Evaluation of a State Early Hearing Detection & Intervention (EHDI) System

Xidong Deng, PhD
Centers for Disease Control & Prevention

Mary Gwyn Allen, DMin., MA
Texas Department of State Health Services

Mar. 2, 2010
Outline

- Background
- Framework
- Method
- Results and Findings
- Discussion
Outline

- Background
- Framework
- Method
- Results and Findings
- Discussion
National EHDI Goals

The 1-3-6 Plan
- All newborns will be screened for hearing loss before 1 month of age, preferably before hospital discharge.
- All infants who screen positive will have a diagnostic audiologic evaluation before 3 months of age.
- All infants identified with hearing loss will receive appropriate early intervention services before 6 months of age (medical, audiologic, and early intervention).
Every state will have a complete EHDI Tracking and Surveillance System that will minimize loss to follow-up.

Every state will have a comprehensive system that monitors and evaluates the progress towards the EHDI Goals and Objectives.
Evaluation Project Objectives

- To establish a systematic process for evaluating state EHDI tracking systems based on the specific needs of the state EHDI program.
- To develop easy-to-use evaluation tools for assessment of a state EHDI tracking system with regard to its functionality, efficiency, and usability.
Pick a “Pilot” State
Texas House Bill 714

HB 714 (1999) requires that certain birth facilities offer newborn hearing screening (NBHS) to all families of newborns during the birth admission. Facilities that must offer NBHS are:

- Hospitals that offer obstetrical services and are located in counties with populations > 50,000.
- Midwifery Centers that are located in counties with populations greater than 50,000 and that have 100 or more births per year.
Rural Hospital Exemptions

- Hospitals in rural counties with populations of 50,000 or less were exempted from the mandate requiring the offering of infant hearing screenings.

- However, in 2002, many rural hospitals waived this exemption by accepting grant funded hearing screening equipment.
Is TEHDI Universal?

Is a hearing screening required by mandate for every infant born in Texas?

- Texas mandates that parents must be offered a hearing screening, not that the infant be screened.

- Parents must give written permission before the hearing screening is performed.
Texas Department of State Health Services (DSHS)

Services Provided:

- TEHDPI Program – TEHDPI database tracking and reporting system
- Follow-up/case management
- Educational outreach
- Birth facility training and technical assistance
- Birth facility certification
The TEHDI Tracking System - data flow

1. Add Patient
2. Edit Patients
3. In Patient
   - Well Baby
   - NICU
4. Screen Patients
5. Out Patient
   - CP Screening
   - Risk Monitoring
6. Import Test Results
7. Appointments
8. Out Patient Screening
9. Risk Monitoring Screening
10. Audiological Assessment
11. Letter
12. Complete Care Process
Outline

- Background
- Framework
- Method
- Results and Findings
- Discussion
A Systematic Evaluation Process

- Program Goals & Objectives
- Performance Metrics
- System Component/Attribute
- Evaluation

Stakeholders
<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Role</th>
<th>Interest</th>
<th>Influence</th>
<th>Level of involvement in evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC EHDI</td>
<td>Sponsor</td>
<td>High</td>
<td>Medium</td>
<td>Plan, design, execution, dissemination</td>
</tr>
<tr>
<td>Newborn Screening (NBS) Branch Manager</td>
<td>Branch Manager</td>
<td>High</td>
<td>Medium</td>
<td>Management oversight of data systems within the Branch</td>
</tr>
<tr>
<td>EHDI Coordinator in Texas</td>
<td>Subject Matter Expert/Team Lead</td>
<td>High</td>
<td>Medium</td>
<td>Subject matter expertise</td>
</tr>
<tr>
<td>TEHDI tracking system: Project Coordinator</td>
<td>Project Coordinator</td>
<td>High</td>
<td>High</td>
<td>Day to day operations of project</td>
</tr>
<tr>
<td>IT Contractor for current data management system</td>
<td>Software developer</td>
<td>High</td>
<td>Low</td>
<td>Informant of system details</td>
</tr>
<tr>
<td>Early Childhood Intervention (ECI) Manager</td>
<td>System user</td>
<td>High</td>
<td>Low</td>
<td>Planner for system enhancements</td>
</tr>
<tr>
<td>Audiology Provider: Karen Ditty</td>
<td>Oversight of hospital screeners in a variety of hospitals</td>
<td>High</td>
<td>High</td>
<td>User of system</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
## TEHDI Program Goals/ Objectives

1. Enhance the tracking and surveillance system of the TEHDI program to accurately identify, match, and collect unduplicated individual identifiable data on a web reporting system throughout the TEHDI process – **Function/Process**

2. Enhance the ability of TEHDI to accurately report the status of every occurring birth in Texas, including those exempt from the Texas hearing screening program -- **Birth**
   - Increase the number of birth reported in TEHDI to come closer in alignment with the Bureau of Vital System (BVS)

3. Enhance the ability to TEHDI to integrate/share data systems related to infant/child health care -- **Referral**
   - Increase the match between infants and served by the PACT system and referred for Early Childhood Intervention (ECI) by 5%
   - Increase the number of children referred to outpatient services and reported in the TEHDI system by 10%
Measure What?

- Health and health service outcomes
- System use
- Workflow impact
- Data quality
# Performance Indicators

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Function/Process</th>
<th>Birth</th>
<th>Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>User friendliness, Usefulness</td>
<td>Reportability</td>
<td>Reportability