospitals screened by 1 month of age
3. Set up a meeting with largest midwife group to determine partnership	1/1/16	2/15/16	NHSP FU/AC	• Meeting date, time, and location determined	• Meeting held

opportunities for screenings of babies					
4. Develop an initial PDSA cycle to improve # of babies born to midwives that receive a hearing screening	2/15/16	3/15/16	NHSP Coord. NHSP FU/AC NHSP QA/DC Midwife Director	• List of ideas (changes) proposed	• PDSA Developed
5. Provide training to midwife staff on techniques, screening protocols, and reporting	3/15/16	5/1/16	NHSP FU/AC	• # of trainings held • # of midwives trained to provide hearing screenings	• Training held • Baseline % Refer Rate for midwives • Baseline % Not Performed Rate for midwives • Baseline % LTF/D for midwives
6. Continue to monitor and modify PDSA cycles until desired outcome achieved	5/1/16	3/1/17	NHSP Coord. NHSP FU/AC NHSP QA/DC Midwife Director	• Small tests of change noted	• % of babies born to midwives who receive a hearing screening prior to 1 month of age

Goal/Aim 5: By April 5, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to increase the # of children who received an audiological diagnostic assessment by 3 months of age from 70% to 85%.

Objective/Aim 5.1: Eighty percent or more of infants who did not pass their hearing screening are documented to have received a rescreen and/or an audiological diagnostic assessment by 3 months of age.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Analyze # of children requiring a hearing rescreen per county	4/1/14	10/1/14	NHSP QA/DC	• # Referred • # Not screened at birth • # Passed initial hearing screening but at risk for delayed- onset hearing loss	• Identification of children needing rescreens per county

2. Develop a Quality Improvement (QI) team to determine the possibilities of replicating the NICHQ Screening project to additional Child Guidance Programs	10/1/14	11/15/14	NHSP Coord NHSP FU/AC NHSP QA/DC Child Guidance Central Office & County Health Department Staff	• # of NHSP staff, Child Guidance staff and county health department staff represented	• Development of NHSP/Child Guidance QI Team
3. Set up an initial workgroup meeting of the NHSP/Child Guidance QI Team to evaluate resources for replication of the NICHQ Screening project	11/15/14	1/1/15	NHSP FU/AC	• Meeting date, time and location determined	• Meeting held
4. Create Aim statement to replicate NICHQ Screening project to provide more timely screening at other Child Guidance Programs	11/15/14	1/1/15	NHSP/Child Guidance QI Team	• Effective understanding of Aim statement to include: - What will improve - When will it improve - How much will it improve - For whom will it improve	• Aim Statement developed
5. Develop an initial PDSA cycle to replicate the NICHQ screening project to provide more timely screening at one additional Child Guidance Program	11/15/14	1/1/15	NHSP/Child Guidance QI Team	• List of personnel involved from each entity • List of ideas (changes) proposed	• Initial PDSA Developed
6. Continue to monitor and modify PDSA cycles until desired	1/1/14	1/1/15	NHSP/Child Guidance QI Team	• Small tests of change noted	• % of children rescreened with normal hearing no longer needing audiological

outcome achieved					follow-up • % of babies seen at the county health department referred to audiology • Mean age of referral to audiology
7. Set up a follow-up meeting of the NHSP/Child Guidance quality improvement team to determine further expansion	1/1/15	3/1/15	NHSP/Child Guidance QI Team	• List of Child Guidance Programs identified for expansion	• NHSP/Child Guidance expansion plan
8. Develop PDSA for Child Guidance expansion	1/1/15	3/1/15	NHSP/Child Guidance QI Team	• List of ideas (changes) proposed	• PDSA Developed
9. Continue to monitor and modify PDSA to expand Child Guidance Project at multiple locations	3/1/15	3/31/17	NHSP/Child Guidance QI Team	• Small tests of change noted	• Expansion to multiple locations

Objective/Aim 5.2: On an annual basis, increase access to hearing screening/rescreening capabilities for children born in rural areas to ensure an audiological diagnostic assessment by 3 months of age.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Assess equipment capabilities of county health departments to provide hearing screening/rescreening services	4/1/14	10/1/14	NHSP Coord. NHSP FU/AC NHSP QA/DC	• # of re-screens needed per county following hospital discharge • List of hearing screening equipment capabilities per location • List of hearing screening equipment needing replacement	• # of hearing screening equipment needing to be purchased or calibrated

2.Purchase equipment and disseminate to county health departments on an annual basis	10/1/14 4/1/15 4/1/16	3/31/15 3/31/16 3/31/17	NHSP Coord. NHSP FU/AC	• # and type of equipment purchased • # of counties in rural areas needing new or replacement equipment	• Equipment replaced in rural areas
3.Provide equipment training, technical assistance and audiology resources to providers at county health departments	5/1/14	6/15/14	NHSP FU/AC	• # of trainings held • # of county health department staff trained	• Training held • Mean age of referrals for audiologic assessment

Goal/Aim 6: By April 1, 2017, the NHSP will partner with Oklahoma pediatric audiology practices and SoonerStart Part C Early Intervention Program to increase the percentage of children diagnosed with hearing loss enrolled in early intervention services by 6 months of age from 63% to 80%.

Objective/Aim 6.1: Seventy-five percent of all infants diagnosed with hearing loss will be reported to NHSP by pediatric audiologists as demonstrated through SoonerStart Part C Early Intervention tracking forms in order to reduce loss to documentation.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Request SoonerStart Part C Early Intervention tracking forms through quarterly tracking forms	Quarterly requests; annual analysis of results received		NHSP FU/AC NHSP QA/DC	• # of SoonerStart sites reporting results • Total # of children with hearing loss reported as being enrolled in SoonerStart • # of children identified with no audiological information reported to NHSP • Dates for all children with hearing loss reported as being enrolled in	• % of children diagnosed with hearing loss who have results already sent to NHSP • % of children enrolled in SoonerStart Part C Early Intervention by 6 months of age

			SoonerStart	
2. Contact audiologists who have not reported hearing diagnosis to NHSP per tracking reports by SoonerStart Part C Early Intervention	Quarterly requests as needed per quarter tracking form results	NHSP FU/AC	• # of audiologists contacted to confirm audiological information not previously reported to NHSP • # of children with confirmed hearing loss diagnosis	• % of audiological confirmations received with updated diagnosis information • % of children diagnosed with hearing loss by 3 months of age • % of children referred to Part C Early Intervention services prior to 6 months of age

Objective/Aim 6.2: Seventy-five percent of all infants diagnosed with hearing loss will be entered in early intervention services by 6 months of age.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Determine age of enrollment for all children diagnosed with hearing loss per birthing year	Annual analysis through the CDC NHSP Survey to be completed in February of each year		NHSP QA/DC NHSP FU/AC	• # of children with enrollment dates by 6 months of age • # of children with enrollment dates after 6 months of age	• % of children receiving Part C Early Intervention services by 6 months of age • Mean age at enrollment
2. Analyze date of hearing loss diagnosis with early intervention enrollment date to determine length of time to connect services	To be completed by the last day of March of each year following the CDC NHSP Survey		NHSP QA/DC NHSP FU/AC	• Individualized timeline for each child diagnosed with hearing loss and receiving EI services	• Mean age at diagnosis • Mean age at enrollment
3. Provide education to audiology practices where early intervention placement	To be completed by the last day of May of each year following the CDC NHSP Survey		NHSP FU/AC	• # of audiology practices contacted • # of cases reviewed with each practice	• % of children receiving Part C Early Intervention services by 6 months of age

was not completed by 6 months of age				

Objective/Aim 6.3: Ninety percent or more of infants who undergo an audiological diagnostic assessment will have results of this evaluation shared with the NHSP and all infants diagnosed with hearing loss will be referred for early intervention services by 6 months of age.

Changes / Activities (sequence as needed)	**Start Date**	**Estimated Completion Date**	**Lead Staff and Partner Support (where applicable)**	**Process Measures**	**Outcome Measures**
1. Develop a quality improvement (QI) team to replicate the NICHQ Audiology Data Collection Tool with one additional Oklahoma Pediatric Audiology practice: Integris Cochlear Implant Clinic	4/1/15	5/1/15	NHSP Coord. NHSP FU/AC NHSP QA/DC	• # of NHSP Staff represented • # and type of Integris CIC staff represented (audiologist receptionist, appointment staff, etc.)	• Development of NHSP/Integris QI Team
2. Set up an initial meeting of the quality improvement team regarding Audiology Data Collection Tool	5/1/15	6/15/15	NHSP FU/AC	• Meeting date, time, and place determined	• Meeting held
3. Audit of the last 20 cases of children seen at the location (birth to 3 years) with or without hearing loss seen at the location	5/1/15	6/15/15	NHSP/Integris QI Team	• Review of 20 charts	• % of children who received an audiologic evaluation by 3 months of age • % of children seen at clinic with results sent to NHSP • % of children diagnosed with hearing loss who were referred to early intervention services by 6 months of age

4. Develop baseline data utilizing the Audiology Data Collection	5/1/15	6/15/15	NHSP QA/DC	• # results sent to NHSP • # of children diagnosed with hearing loss by 3 months of age • # of EI referrals made for children diagnosed with hearing loss	• Baseline data of results indicating % of results sent to NHSP • Baseline data of referrals made to EI for children diagnosed with hearing loss
5. Follow-up meeting with quality improvement team regarding Audiology Data Collection Tool results and outline continuation of project	6/15/15	7/15/15	NHSP/Integris QI Team	• Meeting date, time, and location determined	• Meeting held
6. Create an Aim statement of desired goals to address NHSP reporting and referrals to Early Intervention	6/15/15	7/15/15	NHSP/Integris QI Team	• Effective understanding of AIM statement to include: - What will improve - When will it improve - How much will it improve - For whom will it improve	• AIM Statement developed
7. Develop an initial PDSA cycle to improve NHSP reporting and referrals made to Early Intervention	6/15/15	7/15/15	NHSP/Integris QI Team	• List of personnel involved from each entity • List of ideas (changes) proposed	• Initial PDSA developed
8. Continue to monitor and modify PDSA cycles over a 1 year period	7/15/15	Cycles will be 1 month unless otherwise determined by team – 7/15/16	NHSP/Integris QI Team	• Small tests of change noted	• % of results sent to NHSP • % of referrals made to EI for children diagnosed with hearing loss • Average timeframe in which referrals were made to EI

OKLAHOMA UNIVERSAL NEWBORN HEARING SCREENING & INTERVENTION
ABSTRACT

Project Title: Reducing Loss to Follow-up after Failure to Pass Newborn Hearing Screening;
Applicant Organization Name: Oklahoma State Department of Health (OSDH), Newborn Hearing Screening Program (NHSP); 1000 NE 10th Street, Oklahoma City, OK 73117-1299
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Grant Number: HRSA-14-006; CFDA 93.251

PROBLEM: Through previous Universal Newborn Hearing Screening & Intervention grants, the NHSP has identified further focus areas to improve the loss to follow-up/documentation (LTF/D) by utilizing specific quality improvement methods to achieve measurable improvement in the number of children who receive appropriate and timely follow-up. Principal needs addressed in this project include strategies to: 1) reduce the total number of screenings not reported by Oklahoma birthing hospitals; 2) reduce hospital Refer (did not pass) Rates; 3) reduce the total number of babies not screened at Oklahoma birthing hospitals; 4) reduce the number of home births who do not receive a hearing screening by one month of age; 5) increase the number of children who received an audiological diagnostic assessment by three months of age; and 6) increase the percentage of children diagnosed with hearing loss enrolled in early intervention services by six months of age.
GOALS & OBJECTIVE: Project goals are items 1-6 as stated above. Objectives of this grant include 1) a 15% annual reduction in hospital Not Reported and Not Performed Rates; 2) reducing refers at Oklahoma birthing hospitals with a Refer Rate higher than 5 %; 3) reducing missed screenings at hospitals with a Not Performed Rate higher than 1 %; 4) partnering with midwives to ensure homebirths receive a hearing screening prior to one month of age; 5) increasing access to hearing screening/rescreening capabilities for children born in rural areas to ensure an audiological diagnostic assessment by three months of age; and 6) ensuring 80% of all infants diagnosed with hearing loss will be enrolled in early intervention services by six months of age.
METHODOLOGY: Project goals/objectives will be achieved through continued employment of a Follow-up/Audiology Coordinator, expanded statewide partnerships utilizing quality improvement methods, placement of additional screening equipment at rural county health departments and a loaner hearing screening system for midwifery practices.
COORDINATION: This project includes collaboration with Oklahoma CSHCN, SoonerStart Part C Early Intervention program, MCH/Title V, Home Visitation Programs, medical home providers, county health departments, birthing facilities, midwifery services, audiology program and follow-up clinicians in the public and private sectors.
EVALUATION: The project will be evaluated through specific measures for each Goal and Objective. The program's data tracking system will be used to analyze the number of infants who did not pass the initial screen; the number of those evaluated, results, and date of evaluation; and for those with diagnosed loss, the early intervention enrollment date and site.
ANNOTATION: The purpose of this project to continue to enhance NHSP services such as: monitoring of hospital infant hearing screenings, managing statewide reporting of hearing results, assisting parents with follow-up screenings, and creating materials to educate providers to ensure appropriate information is provided to infants diagnosed with hearing loss.

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Oklahoma Project Narrative

INTRODUCTION

Purpose of Project

The purpose of the *Reducing Loss to Follow-up after Failure to Pass Newborn Hearing Screening* project is to further focus efforts to improve the loss to follow-up/documentation (LTF/D) by utilizing specific interventions such as quality improvement methodology to achieve measurable improvement in the number of children who receive appropriate and timely follow-up. This grant specifically focuses on those children who did not pass a physiologic newborn hearing screening prior to discharge from an Oklahoma birthing hospital. Additional efforts will be placed on those children who are born outside of an Oklahoma birthing hospital and do not receive a hearing screening by one month of age. For the purpose of this grant application, these babies will be referred to as "home births."

The project requests funds to continue support of the Follow-up/Audiology Coordinator (FU/AC), Dr. Deborah Earley, for case management. The FU/AC role was enhanced in the last grant project to include audiological training, collaboration, and consultation with statewide providers from a variety of programs (hospitals, county health departments, home visitation programs, etc.). Funding is requested to purchase additional hearing screening equipment and screening supplies for health department sites in rural areas. Funds are also requested for equipment and supplies to be used by the largest nurse midwife practice in Oklahoma. Funds are requested for the dissemination of educational materials for parents and providers.

Anticipated Benefits

The previous grant-funded project assisted the Oklahoma State Department of Health (OSDH) Newborn Hearing Screening Program (NHSP) in reducing LTF/D from 40% in 2006 to 10.8% in 2009. However, the LTF/D rate rose to 21.8% in 2010 with the absence of a full-time FU/AC. The NHSP LTF/D rate was reduced to 16% in 2011 when the position was refilled by Dr. Earley. Data used for this assessment is from the last Centers for Disease Control and Prevention (CDC) Early Hearing Detection and Intervention (EHDI) Survey completed in 2013 and includes data for 2011 births. Data for 2012 births will be completed in February 2014. Refer to Table 1.

The Funding Opportunity Announcement has indicated a national goal of "5% annual reduction in the LTF/D in years 2014 through 2017." This goal would yield a 20% national LTF/D rate that is currently at 35%. The NHSP has a LTF/D rate below the anticipated goal of 20%; therefore, the goal of this project is a 6% reduction (2% per year during the three year grant period) in the LTF/D in years 2014 through 2017. The NHSP has set a goal to maintain a 10% annual LTF/D rate or lower. This reduction factors in extraneous variables such as parent refusals, children

moving out of state, and those who are unable to be screened for a variety of reasons, such as birth defects or terminal conditions requiring hospice services.

Table1: Oklahoma Newborn Hearing Screening Program Annual Screening Statistics

	2006	2008	2009	2010	2011
OK Births	54,010	53,735	53,635	52,055	51,075
Screened	**51,352** 95.10%	**52,980** 98.60%	**52,670** 98.20%	**51,571** 99.10%	**50,616** 99.10%
Not Screened	**2,658** 4.92%	**755** 1.40%	**965** 1.80%	**484** 0.93%	**459** 0.90%
Referred (Did not Pass)	**1,927** 3.75%	**2,607** 4.92%	**2,556** 4.85%	**2,668** 5.17%	**2,901** 5.73%
Confirmed Hearing Loss	91	94	93	84	92
Loss to Follow-up/Docum.	~40%	18.80%	10.80%	21.80%	16.00%

Continued funding from the Health Resources and Services Administration (HRSA) would allow the NHSP to maintain a low LTF/D rate and decrease the number of children who are lost to follow-up after failure to pass newborn hearing screening. This proposal seeks to enhance services provided by the FU/AC by utilizing data obtained from the annual CDC EHDI Survey as well as baseline data from hospital reports created by the CDC-funded NHSP Quality Assurance/Data Coordinator. Analysis of the combined information will allow the NHSP to identify babies who are not screened by location and subsequently provide targeted training and support to specific hospitals that have high Refer (did not pass), Not Performed, and Not Reported Rates. The results will be analyzed through ongoing qualitative measures that look at changes in hospital data monthly, quarterly, and annually.

To assure follow-up screenings and reduce the LTF/D rates, physiologic hearing screening equipment and supplies will be available at rural county health department sites and in partnership with nurse midwives with high home birth populations. Additional training with updated manuals and materials will be provided to parents, hospital staff, primary care physicians, home visitation specialists, and parent-to-parent support organizations. These collaborative efforts will ensure that every infant who does not pass initial screening will have the opportunity to obtain an appropriate audiological diagnostic assessment within three months after birth. Additionally this partnership will ensure that those children diagnosed with hearing loss are enrolled in intervention by six months of age.

NEEDS ASSESSMENT

The target population for newborn hearing screening is all children born in Oklahoma. The annual number of births is between 51,000 and 55,000 per year. This section will address the needs of this population in Oklahoma to improve EDHI services with an emphasis of *Reducing*

Loss to Follow-up after Failure to Pass Newborn Hearing Screening. The needs include: 1) funding for the FU/AC position; 2) additional training to reduce birthing hospital referral rates; 3) improved accuracy of reporting by Oklahoma birthing hospitals; 4) reduction in the number of babies not screened at a birthing hospital prior to discharge; 5) reduction in the number of children born at home who are not screened; 6) increased availability of pediatric audiology-related services in Oklahoma's rural areas; and 7) increased collaboration with Early Intervention, Audiology and Home Visitation Programs.

The Target Population

This project focuses on infants (approximately 2,600 annually) who did not pass the initial screen and need additional testing. The target population for referral to early intervention services are those infants identified with hearing loss, which is between 90-160 per year including those infants with risk factors for late onset hearing loss.

Funding for the Follow-up/Audiology Coordinator Position

The Funding Opportunity Announcement indicates that "the single most effective means of reducing LTF/D rates is the assignment of a dedicated follow-up coordinator." Prior to the implementation of Universal Newborn Hearing Screening, the average age of diagnosis of childhood hearing loss in the United States was thirty (30) months of age. Due to the implementation of previous HRSA grant funding in Oklahoma, which allowed for the hiring of a NHSP FU/AC for hospital and county health department training, the age of diagnosis for hearing loss has been drastically reduced. Data shows that there have been at least five to ten children annually who were screened, diagnosed and amplified with hearing aids as early as one week of age since 2008. Lack of funding for this position would be detrimental to the NHSP program and loss of this position would result in a LTF/D rate that would double as evidenced by the data from 2009 when the position was vacant for several months. Additionally, delay in screening and diagnosis would result in late placement into early intervention services which would negatively impact a child's outcome due to delays in outreach and support to families.

Additional Training to Reduce Birthing Hospital Referral Rates

Currently, there are fifty-nine (59) licensed birthing hospitals in Oklahoma. Since April 2009, all hospitals have received a Natus Algo 3 or 5 Automated Auditory Brainstem Response (AABR) screener, except for Reynolds Army Medical Center (a federally-operated military hospital) that opted out of utilizing state equipment. The equipment manufacturer suggests an average 2-4% referral rate. The Neometrics data tracking system utilized by the OSDH NHSP allows for individualized patient tracking. Queries were modified during the last grant period to analyze the number of children who refer (did not pass) for each site. Through a CDC Cooperative Agreement, the NHSP has developed a statewide baseline for Refer Rates to determine if Oklahoma birthing hospitals were meeting the Joint Committee on Infant Hearing benchmarks of less than 4%. Refer Rates were analyzed for all birthing hospitals for Birthing Years 2011-2012. Oklahoma's Annual Refer Rate Average was 5.55% (Range: 0.00%-29.38%) in 2011 and 4.66% (Range: 0.00%-24.72%) in 2012. This data indicates that additional training is needed at Oklahoma birthing hospitals to reduce the number of child who refer (did not pass) the initial hearing screening.

Improved Accuracy of Reporting by Oklahoma Birthing Hospitals
In efforts to reduce LTF/D, the NHSP Administrative Assistant currently contacts birthing hospitals for updates on missing information when incorrect or insufficient results are received from birthing hospitals. Each contact made for requested data was previously only logged within the patient's NHSP chart. In an effort to provide feedback to hospitals, the NHSP underwent several small tests of changes in 2011 to determine the best method of recording hospital contacts for results. Not Reported Rates were analyzed for all birthing hospitals for Birthing Year 2012. Quantitative data revealed that the NHSP requested 863 missing hearing results. Oklahoma's Annual Not Reported Rate Average was 1.67% (Range: 0.00%-12.66%) with 22 (37%) hospitals higher than Oklahoma's average. This indicates that additional training is required to educate hospitals about the need to accurately report hearing results to the NHSP.

Reduction in the Number of Children Not Screened at a Birthing Hospital Prior to Discharge
In 2011, 772 children were not screened in Oklahoma birthing hospitals due to technical issues related to equipment, inadequate supplies, parental refusals and children discharged prior to completion of hearing screening. Through hospital trainings by the FU/AC, the number of children not screened at birthing hospitals is decreasing. Not Performed Rates were analyzed for all birthing hospitals for Birthing Years 2011-2012. Oklahoma's Annual Not Performed Rate Average for birthing hospitals was 1.49% (Range: 0.00%-13.31%) in 2011 and 0.90% (Range: 0.00%-11.39%) in 2012. For 2012, 25 (42%) hospitals were higher than Oklahoma's average. Emphasis will be placed on reducing extraneous factors that hinder the performance of hearing screening by providing additional training and education to the hospitals with higher rates of technical issues.

Reduction in the Number of Children Born at Home Who are Not Screened
Anecdotal data suggests that the number of home births is rising. The NHSP has provided trainings to nurse and lay midwife groups to emphasis the importance of hearing screening for all newborns. During discussions, most midwives indicated that parents who birth children at home or through a midwifery service are hesitant to go to a hospital or county health department for hearing screenings. A preliminary review of Oklahoma's missed screenings indicates that approximately half of the children not screened for hearing were born at home or delivered by a midwife. Data from 2012 for missed screenings related to home births will be analyzed following the CDC EHDI Survey to be submitted in February 2014. This proposal outlines further collaborations that are needed to determine ways to assist home birthing families in obtaining an initial hearing screening. This may include the need for a loaner program to ensure hearing screening equipment is available to midwife staff.

Increased Availability of Pediatric Audiology-Related Services in Oklahoma's Rural Areas
Oklahoma has 168 licensed audiologists who are located primarily in metropolitan areas. Only 21 are able to provide infant audiological diagnostic assessment. Five audiology practices are located within Indian health programs that only provide services to the Native American population. The remaining 16 audiology practices are located in the three largest metropolitan areas in Oklahoma. Lack of accessibility to qualified audiologists with the appropriate equipment and technical skills is a primary reason for the difficulty in assuring appropriate and complete

audiological diagnostic assessment by three months of age for children who did not pass the initial screen.

The NHSP follow-up protocol recommends an audiological diagnostic assessment for children who did not pass the hospital screening. In areas of the state where no pediatric audiology services are available locally, children who refer the hospital screening frequently are rescreened by well-trained clinicians (nurses, speech-language pathologists, etc.) located at a county health department. Currently, 35 Oklahoma county health departments have providers who can complete these hearings screenings. These providers also screen children who were not screened at birth or those who are at risk for late-onset hearing loss. If additional pediatric audiological diagnostic assessment is needed, these providers educate families on the importance of timely follow-up and serve as local liaisons to assist families with additional pediatric audiological services. This process has proven to be an efficient way to identify children who need a diagnostic appointment. Oklahoma is a national leader in ensuring that children are screened, rescreened, and diagnosed with hearing loss as soon as possible. The national goals are initial hearing screening by one month, diagnosis by three months and enrollment into early intervention by six months of age. Oklahoma seeks to surpass national goals by modifying the timeframe from months into weeks. For example, in 2010, 84 children were diagnosed with hearing loss. Of those, 55 (65%) were diagnosed by 3 months with 37 (44%) diagnosed in the first month of life. Similar data indicates that in 2011, 64 (70%) of the 92 children diagnosed with hearing loss received a diagnosis by three months with 19 (21%) of those children diagnosed in the first month of life. Data from a NHSP chart review indicated that many of the children that referred on follow-up screening at the county health department were immediately referred to pediatric audiology services.

Hearing screenings completed at rural county health departments are vital in meeting state and national goals for screening and diagnosis. To ensure that these services continue, this grant proposal will emphasize training and ongoing audiological consultation to these providers via the FU/AC. Funding will also assist in purchasing new Automated Auditory Brainstem Response (AABR) and Otoacoustic Emissions (OAE) screeners to replace aging devices.

Increased Collaboration with Early Intervention, Audiology and Home Visitation Programs

The NHSP partners with SoonerStart, Oklahoma's Part C Early Intervention program, to provide hearing screening to children who were not screened at the hospital, referred on the initial hospital screening, or passed but were at risk for late onset hearing loss. Current equipment is aging and many devices need replacement or repair. The NHSP was issued an "End of Life Notification" effective December 2013 on the most commonly utilized hearing screener in county health departments. These devices will still be calibrated, but repairs may not be possible. Funding from this grant will provide additional equipment to screen Oklahoma children from birth to three years of age in urban and rural areas of the state.

Collaborative efforts with SoonerStart and the NHSP are ongoing to determine if children with diagnosed hearing loss are placed in intervention by six months of age. Quarterly tracking forms are sent by the NHSP to providers at each SoonerStart location. Information is requested regarding children diagnosed with hearing loss that are currently receiving SoonerStart services.

This includes demographics, name of audiologist/audiology clinic, hearing loss type/degree, and dates for the following: hearing loss diagnosis, hearing aid fitting, and early intervention placement. A one year analysis was completed and presented at the EHDI 2012 Conference. Data revealed that in one year SoonerStart was able to reduce loss to documentation by identifying 33 children who had been diagnosed with hearing loss and were receiving early intervention services but were not reported to the NHSP by the diagnosing audiologist. The FU/AC utilizes this information to educate audiology sites about the need to report results for all children and toddlers diagnosed with hearing loss after failure of the newborn hearing screen.

The OSDH has been designated as the lead agency for the Home Visiting Program. The NHSP has partnered with the statewide Home Visitation Leadership Advisory Council (HVLAC) to educate providers about the impact of hearing loss on child development and the need for immediate follow-up of children who did not pass the newborn hearing screening at the hospital. Information and education have been presented by the NHSP Coordinator and FU/AC at quarterly HVLAC meetings and the annual statewide Home Visitors Conference. Ongoing training and audiological consultation is vital to this group of stakeholders to ensure that children are screened, diagnosed and enrolled in appropriate early intervention services.

Summary of Needs

The NHSP Needs Assessment has outlined causes for loss to follow-up after failure to pass newborn hearing screening. In order to increase the percentage of children who receive appropriate comprehensive audiology diagnostic assessment, the NHSP must continue to employ appropriate personnel to perform the case management, follow-up, and audiological training. The Oklahoma FU/AC is a key partner in the grant goals and objectives by: 1) providing audiological training/technical assistance for hospitals, county health departments, midwives, local Part C Early Intervention programs, home visitation programs, etc.; 2) assisting parents with recommended follow-up audiological and early intervention services; and 3) requesting documentation from various entities such as local Part C Early Intervention programs, audiology practices, etc.

Enhancing clinicians' skills at the hospital, midwifery practices, and local county health departments will result in more efficient identification of those children who did not pass a hospital screening and should clearly identify those children who need an audiological diagnostic assessment. Replacement of aging devices at current county health departments and providing additional follow-up screening equipment at more rural locations will continue to lower the number of families who do not receive services because they are unable to travel long distances to obtain a diagnostic assessment. Similar strategies already employed by the NHSP have documented success in meeting and exceeding national guidelines for screening, diagnostics, and intervention placement.

METHODOLOGY

Goals and Objectives

The current proposed project is designed to address several of the unmet needs of the Oklahoma NHSP. The specific goals and objectives of this project are stated below. Specific details regarding the timeline and evaluation methods can be located in the Work Plan Chart provided.

Goal/Aim 1: By April 1, 2017, the NHSP will reduce loss to documentation by utilizing quality improvement strategies to reduce the total number of screenings not reported to the NHSP by Oklahoma birthing hospitals by a total of 50%.

Objectives:

1. *Monitor all Oklahoma birthing hospitals to ensure a 15% annual reduction in Not Reported Rates.*
2. *Reduce the Not Reported Rate at Oklahoma State University (OSU) Medical Center by a total of 50% over a 3 year period.*

Goal/Aim 2: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce hospital Refer (did not pass) Rates by a total of 50%.

Objectives:

1. *Monitor all Oklahoma birthing hospitals to ensure an average Refer Rate of 5% or lower.*
2. *Reduce refers at Oklahoma birthing hospitals with a Refer Rate higher than 5%.*

Goal/Aim 3: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the total number of babies not screened at Oklahoma birthing hospitals by a total of 50%.

Objectives:

1. *Monitor all Oklahoma birthing hospitals to ensure a 15% annual reduction in Not Performed Rates.*
2. *Reduce missed screenings at Oklahoma birthing hospitals with a Not Performed Rate higher than 1%.*

Goal/Aim 4: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the number of children who are not born at an Oklahoma birthing hospital (home birth) and do not receive a hearing screening by one month of age.

Objectives:

1. *Create a baseline of the total number of babies who are not born at an Oklahoma birthing hospital.*
2. *Ensure 80% of the babies born through Oklahoma's largest midwifery service receive a hearing screening prior to one month of age.*

Goal/Aim 5: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to increase the number of children who received an audiological diagnostic assessment by three months of age from 70% to 85%.

Objectives:

1. *Eighty percent or more of infants who did not pass their hearing screening are documented to have received a rescreen and/or an audiological diagnostic assessment by three months of age.*
2. *On an annual basis, increase access to hearing screening/rescreening capabilities for children born in rural areas to ensure an audiological diagnostic assessment by three months of age.*

Goal/Aim 6: By April 1, 2017, the NHSP will partner with Oklahoma pediatric audiology practices and the SoonerStart Part C Early Intervention Program to increase the percentage of children diagnosed with hearing loss enrolled in Early Intervention services by 6 months of age from 63% to 80%.

Objectives:

1. *Seventy-five percent of all infants diagnosed with hearing loss will be reported to NHSP by pediatric audiologists as demonstrated through SoonerStart Part C Early Intervention tracking forms in order to reduce loss to documentation.*
2. *Eighty percent of all infants diagnosed with hearing loss will be enrolled in Early Intervention services by six months of age.*
3. *Ninety percent or more of infants who undergo an audiological diagnostic assessment will have results of this evaluation shared with the NHSP, and all infants diagnosed with hearing loss will be referred for Early Intervention services by six months of age.*

Quality Improvement Strategies

In 2012-2013, the NHSP participated in the National Initiative for Children's Healthcare Quality (NICHQ) Improving Hearing Screening and Intervention Systems (IHSIS) Learning Collaborative over a 14 month period with 18 states in an effort to improve newborn hearing screening follow-up. The Learning Collaborative was an innovative quality improvement model designed to enable teams to share, test, and implement ideas that result in more timely, appropriate, coordinated, and family-centered care. The Learning Collaborative focused on using the Model for Improvement developed by *Associates in Process Improvement*. The Oklahoma Quality Improvement (QI) team was able to test changes to improve the quality of care to newborns with hearing loss. The Oklahoma QI team included members of the NHSP staff, pediatric audiologists, SoonerStart Part C Early Intervention providers, and parent advocates from the Oklahoma Chapter of Hands and Voices. Additional partners were included as needed to address specific goals and activities.

The NHSP completed several projects throughout the NICHQ process. Modifications were completed utilizing strategies from the Model for Improvement. This included planning a change (Plan), trying the change (Do), observing the results (Study) and acting on what was learned (Act). The Plan-Do-Study-Act (PDSA) cycles were utilized to determine if the changes resulted in improvement of hospital screening and reporting.

C***ollaboration with Stakeholders***

The NHSP will build upon quality improvement strategies learned during the NICHQ Learning Collaborative to enhance communication within a team of stakeholders. This Early Hearing Detection and Intervention (EHDI) team will include the NHSP Coordinator as the team lead, the FU/AC, who is one of Oklahoma's top pediatric audiologists, and the Quality Assurance/Data Coordinator (QA/DC) as the data person. The stakeholder team will also include representatives from the Oklahoma Family Network and the Oklahoma Chapter of Hands and Voices whose members include parents of children with hearing loss. These statewide parent-to-parent support groups serve families and communities of culturally, linguistically, socio-economically and geographically diverse backgrounds. Extended partners for specific quality improvement activities will include 1) Oklahoma State Department of Health (OSDH) Child Guidance Program; 2) Oklahoma SoonerStart Part C Early Intervention Program; 3) Integris Cochlear Implant Clinic; 4) Oklahoma State University Medical Center, Labor and Delivery unit; and 5) OSDH Newborn (Bloodspot) Screening Program.

The NHSP will also work with a statewide workgroup, Oklahoma Audiology Taskforce (OKAT) to spread successful changes throughout the state. The OKAT was developed in 2000 under the direction and facilitation of the NHSP to address practice issues related to infant hearing screening, assessment, and management. The OKAT initially instituted newborn hearing screening at Oklahoma birthing hospitals and was instrumental in supporting legislation mandating private insurance coverage for hearing aids. This workgroup developed standardized state infant audiological diagnostic assessment and amplification protocols to ensure that Oklahoma newborns received appropriate hearing assessment and proper amplification was provided to children with hearing loss. In 2010, OKAT was restructured and expanded with a vision of "Improving opportunities for Oklahoma infants, toddlers, and children." The mission statement for this taskforce is as follows: "The Oklahoma Audiology Taskforce (OKAT) is dedicated to establishing the gold standard of hearing healthcare for the early detection, diagnosis, and treatment of childhood hearing loss through implementation of newborn hearing screening, family-centered support and outreach education." Guiding Principles for the taskforce state "As a collaborative network of individuals, our efforts are focused on the impact hearing loss has on a child's speech, language, cognitive, social and emotional development. We are committed to establishing consistent pediatric audiology practices in accordance with the national guidelines, created by the CDC Early Hearing Detection and Intervention Program, to exceed the '1-3-6' goals." The OKAT meets quarterly face-to-face in Oklahoma City with videoconferencing to the Tulsa Health Department. (See Attachment 8: OKAT)

Five OKAT subcommittees were developed to address the needs of Oklahoma families: Family Support, Pediatric Audiology, Childhood Provider Outreach, Genetics, and Protocols. Through this restructuring, OKAT tripled its participation by statewide stakeholders. Subcommittees provide opportunities for members to focus on a particular area of interest and meet via teleconferencing once a month. Membership is open to statewide stakeholders and includes audiologists, Deaf educators, speech-language pathologists, early interventionists (Part C and Non-Part C), physicians, genetics community members, hospital screening staff, follow-up screening providers at county health departments (ie. Child Guidance), parents of children with hearing loss, consumers, representatives from Indian Health Services, and the Oklahoma Chapter

Champion of the American Academy of Pediatrics. Several projects are underway to reduce the number of children LTF/D. In addition, the OKAT partners with the Oklahoma Board of Examiners for Speech-Language Pathology and Audiology, the Oklahoma Speech-Language-Hearing Association, and the Oklahoma Health Care Authority, the state Medicaid agency, to ensure that all practicing clinicians in Oklahoma are aware of and complying with best practices for infant hearing assessment and state requirements for reporting of NHSP follow-up results.

The Children with Special Health Care Needs (CSHCN) program is located within the Department of Human Services (DHS). The OSDH and the CSHCN began collaborating in 1998 to provide the initial physiologic screening equipment to all Oklahoma birthing hospitals. The CSHCN program also provided funding for audiologists to work with hospitals to initially train staff and negotiate Memoranda of Agreements to implement universal newborn hearing screening. The CSHCN is paired with the Maternal and Child Health Service (MCH) to implement Oklahoma's Title V program. Programs work together to meet targeted needs in Oklahoma for children with hearing loss. This includes providing hearing screening capabilities to county health departments who do not have Child Guidance or SoonerStart staff to provide hearing screenings. Hearing screening equipment is provided along with annual calibration and training to meet the needs of those rural families.

Since 2006, the NHSP has paired with the Children First Nurse Family Partnership program at the OSDH. This is a voluntary family support program that offers home visitation services to mothers expecting their first child beginning before the 29th week of pregnancy and continuing until the child's second birthday. This program employs 140 public health nurses and serves approximately 5,000 families across Oklahoma. Once enrolled in the program, a public health nurse works with the mother in order to increase her chances of delivering a healthy baby as well as educating the family about safety and child development. The NHSP provides training for new nurses employed by the Children First program regarding the importance of follow-up for children who refer the newborn hearing screening or those at risk for late onset hearing loss. Additional topics addressed include the impact of hearing loss on language, literacy, and other developmental skills. In 2008, at the request of the Children First nurses to provide information to parents regarding Newborn Hearing Screening, permission was obtained from Utah State University to reproduce and utilize the *Sound Beginnings* videos created by the National Center for Hearing Assessment and Management (NCHAM). Each Children First nurse received a copy of the video in Spanish and English along with a parent education packet. The packet included examples of the hospital bloodspot form, hearing loss facts, and additional information on follow-up for a child who did not pass the hospital screening. This project continues to provide training packets and videos to new providers as needed along with *A Professional's Guide to Pediatric Audiologists in Oklahoma*. The FU/AC will continue to provide training for providers several times a year. Feedback will be requested to determine areas in which improvements can be made to meet the needs of the families served by the Children First staff.

The NHSP has expanded similar trainings to other home visitation programs throughout the state. Programs include Healthy Start, Early Head Start, and Smart Start programs as well as the Child Abuse Training and Coordination (CATC)/Home Visitation Leadership Advisory Council (HVLAC). The NHSP is working with the Maternal, Infant, Early Childhood Home Visiting

(MIECHV) program and Oklahoma Parents as Teachers (OPAT) to provide audiology resources such as infant and school-age hearing screening protocols.

Measurements, Sustainability, and Expansion

Through the use of quality improvement (QI) methodologies, the NHSP expects to be able to sustain key elements of grant projects after the period of federal funding ends. The program seeks to engage stakeholders in ways that lead to sustainable improvement to reduce LTF/D**.** There will be four QI teams developed to meet the goals/aims in this grant application: 1) NHSP/OSU QI Team, 2) Home Birth QI Team, 3) NHSP/Child Guidance QI Team, and 4) NHSP/Integris QI Team. The teams will meet to identify needs and develop Aim statements to include: what will improve, when will it improve, how much will it improve, and for whom will it improve as detailed in figure on page 1 of the Funding Opportunity Announcement. The team will propose changes and work through PDSA cycles to implement small tests of change. Data for each goal will be collected, reviewed, and analyzed on an ongoing basis to determine if the changes proposed in this application have led to system-wide improvements.

The program will continue to provide hospital reports on a quarterly and annual basis through CDC Cooperative Agreement funding. This includes ongoing monitoring and trend analysis to determine which hospitals need additional training to improve the accuracy of reporting all hearing screening results to NHSP, reduce hospital Refer Rates, and determine reasons for missed hearing screens. Data will be compiled each year to develop an Oklahoma average for each of the three categories addressed in the hospital report. Each hospital's annual report will be reviewed to determine the percentage of individual hospitals demonstrating improvements compared to previous hospital performance. The number of hospitals meeting the NHSP averages will also be analyzed. The NHSP/OSU QI Team will also assist in determining which strategies were successful and how to spread those successful changes to other Oklahoma birthing hospitals.

The development of a comprehensive list of Oklahoma home birth sources along with the Neometrics query development will assist to identify the number of children who have not received an initial hearing screening by one month of age. Baseline data of home births will be compared annually following each CDC EHDI Survey submission to determine if there is an increase in the number of children receiving hearing screening. The development of a Home Birth QI Team along with the implementation of PDSA cycles will determine the feasibility and success of a hearing equipment loaner program for midwife groups across the state.

The development of the NHSP/Integris QI Team to replicate the NICHQ Audiology Data Collection Tool will assist in determining ways to link early intervention services in a more timely manner. Similar to the NICHQ process, baseline data will be compiled from the audit of the last twenty (20) cases of children seen at the location (ages birth to three years) regardless of diagnosis. Data will be monitored on a monthly basis or more frequently as determined by the team. Improvement will be measured based on subsequent data to determine if the changes tested were successful. The tool created by NICHQ will be modified to determine the best methods for expansion to other Oklahoma pediatric audiology clinics to ensure all infants diagnosed with hearing loss are referred for early intervention services by six months of age.

WORK PLAN

This section will address activities and steps used to achieve the six goals/aims created for the project period in the methodology section. Additional details regarding the project work plan, timelines, activities, impact and evaluation components appear in the Work Plan Attachment.

The Newborn Hearing Screening Program (NHSP) at the Oklahoma State Department of Health (OSDH) continues to employ a Quality Assurance/Data Coordinator (QA/DC) utilizing CDC Cooperative Agreement funds to analyze individual hospital performance/compliance rates. During the NICHQ process, the NHSP Coordinator and QA/DC modified queries within the Neometrics data tracking system to abstract newborn hearing screening results and reporting for all Oklahoma birthing hospitals by month.

The NHSP developed a new initiative to create statewide data reports for every birthing hospital and provide consultation on a quarterly basis to assist in reducing LTF/D. Monthly hospital data is abstracted and extensively analyzed by the QA/DC to create hospital reports for annual and quarterly time frames. Reports are issued in March, June, September, and November of each year. Reports are provided three to four months after a quarter has ended to allow for the receipt of screening information for babies placed in the Neonatal Intensive Care Unit and for analysis purposes. The reports include hospital specific information as well as overall state comparison data for the following categories: Refer (did not pass) Rate, Not Performed Rate, and Not Reported Rate. Currently, the NHSP has baseline data for Birthing Years 2011-2012. The CDC Cooperative Agreement funds focus on obtaining data but do not fund individualized direct services for hospital trainings, troubleshooting, and other on-site or consultative support at Oklahoma birthing hospitals. Goals/Aims 1-3 utilize the data provided by the three hospital reports to target specific interventions to be completed in efforts to reduce LTF/D.

Multiple changes were made to ensure utility for the hospital and the NHSP. The project was expanded to the Pediatrix Medical Group, which manages the hearing screening programs in nine Oklahoma birthing hospitals in the Oklahoma City metropolitan area. Additional modifications were made over a one year period and then expanded to all Oklahoma birthing hospitals in June 2013. (See Attachment 6: Hospital Data Comparison Tables)

Goal/Aim 1: By April 1, 2017, the NHSP will reduce loss to documentation by utilizing quality improvement strategies to reduce the total number of screenings not reported, to the NHSP, by Oklahoma birthing hospitals by a total of 50%.

The NHSP Follow-up/Audiology Coordinator (FU/AC) has provided training for all Oklahoma birthing hospitals. Training was implemented in a generalized format to discuss all areas of newborn hearing screening and follow-up.

Objective 1.1: The NHSP will utilize the data obtained through the Not Reported Rate Reports created each quarter by the QA/DC to improve reporting. Originally, the NHSP only created two reports: Not Performed Rates and Referred. However, through PDSA cycles, it was determined that the creation of the Not Reported Rate Reports allowed NHSP to differentiate between the

categories of loss to follow-up and loss to documentation. Modifications will be made to hospital trainings and technical assistance to determine why data is not reported to the NHSP utilizing PDSA cycles. One month following the creation of all quarterly Not Reported Rate Reports, the FU/AC and QA/DC will review all reports. Hospital training and/or technical assistance will be provided by the FU/AC to sites identified with trends of poor reporting in an effort to reduce loss to documentation. The FU/AC will work with each hospital to identify reasons that reporting was not completed for each individual child. This includes babies not screened due to delayed equipment calibration, broken devices, lack of hearing supplies, parent refusals, and those discharged prior to screening.

Objective 1.2: The NHSP will partner with Oklahoma State University (OSU) Medical Center in Tulsa, OK to greatly reduce the hospital's Not Reported Rates. After analyzing the Not Reported Rates at all Oklahoma birthing hospitals, OSU Medical Center was identified as having one of the highest Not Reported Rates. In 2011, the hospital neglected to report 65/538 (12.08%) screenings completed at the location and was ranked 56/60 when compared to other hospitals. In 2012, OSU Medical Center was identified as having the highest Not Reported Rate in Oklahoma by not sending 46/482 (9.54%) screening results to the NHSP. To address this issue, the NHSP proposed a QI project to determine the reasons for not reporting. The goal is to reduce OSU's Not Reported Rates to meet Oklahoma's Annual Not Reported Rate Average of 1.67%. A meeting will be held with the NHSP staff, OSU hospital personnel and other related partners to create an Aim statement and to address, plan and analyze for better data collection and monitoring. Modifications will focus the NHSP training on reporting protocols and addressing other issues as needed. The NHSP/OSU QI team will monitor and modify PDSA cycles over a one year period and will access annual data to determine the reduction in Not Reported Rates over a three year period. It is expected that cycles will be one month unless otherwise determined to allow the NHSP/OSU QI team to monitor progress more frequently than the scheduled quarterly Not Reported Rate Reports. All PDSA cycles will be documented to identify possible changes that can be implemented at other birthing hospitals with high Not Reported Rates.

Goal/Aim 2: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce hospital Refer (did not pass) Rates by a total of 50%.

Objective 2.1: The NHSP will utilize the data obtained through the Refer Rate Reports created each quarter by the QA/DC. One month following the creation of all quarterly Refer Rate Reports, the FU/AC and QA/DC will review all reports to identify trends of poor screening capabilities per hospital location.

Objective 2.2: Hospitals with high Refer Rates will receive additional training in an effort to enhance quality screening at the hospital prior to hospital discharge. Training and technical assistance will focus on all aspects of reducing Refer Rates which include but are not limited to completion of annual calibration, care of device, troubleshooting tips, preparation of infant, electrode placement, addressing myogenic or ambient noise, etc. These training efforts will reduce the number of babies needing re-screens prior to discharge thus reducing loss to follow-up.

At the time of this grant application, the most current data submitted on the last CDC EHDI Survey was completed in February 2013 and included data for 2011. Twenty-five hospitals were identified as having Refer Rates higher than Oklahoma's 2011 Annual Refer Rate Average of 5.55%. Upon review of the 2011 Refer Rates for Oklahoma birthing hospitals, it was determined that three categories were identifiable: Extremely High, High, and Medium Concern.

Five hospitals were placed in the Extremely High Concern category and will receive more intensive hospital training and/or technical assistance in Budget Year 1:

Hospital Name	Year	Total Birth	Refers	Average
Chickasaw Nation Medical Center	2011	616	181	29.38%
Hillcrest Hospital Claremore	2011	531	135	25.42%
Memorial Hospital of Stilwell	2011	83	16	19.28%
Mercy Memorial Health Center	2011	843	134	15.90%
Comanche County Memorial Hospital	2011	1171	186	15.88%

Five hospitals were placed in the High Concern category and will receive initial training in Year 1 and targeted hospital training and/or technical assistance in Budget Year 2 if quarterly reports demonstrate limited improvement:

Hillcrest Hospital Cushing	2011	228	32	14.04%
Hillcrest Medical Center	2011	3179	355	11.17%
Claremore Indian Hospital	2011	215	23	10.70%
Tahlequah City Hospital	2011	339	35	10.32%
Great Plains Regional Medical Center	2011	448	46	10.27%

Fifteen hospitals were placed in the Medium Concern category and will receive targeted hospital training and/or technical assistance in Budget Year 3:

Craig General Hospital	2011	75	7	9.33%
St. Mary's Regional Medical Center	2011	322	30	9.32%
Reynolds Army Community Hospital	2011	658	61	9.27%
Eastar Health System	2011	670	60	8.96%
Grady Memorial Hospital	2011	313	25	7.99%
Integris Baptist Regional Health Center	2011	340	27	7.94%
McAlester Regional Health Center	2011	535	42	7.85%
Integris Grove Hospital	2011	326	24	7.36%
St. John Owasso	2011	343	25	7.29%
Oklahoma State University Medical Center	2011	538	39	7.25%
Choctaw Nation Health Care Center	2011	505	36	7.13%
W.W. Hastings Indian Hospital	2011	780	54	6.92%
St. John Medical Center	2011	1976	132	6.68%
Memorial Hospital of Texas County	2011	344	22	6.40%
Pauls Valley General Hospital	2011	81	5	6.17%

The FU/AC will individualize training to the above listed Oklahoma birthing hospitals based on the level of concern. Hospital trends will monitored on an annual basis to determine the need for additional training.

Goal/Aim 3: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the total number of babies not screened at Oklahoma birthing hospitals by a total of 50%.

Objective 3.1: The NHSP will utilize the data obtained through the Not Performed Rates reports created each quarter by the QA/DC. One month following the creation of all quarterly reports, the FU/AC and QA/DC will review all reports to identify trends of high Not Performed Rates.

Objective 3.2: Hospitals with high Not Performed Rates will receive additional training to comply with the state mandate that all children born at Oklahoma birthing hospitals are screened. The FU/AC will work with each hospital to identify reasons for missed screens and provide consultation regarding ways to ensure all screens are completed prior to discharge.

Hospitals not performing hearing screenings prior to discharge can often be attributed to incomplete protocols, lack of annual calibration, lack of hearing screening supplies, and lack of experience in counseling parents regarding the importance of screening. By working with Oklahoma birthing hospitals to screen all babies, a higher percentage of children will be screened by one month of age and the rate of LTF/D will be reduced.

In 2011, a total of 772 infants were not screened in Oklahoma birthing hospitals. Though some of those infants did receive follow-up screenings, the statewide total of babies not screened was 459**.** Additional NHSP training and collaboration will be provided to reduce the number of babies who do not receive hearing screening by 50% through a 15% annual reduction. Twenty-five (25) hospitals were identified as having Not Performed Rates higher than Oklahoma's 2011 Annual Not Performed Rate Average of 1.49%. However, only ten (10) hospitals had a Not Performed Rate over 2%. Upon review of the 2011 Not Performed Rates for Oklahoma birthing hospitals, it was determined that two categories of concern were identifiable: Extremely High and High Concerns.

Five hospitals were placed in the Extremely High Concern category and will receive targeted hospital training and/or technical assistance in Budget Year 1:

Hospital Name	Year	Total Birth	Not Performed	Average
St. Anthony Shawnee Hospital	2011	939	125	13.31%
Medical Center of Southeastern Oklahoma	2011	1133	80	7.06%
Eastar Health System	2011	670	47	7.01%
Memorial Hospital of Stilwell	2011	83	5	6.02%
Chickasaw Nation Medical Center	2011	616	34	5.52%

Five hospitals were placed in the High Concern category and will receive targeted hospital training and/or technical assistance in Budget Year 2:

Mercy Memorial Health Center	2011	843	42	4.98%
Purcell Municipal Hospital	2011	42	2	4.76%
Memorial Hospital of Texas County	2011	344	16	4.65%
Hillcrest Hospital South	2011	1648	70	4.25%
Integris Grove Hospital	2011	326	10	3.07%

During Budget Year 3, all Not Performed Rates will be re-evaluated to determine which hospitals need additional training to ensure that all newborns are screened prior to discharge. Hospital trends will continue to be monitored to determine the need for additional training on an annual basis.

Goal/Aim 4: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to reduce the number of children who are not born at an Oklahoma birthing hospital and do not receive a hearing screening by 1 month of age.

The NHSP has been successful in implementing small tests of change to gradually reduce the LTF/D rate over the last five years. This includes a reduction from 40% in 2006 to 16% in 2011. Additionally, the number of children not receiving an initial hearing screening was reduced from 2658 (4.9%) children in 2006 to 459 (0.9%) children in 2011. A review of the 2011 data revealed that many of the infants reported as not screened were born through assistance of a midwife/ midwifery service and not in an Oklahoma birthing hospital. The NHSP began discussions with local midwives resulting in a presentation to the Oklahoma Midwife Alliance by the NHSP FU/AC in February 2012. Twenty-five (25) professional nurse midwives from across the state were present to receive the information and discuss the issues related to newborn hearing screening. The presentation reviewed the importance of NHSP for all children born in the state of Oklahoma. A copy of the National Center for Hearing Assessment and Management (NCHAM) *Sound Beginnings* video was provided to assist the midwives when educating families about the process of newborn hearing screening and follow-up. Resources specific to Oklahoma were provided including the Oklahoma *Newborn Hearing Screening* brochure, *A Professional's Guide to Pediatric Audiologists in Oklahoma,* and information about local county health department resources with hearing screening capabilities. The midwives indicated that the population they serve is less likely to go to a hospital, a pediatric audiologist or a county health department to obtain a needed hearing screening. Discussions indicated that many of the nurse midwives were educating parents about newborn hearing screening and in most instances, referring the family back to the primary care provider to initiate hearing screening follow-up. Some families who were referred to the county health department for follow-up would refuse services due to the stigma of county health departments. It was also noted that the Amish communities in Oklahoma utilize midwives but transportation to a facility is a significant obstacle.

Midwives indicated the obstacles that hinder them from providing hearing screening services include: 1) cost of hearing screening devices; 2) training needed to implement the hearing

screening; and 3) access to an audiology consultant to assist with troubleshooting. Due to these obstacles/challenges, the midwives indicated they would like to partner with the NHSP to obtain or borrow hearing equipment to provide screenings at the two week well-child check in the child's home.

The NHSP proposes that opportunities exist to link with Oklahoma nurse midwives to encourage initial hearing screenings prior to one month of age. The NHSP already provides hearing screening equipment to Oklahoma birthing hospitals and county health departments while the FU/AC provides the training and audiological consultation. During this grant period, the NHSP would like to replicate the hearing equipment loaner opportunities to nurse and lay midwives including education, training, and audiology consultation.

Objective 4.1: The NHSP seeks to create multi-year baseline data to determine the number of babies born outside of Oklahoma birthing hospitals who do not receive an initial hearing screening. The NHSP is currently linked with the Oklahoma Newborn Metabolic Disorder Screening Program (NMDSP). Both programs utilize a Neometrics data tracking system to provide surveillance and case management for all children born in the state of Oklahoma. Queries will be written to abstract data to determine the number of bloodspots of initial newborn screens at county health departments as well as identify the number of home births by provider name. The NHSP has determined that both programs do not have a current comprehensive list of home birth/midwifery providers. Therefore, the NHSP will develop a quality improvement team to explore all providers in the state of Oklahoma. This team will include various partners such as the NHSP, the NMDSP, the Oklahoma Center for Health Statistics which includes Vital Records for Birth Certificates, the Oklahoma Maternal and Child Health Title V Program, and the Oklahoma Midwife Alliance. Additional stakeholders are expected to be identified through the workgroup efforts. Once a comprehensive list of home birth/midwifery providers in the state of Oklahoma is developed, the NHSP will be able to modify Neometrics queries to abstract data by specific providers. This information will be used to identify the number of births by each midwife and determine the percentage of those infants who have not received an initial screening by location. In addition to the baseline data, the Neometrics data tracking system will be modified to track hearing closure codes to differentiate home births from hospital births for continued monitoring and measure management.

Objective 4.2: The NHSP seeks to further reduce LTF/D by reducing the number of children who do not receive a hearing screening and are born outside of an Oklahoma birthing hospital. The NHSP will utilize the comprehensive list of home birth/midwifery providers developed between April 1, 2014 through July 1, 2015 to identify the largest midwife group in Oklahoma. Currently, available data indicates that the largest midwifery service is Community Midwifery in Norman, OK with 68 home deliveries in 2011. This site has expressed interest in partnering with the NHSP to provide hearing screenings. Baseline data will allow the NHSP to determine birth trends over several years which will assist in selecting a partner for screening opportunities. The NHSP will purchase additional hearing screening equipment and develop protocols for a Midwife Loaner Program. Once a partner is selected, an initial PDSA cycle will be created and training will be implemented. It is expected that numerous PDSA cycles will be completed with small tests of change to determine the efficiency of the project and the method of

implementation. The project will be replicated to other statewide midwifery services in order to ensure a hearing screening for all babies born outside of Oklahoma birthing hospitals.

Goal/Aim 5: By April 1, 2017, the NHSP will reduce loss to follow-up/documentation by utilizing quality improvement strategies to increase the number of children who received audiological diagnostic assessment by three months of age from 70% to 85%.

Objective 5.1: As mentioned, the NHSP participated in the NICHQ Learning Collaborative in 2012-2013. One aim of the NHSP NICHQ Project was that "80% or more infants referring on their initial screen are documented to have a follow-up screen by one month and if needed an audiological diagnosis by three months of age." Initial steps were made towards the goal but continued efforts are needed to obtain the desired outcome.

The initial objective of the NICHQ Child Guidance Project was "to implement a referral process from the NHSP directly to county health departments with hearing screening capabilities to ensure timely follow-up screenings and audiological diagnostic assessment as needed." NHSP has partnered with the Child Guidance Program for many years by providing hearing equipment and protocols to enable them to provide screenings to children birth to 12 years of age at 15 local county health departments across Oklahoma. In 2012, the NHSP created a QI team with the Child Guidance central office leadership and Linda Blake, Payne County speech-language pathologist (SLP). The Oklahoma QI team utilized the PDSA quality improvement strategy to revisit the project activities every two to four weeks. The team identified changes to test, made predictions of the outcomes of each change, planned for the testing process (who, what, when, where) and developed a data collection plan to learn if the test was successful. It was predicted that: 1) more families will receive follow-up screening in a timely manner due to the county SLP initiating the follow-up appointment instead of expecting the parent to make the appointment and 2) if successful in Payne County, this process would be expanded to other Child Guidance locations across the state.

The Oklahoma QI team initially "Planned" a change process where NHSP notified the provider via secure internal agency email with screenshots of patient's demographics for children who reside in the county or surrounding counties who needed follow-up hearing screenings. Upon receipt of notification, the county provider contacted the family within one week in an attempt to schedule a follow-up screening. Observations, findings, problems encountered, and special circumstances were documented for each "Do" cycle. The team compared the results to initial predictions and discussed lessons learned during the "Study" cycle. Finally, the team was able to determine next steps during the "Act" cycle which included one of the three areas:

- Adapting: improve the change and continue testing plan
- Adopting: select changes to implement on a larger scale and develop an implementation plan and plan for sustainability
- Abandoning: discard this change idea and try a different one

One of the most successful adaptations was created to address the problem of providers being unable to connect with the parent to schedule a hearing screening appointment. The Oklahoma QI team developed a process whereby the provider would make two additional attempts. If the

provider was unable to contact the family, the NHSP was then updated and services such as the Women Infants, and Children (WIC) Program were alerted through the patient's chart at the county health department.

The Oklahoma QI implemented numerous PDSA cycles and the findings of the year-long NICHQ Child Guidance Project indicated that the process of initiating referral from the NHSP directly to county health departments with hearing screening capabilities did ensure timely follow-up screenings and audiological diagnostic assessment in most instances. Approximately 50% of the families contacted were able to schedule an appointment for a hearing rescreen within 45 days of the initial hospital screening. Several children were able to obtain a screening within one week from the date the NHSP sent the information to the county health department provider. The partnership also reminded the provider to send results to the NHSP thus reducing loss to documentation. The QI project also revealed that replication with another Child Guidance county location could be done with little or minimal difficulties. Therefore, NHSP will utilize this grant opportunity to expand upon the knowledge learned during the NICHQ process and continue to work on this aim through Objective 5.1.

Objective 5.2: The NHSP will complete a statewide review of equipment capabilities of county health departments to provide hearing screening/rescreening services. This includes enhanced partnerships with the Child Guidance Program, SoonerStart Part C Early Intervention, and Maternal and Child Health. It is noted that many hearing screening devices are aging and in need of extensive repair or replacement. The list of providers trained to provide screening continues to change due to county health department staffing (retirements, limited travel, provider moved, etc.). Data will be obtained to determine the number of re-screens needed per county following hospital discharge and current hearing screening equipment capabilities per location. All equipment at county locations will be reviewed to determine the need for replacement. Equipment will be purchased by utilizing grant funds with a priority to be placed on rural locations where no pediatric audiology services are available to ensure timely follow-up. Training and technical support will be provided by the FU/AC to assist the providers in working with families to ensure prompt referral of families to a pediatric audiologist. This will assist in reducing the number of children loss to follow-up and increase the number of children who received an audiological diagnostic assessment by three months of age. Additional emphasis will be placed on reporting of all screenings and referrals made for audiological diagnostic assessment in order to reduce loss to documentation.

Goal/Aim 6: By April 1, 2017, the NHSP will partner with Oklahoma pediatric audiology practices and the SoonerStart Part C Early Intervention Program to increase the percentage of children diagnosed with hearing loss enrolled in early intervention services by six months of age from 63% to 80%.

The Oklahoma Part C Early Intervention Program, SoonerStart, is funded through the Oklahoma State Department of Education (OSDE) and implemented through the Oklahoma State Department of Health (OSDH). SoonerStart requires providers to document initial hearing screening results from the NHSP. The NHSP partners with SoonerStart by providing hearing equipment, training, technical assistance, and ongoing consultation to enable the program to

offer hearing screenings to children birth to three years and to assist families in obtaining needed audiological diagnostic assessments.

Federal privacy protections for individual student records created difficulties for public health efforts to conduct ongoing surveillance and monitoring of children through the early intervention process. Sharing data between SoonerStart is the primary avenue to accurately determine if children diagnosed with hearing loss are enrolled in early intervention services by six months of age. In 2007, a Memorandum of Understanding (MOU) was created between the OSDE and the OSDH to address issues of sharing data. This MOU addressed issues between the Family Educational Rights and Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule related to the use and disclosure of information. To resolve the outstanding issue, the parent/guardian is required to sign a general release of information at the onset of SoonerStart services to allow the program to share hearing-related information with the NHSP.

Collaborative efforts with SoonerStart and the NHSP have occurred since 2005 to determine if children with diagnosed hearing loss are placed in intervention by six months of age. Currently, the NHSP sends a quarterly tracking form electronically to providers at each SoonerStart location. Information is requested for children diagnosed with hearing loss that are currently receiving SoonerStart services, including demographics, hearing loss type and degree, date of hearing loss diagnosis and hearing aid fitting, name of audiologist or audiology clinic, and early intervention placement date.

Objective 6:1: The NHSP will continue to collect the successful SoonerStart tracking forms on a quarterly basis with an emphasis on data collection and measure management. The project will expand to include a reverse tracking form process utilizing *A Professional's Guide to Pediatric Audiologists in Oklahoma.* The FU/AC will contact all audiology clinics for updated information on children who were diagnosed with hearing loss as well as seek confirmation on missing information discovered through the SoonerStart tracking forms. Specific information requested includes dates for hearing aid and early intervention placement. The reverse tracking form process was piloted in 2012 and results were analyzed in 2013. Findings indicated that there were 74 children born in 2012 who were reported as receiving a diagnosis of hearing loss. Additional data was requested for 30 (41%) early intervention placement dates and 34 (46%) hearing aid or cochlear implant dates. This project revealed that audiologists may report the initial diagnosis but not additional information needed to completed the annual CDC EHDI Survey.

Objective 6:2: The NHSP will utilize data gathered for the annual CDC EHDI Survey completed in February of each year. In 2011, 26/41 (63%) children were enrolled in early intervention services by six months of age. The NHSP will further analyze the data to compare the age of hearing loss diagnosis to the age of early intervention enrollment. The baseline data will adjust for children who are not diagnosed with hearing loss by six months of age and therefore could not meet the timeline of referral to early intervention services by six months of age. The FU/AC will provide education to audiology practices with trends of early intervention placement not completed by six months of age.

Objective 6.3: The NHSP will build upon the NICHQ Audiology Data Collection Tool completed with two Oklahoma pediatric audiology clinics over a one-year period. An additional pediatric audiology clinic, Integris Cochlear Implant Clinic, will be asked to partner in the data collection process. Additional steps will be taken to enhance the previous project such as a collaborative review to audit the last 20 cases of children seen at the location (birth to three years) regardless of hearing diagnosis to create baseline data on the percent of children who received an audiologic diagnostic assessment by three months of age, children seen at clinic with results sent to the NHSP, and children diagnosed with hearing loss who were referred to early intervention services by six months of age. The process will also assist the clinic to improve their internal processes by reviewing how the clinic communicates appointments and diagnostic information to families as well as collaborative efforts with the primary care provider, referral sources, and SoonerStart. Additional items will be added upon the suggestion of the NHSP/Integris Quality Improvement Team and monitored through PDSA cycles over a one-year period.

RESOLUTION OF CHALLENGES

The NHSP piloted the three hospital reports with a select number of birthing facilities over a series of time with numerous small tests of change in order to prepare for statewide distribution. All Oklahoma birthing hospitals received the three hospital reports with 2012 baseline data for their facility in June 2013. The nurse managers at each facility were contacted by the NHSP Coordinator to discuss the purpose of the reports and individual areas of improvement. Most hospitals that demonstrated poor trends of screening and/or reporting indicated they were unaware of their performance levels. Several expressed they had the understanding that all babies were screened and all results were reported per the state mandated process. Few had quality assurance measures in place to ensure they were meeting requirements. Some hospitals seemed disinterested in quality improvement aspects while others indicated they had limited staff or resources. To reduce LTF/D, changes must be made at the hospital level. To resolve these issues, the NHSP will modify the already existing hospital in-services provided by the FU/AC. In past years, the NHSP provided the same streamlined training at all Oklahoma birthing hospitals within a two or three year time period. During this grant project, hospitals with poor hospital reports will be prioritized and specific interventions will be targeted. Hospitals will also be asked to collaborate through quality improvement teams utilizing PDSA cycles. It is expected that hospitals will be more invested in the process when they are included in planning a change, predicting the outcome, trying the change, and then observing the results through the NHSP quarterly reports.

Discussions with Oklahoma midwives revealed several obstacles when assisting families seeking an initial hearing screening for those children who are not born at an Oklahoma birthing hospital. This includes the lack of understanding in regards to the importance of screening as well as service availability outside a hospital or county health department. To resolve these issues, the NHSP will obtain more accurate data on home births by specific location to determine midwife partnership opportunities such a hearing equipment loaner bank. The FU/AC will be available to assist in hearing equipment training and ongoing troubleshooting consultation. It is also expected that a trial with one of Oklahoma's largest midwife groups will encourage other providers to

partner on future collaborations. This trial includes developing a Home Birth QI Team to craft an aim statement, identify change strategies, implement PDSA cycles to decide what changes lead to improvement, and finally spreading successful changes to other midwife groups.

The NHSP seeks to replicate the NICHQ Audiology Data Collection Tool with one additional Oklahoma pediatric audiology practice in 2015-2016. The previous project was completed with two programs. A similar NICHQ project, the Early Intervention Data Collection Tool, was implemented with two SoonerStart county locations at the same time. The biggest obstacles noted during both projects included staff changes (temporary and permanent) and the lack of consistency in reporting the additional data. The NHSP will maximize on the lessons learned from the year-long data collection process to resolve challenges previously faced. This includes meeting with the pediatric audiology practice to assist in the initial audit of charts and engaging the program staff in the development of an Aim statement and active participation in PDSA cycles. Reminders will also be provided to the pediatric audiology practice regarding data submissions. The development of the NHSP/Integris QI Team will be vital in re-invigorating existing stakeholders to assist in the quality improvement work.

Finally, the NHSP has a strong history of reducing LTF/D. However, the program noted that when staff was not available to assist with working with hospitals, families, and follow-up providers, the LTF rate rose. The goal of this project is at least a 6% reduction (2% per year) in a 3-year period to maintain a 10% annual LTF/D rate or lower. The NHSP has found that as the percent of LTF/D is reduced, more targeted activities are needed to address very specific needs as opposed to previous larger activities that were able to focus on a larger number of infants. To resolve these issues, the NHSP will maintain the FU/AC position to provide needed assistance statewide. The QA/DC will also continue to develop quarterly reports and complete trend analysis to prioritize hospitals for training and quality improvement efforts.

EVALUATION AND TECHNICAL SUPPORT CAPACITY

In developing this HRSA project, consideration has been given to decreasing the percentage of infants who are LTF/D as well as ensuring that those infants with diagnosed hearing loss are enrolled in early intervention services by six months of age. The proposed project will utilize both process and outcome measures in evaluating performance in those areas. Additionally, the NHSP will develop quality improvement teams to address specific areas of improvement. Specific evaluation criteria for each objective can be found in the Work Plan Table. All grant activities are scheduled for routine monitoring of ongoing processes to review progress and make changes to program activities.

Through CDC Cooperative Agreement funding, a full-time NHSP QA/DC position was developed to assist in assessing program outcomes as well as monitoring the effectiveness and efficiency of all NHSP projects. Goals 1-3 focus on the use of current hospital reports developed and disseminated by the QA/DC on a quarterly basis for each Oklahoma birthing hospital. Hospital hearing screening data will be collected on the bloodspot specimen form and stored in the Neometrics data tracking system. Data will be abstracted through a query process and analyzed for the creation of each report. The QA/DC will collaborate with the FU/AC to monitor

all hospital data within one month following each quarterly cycle to determine hospital needs for training purposes.

Some of the process measures expected for the hospital reports process include:

- Number of results not reported to the NHSP by each hospital and total for all Oklahoma hospitals
- Number of babies Not Reported due to:
  - Mechanical issues
  - No supplies
  - Parent refusal
  - Discharged prior to screening
- Number and list of hospitals with Not Reported Rates higher than the NHSP average of 1.67%
- Number of refers by each hospital and total for all Oklahoma hospitals
- Number and list of hospitals with Refer Rates higher than the NHSP average of 5%
- Number of babies not screened by each hospital and total for all Oklahoma hospitals
- Number and list of hospitals with Not Performed Rates higher than the NHSP average of 1%

Some of the outcome measures expected for the hospital reports process include:

- Average Refer, Not Reported, and Not Reported Rates per hospital
- Percent of children screened and reported prior to discharge
- Differentiation between number of babies Not Reported (loss to documentation) vs. number of babies Not Performed
- Customized parent support based on reason why the child was not screened
- Percent of individual hospitals demonstrating improved reporting to the NHSP
- Percent of children screened prior to discharge
- Percent of children passing hearing screening prior to hospital discharge

The quantitative and qualitative reports will be disseminated to each hospital nursery manager. Progress will be tracked for each facility on a quarterly, annually, and more frequently as needed. Lessons learned from the NHSP/OSU QI Team will be utilized and replicated to promote change to other hospitals in efforts to partner on quality improvement work. Data from the hospital reports and the annual CDC EHDI Survey submission will be utilized to inform change strategies, program development and service delivery.

The NHSP does not have staff formally trained in the area of quality improvement but has participated in the NICHQ Learning Collaborative. Staff also participated in the recent CDC and NCHAM presentations on this topic. In addition, the OSDH has an Office of Performance Management that conducts quality improvement training. The NHSP will utilize this service during this grant period. Continued training and technical assistance from these entities on quality improvement strategies, specifically the Model for Improvement, will be pursued to assist the NHSP in additional ways to evaluate program performance.

ORGANIZATIONAL INFORMATION

This section addresses the organizational placement of the NHSP within the OSDH and the resulting relationships with other OSDH programs, other state agencies, and the private sector. Background information and scope of current activities are also included to demonstrate the ability of the NHSP to conduct program requirements and meet program expectations.

Administration and Organization

The mission of Oklahoma State Department of Health (OSDH) is "to protect and promote health, to prevent disease and injury, and to cultivate conditions by which Oklahomans can be healthy." The organization has a vision of "Creating a State of Health." The OSDH, through its system of local health services delivery, is ultimately responsible for protecting and improving the public's health status through strategies that focus on preventing disease. Three major service branches, Community and Family Health Services, Prevention and Preparedness Services and Protective Health Services, provide technical support and guidance to 68 county health departments as well as guidance and consultation to the two independent city-county health departments in Oklahoma City and Tulsa.

The NHSP is part of the Screening and Special Services Division (S&SS) in Prevention and Preparedness Services (PPS) at the OSDH. The S&SS Division includes the Oklahoma Birth Defects Registry, the Oklahoma Healthy Homes Childhood Lead Poisoning Prevention Program, the Oklahoma Genetics Program, the Newborn Hearing Screening Program (NHSP) and the Newborn Metabolic Disorder Screening Program (NMDSP). See organizational chart attachment for details. (See Attachment 5: Organizational Chart)

All OSDH employees must complete HIPAA and cultural competency training annually based on calendar year. Credit is awarded for training that assists staff in meeting one or more of the five essential elements that contribute to the agency's ability to become more culturally competent. These elements are valuing diversity; having the capacity for cultural self-assessment; being conscious of the dynamics inherent when cultures interact; having institutionalized cultural knowledge; and adapting service delivery based on understanding of cultural diversity. To further ensure that programs such as the NHSP are prepared to provide culturally and linguistically competent and health literate services, the OSDH has developed the Oklahoma Health Equity Campaign (OHEC). The campaign alerts state and community leaders on socioeconomic and ethnic inequities in health and engages leaders in conversation and action to fight the effects of these inequities on Oklahomans.

Legislative Background
Oklahoma legislation enacted in 1982 states, "*A screening procedure for the detection of hearing impairments shall be required for all infants*." The ONHSP was established at the OSDH in August 1983 and was charged with developing procedures and guidelines for the administration of the program. In 2000, updated legislation and Board of Health rules required both physiologic and risk screening as well as the reporting of the hearing screening results for all infants prior to discharge from the birthing facility. The requirements also mandated that follow-up screenings be reported to the NHSP for tracking and surveillance.

Organizational Experience
To assist in reporting and tracking hearing results, a Windows-based tracking system was put in place during 1983 using a full-page *Newborn Hearing Screening Questionnaire* provided for hospitals to send results. However, it did not meet the needs of tracking all Oklahoma births. In 1989, Oklahoma began contracting with Neometrics to provide case management and follow-up for newborn metabolic disorder screening through a data management system. It was determined that this system was an excellent data collection and tracking program. A hearing screening module was added as the most appropriate means for tracking newborn hearing results. The Newborn Screening Program (NSP), which includes the NHSP and NMDSP, collaborated with the OSDH Public Health Laboratory (PHL) to integrate hearing screening and metabolic disorders screening data systems. The NHSP's data management system was merged into the NSP system in July 2002. A redesigned metabolic disorders bloodspot specimen form was developed that included a section to record hearing results and to indicate risk status for late onset of hearing loss.

The Neometrics data tracking system has been vital in tracking information for the NSP. This system's software allows the programs to track infants with abnormal metabolic results, infants who referred on hearing screening, and infants who were not screened. Updates to the system have allowed for the tracking of the infant's hearing follow-up testing data including degree and type of loss for each ear, assessment tools used, name of audiologist, date of diagnosis, and amplification/cochlear implant data. Information can be entered into the system regarding the early intervention program in which the child is enrolled and the date of entrance into that program. Program staff can more easily generate hospital-specific reports regarding the number of children screened, referred (did not pass), not reported, at-risk for late onset hearing loss, and those who did not receive follow-up services. The data assists the NHSP in determining if the program is meeting national CDC Healthy People 2020 Guidelines of initial hearing screening by one month of age, diagnostic audiological evaluations by three months of age, and receipt of appropriate early intervention services by six months of age.

Reporting Protocols
After a baby has been screened and prior to discharge, the newborn hearing screening section of the bloodspot form is completed by a health care provider. The results of the screening are provided to the newborn's parents along with a copy of the results that is detached from the filter paper. If the baby does not pass, referral information is provided. The results form explains why hearing is screened, what the results indicate, and how additional information can be obtained. A copy of the results is retained by the hospital. The original copy, attached to the bloodspot filter

paper, is sent to the OSDH PHL. Upon receiving the specimen, laboratory staff enters the demographics and hearing results into the Neometrics (Metabolic) Screening Data Management System (MSDS). For infants who referred, were not screened, and/or had positive risk status for hearing loss, the information is transferred to the Neometrics Case Management System (CMS). Both hearing and metabolic screening results are available to the infant's authorized health care provider 24 hours a day through a voice response system that is a part of the tracking software. The NHSP has a toll-free hotline at the OSDH that is manned during agency business hours with the availability of voice mail after hours for families and providers. Results are available to authorized county health department staff through the agency's client record system.

The CMS generates personalized letters daily within seven days of age to the infant's parents and primary health care provider reporting the results of those who refer or were not screened. These letters include recommended actions that need to be taken. For infants that refer or were not screened, a hearing results form to be taken to the follow-up appointment is attached to the letter along with a postage-paid envelope to assist in returning assessment or screening results to the NHSP. A toll-free telephone number is listed for parents to use when they have questions as well as the number for the local county health department where screening can be completed. If the NHSP does not receive information back from the family within six weeks, a second letter is generated. The FU/AC utilizes the state immunization records and health department client information system to ensure correct phone and address, check language of family, and determine if appointments have been made for follow-up. If no appointments are scheduled, the FU/AC calls each family to provide additional information on the importance of screening as well as local resources available to the family. For infants with a positive risk status, the initial letters sent shortly after birth remind the parent and physician that the infant needs to be observed for the possible development of hearing loss and that hearing needs to be re-screened at six months and one year. A second letter is sent when the baby is five months old stating that it is time for re-screening; the hearing results form is included with the number for the local health department.

Hearing results forms can be used by audiologists for audiological diagnostic assessment results, and for follow-up screenings by a physician's office or trained screener at a county health department. As required by state legislation, follow-up results are sent to the NHSP. Efforts to enhance collaboration with private and public providers are ongoing.

Personnel

Patricia A. Burk, M.S., CCC-SLP, LSLS Cert. AVT, has served as the NHSP Coordinator since January 2009. She previously served as the Follow-up Coordinator starting in October 2006. Prior to coming to the OSDH, she provided services to Deaf and hard of hearing infants, toddlers, and their families through a private early intervention program. Currently, she is responsible for the overall day-to-day operations of the program. Ms. Burk is the supervisor for the program's FU/AC, QA/DC, and Administrative Assistant. The Coordinator is ultimately responsible for all elements of the operation of the NHSP. Ms. Burk works closely with hospitals to ensure that screening is accomplished and that results are forwarded to the NHSP; she interacts with the directors and coordinators of early intervention programs for infants/toddlers with hearing loss; meets regularly with coordinators and directors of the OSDH programs

including Genetics, NMDSP, Child Guidance, and Child Abuse Prevention to ensure that families of infants with hearing loss are connected to appropriate services; and serves as a facilitator for the NHSP workgroup and the Oklahoma Audiology Taskforce (OKAT). Nationally, Ms. Burk served on the Joint Committee on Infant Hearing (JCIH) subcommittee regarding best practices in early intervention on Parent Involvement. She presented at the 2009 and 2012 Early Hearing Detection and Intervention (EHDI) Conferences demonstrating ways to reduce LTF/D, partnerships with Part C Early Intervention programs, hospital training techniques, and Oklahoma's success in striving for 1-3-6 *weeks* instead of 1-3-6 *months*. No funds are requested for Ms. Burk's salary.

Funds are requested in this grant to maintain a Follow-up/Audiology Coordinator to assist with loss to LTF/D. Deborah Earley, Au.D, CCC-A has served as the FU/AC since December 2010. She has worked as a pediatric audiologist at an Oklahoma county health department as well as served as Coordinator of the Newborn Hearing Screening Program at the University of Oklahoma Health Sciences Center at both the hospital and university levels. She was one of the original state taskforce members who assisted in the implementation of Universal Newborn Hearing Screening in Oklahoma. One of her primary responsibilities is to ensure that families of infants not screened at birth and families of infants who referred are connected with appropriate providers. The FU/AC interacts with thousands of families each year, working closely with Part C and Non-Part C early intervention staff, health department WIC nurses, and other county health department providers emphasizing the importance of completing hearing screening for every newborn, and for infants who did not pass the screening. She facilitates timely referral for audiometric assessment and intervention when appropriate. The FU/AC also provides educational opportunities for birthing hospital personnel regarding screening, reporting, and counseling parents on the topic of newborn hearing screening. She will continue to provide support to all Oklahoma birthing hospitals and will expand training to target specific areas noted through individualized Refer Rate, Not Performed Rate, and Not Reported Rate Reports. The FU/AC position was expanded in the last grant period to plan, coordinate, and supervise audiology related activities at county health departments in Oklahoma.

Nazim Abdul Rahim, M.B.A, joined the NHSP in November 2011 and serves as Quality Assurance/Data Coordinator through funds provided by a CDC Cooperative Agreement. Employing this additional staff person has allowed the program to provide enhanced quality assurance for all initial and follow-up newborn hearing screening results and further strengthens the program's relationships with parents, hospitals, intervention programs, physicians, audiologists, and others. Mr. Abdul Rahim is responsible for working with all Oklahoma birthing hospitals by creating quarterly hospital reports to assess each hospital's compliance of state-mandated newborn hearing screening (Not Performed Rate Reports) and reporting (Not Reported Rates Report) as well as analyzing sites' screening techniques (Refer Rate Reports). He completes a quarterly trend analysis and works with the FU/AC to prioritize hospitals' needs. The QA/DC will continue to work with Neometrics staff to modify queries within the data system, which includes monitoring tracking needs of the NHSP. In addition, epidemiologic processes related to surveillance, data collection, and data analysis will be conducted to improve data analysis for the annual CDC EHDI Survey. These measures will assist in determining if the NHSP is meeting national standards and ensure infants who are diagnosed with hearing loss

receive appropriate follow-up. The data provided through hospital reports and annual analysis will allow the NHSP to routinely assess the unique needs of target populations of the communities to implement quality improvement strategies. No funds are requested for Mr. Abdul Rahim's salary.

Linda Muse, B.S., joined the NHSP in January 2012 as the Administrative Assistant. Ms. Muse has a background in Business Administration and worked as an Executive and Medical Secretary prior to coming to the OSDH. Her responsibilities include the day-to-day printing and mailing of newborn hearing screening follow-up correspondence to the infant's family and primary care provider. She also serves as first contact when families call with questions about the correspondence they received, when they seek referral for additional screening or assessment, and when they need information about intervention. She also enters updated hearing screening results from Oklahoma birthing hospitals and contacts hospitals for missing or inconsistent screening results, inaccurate or incomplete demographics, and missing information. No funds are requested for Ms. Muse's salary.

(See Attachment 2: Job Descriptions and Attachment 3: Biographical Sketches)

Quality Improvement Experience

Since its inception, the NHSP has worked to enhance services to Oklahoma families in regard to early detection, diagnosis, and treatment of childhood hearing loss. The enhancements documented throughout this grant application are evidenced by Oklahoma's various activities/processes and the reduction in the number of children LTF/D.

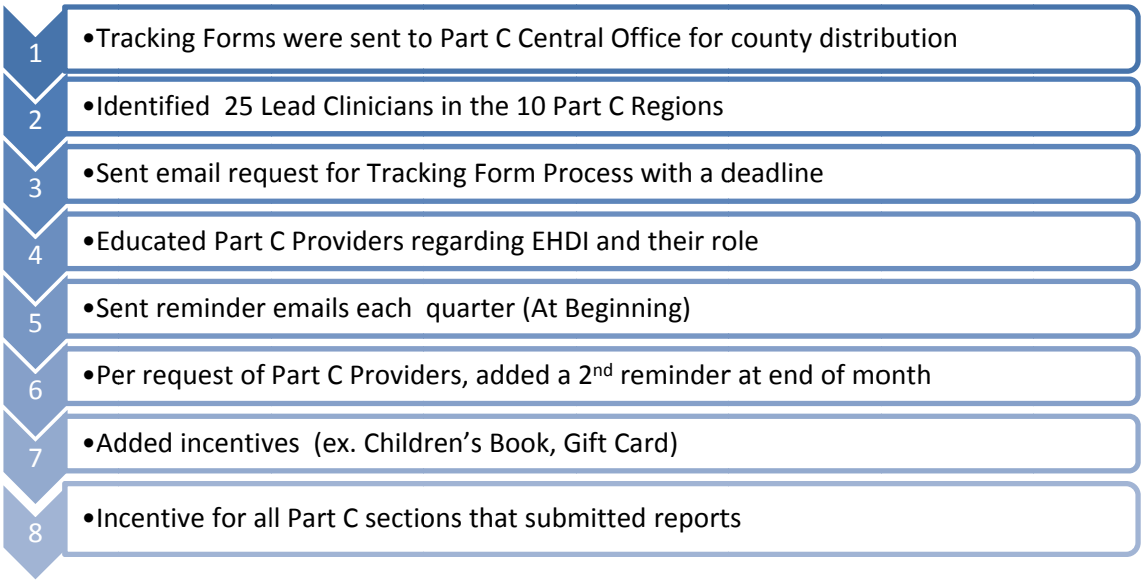
The NHSP has outlined and completed numerous project goals through HRSA and CDC Cooperative Agreement funding. The program has been very strong at identifying needs, implementing small tests of change, using data to inform program decisions, and engaging stakeholders. One example of previous experience regarding executing and implementing quality improvement projects is noted in Goal 6. As mentioned, the NHSP partners with SoonerStart to complete quarterly tracking reports to determine if children with diagnosed hearing loss are placed in intervention by six months of age to reduce loss to documentation.

A data analysis was completed from October 2010 to October 2011 to determine the efficacy of the project. During the one-year process, 120 children were identified as having a hearing loss and enrolled in early intervention services. Of those children, 33 (27%) were previously marked as loss to follow-up by the NHSP. Data received through the SoonerStart tracking form revealed that children were not loss to follow-up but instead loss to documentation due to the lack of reporting by Oklahoma audiologists. Audiologists were contacted to request hearing results and related data for the annual CDC EHDI Survey. All providers were reminded of state mandated reporting for all children seen for follow-up to newborn hearing screening. All screening and diagnostic data for children with confirmed hearing loss were updated in the database upon receipt. The results were presented at the 2012 EHDI conference during a rapid fire presentation on the topic of early intervention. Following the presentation, the NICHQ Learning Collaborative invited the NHSP to provide a special presentation to other states regarding how

Oklahoma utilized quality improvement methodology to spread successful change strategies to reduce LTF/D.

The process underwent numerous small tests of change over a five-year period to enhance the process as indicated in the chart below in chronological order:

distribution



As mentioned in the Methodology section, the NHSP participated in the NICHQ Learning Collaborative. Prior to that experience, none of the NHSP staff had formal training in quality improvement methodology other than journal research. During the 14 month period, the Oklahoma QI team was able to learn terminology and methods to apply to the program and state collaborations. The team specifically learned: 1) the purpose and steps to develop strong Aim statements, 2) better ways to collect and analyze data, 3) measure management, 4) the need for monitoring data more frequently, 5) how to focus on small tests of change more intentionally, and 6) and ways to spread successful changes. Finally, the NICHQ process helped the NHSP with developing specific quality improvement teams to assist in the quality improvement work.

Additional State Resources

The State of Oklahoma currently has a statewide immunization registry, the Oklahoma State Immunization Information System (OSIIS) that is used by a large portion of Oklahoma's primary care providers. Demographic data such as current addresses can be located to assist the NHSP in providing follow-up services. The OSIIS program is also linked to the Public Health Oklahoma Client Information System (PHOCIS), which allows the NHSP to see if a child has received services through any county health department programs such as Women, Infants and Children Supplemental Nutrition Program (WIC), Immunizations, Part C Early Intervention or Children First. Additional information such as current phone numbers, address, and primary language can be located. Dates of appointments are also available which allows the NHSP to request hearing results if not reported by the county provider. By accessing this information, the program has

been able to reduce the number of loss to follow-up due to insufficient contact information and loss to documentation.

National Resources

On a national level, the NHSP participates actively with the National Center for Hearing Assessment and Management (NCHAM) and the Centers for Disease Control and Prevention (CDC) Early Hearing Detections and Intervention (EHDI) programs. Representatives of the NHSP have attended all of the HRSA/CDC sponsored annual EHDI conferences. The NHSP participates in all NCHAM teleconferences, provides program information/data, and has assisted in recruiting Oklahoma families of children with hearing loss to participate in statewide projects. The NHSP participates regularly in the CDC EHDI teleconferences and provides the program with yearly NHSP statistics. The current NHSP Coordinator serves as the Secretary/Treasurer for the Directors of Speech and Hearing Programs in State Health and Welfare Agencies (DSHPSHWA). This organization has been a long-time supporter of newborn hearing screening efforts and provides two representatives to the Joint Committee on Infant Hearing (JCIH). Currently, one of the two DSHPSHWA JCIH representatives is Director of the OSDH Child Guidance Service who will assist in the implementation of Goal 5. All of these national collaborations will contribute to the NHSP's ability to conduct program requirements and meet program expectations.

Conclusion

As seen in this grant, the Oklahoma NHSP is well equipped to further focus efforts to improve the LTF/D by utilizing specific interventions such as quality improvement methodology to achieve measurable improvement in the numbers of infants who receive appropriate and timely follow-up. The program collaborates with numerous partners in order to conduct the program requirements set for this grant opportunity to meet and exceed program requirements. The NHSP is confident that the Work Plan created will assist the program in implementing the QI strategies for system-wide improvements that will be reported out to the appropriate stakeholders as indicated in the grant guidance. The continuation of HRSA funds will allow the NHSP to continue efforts to address universal newborn hearing screening while reducing LTF/D.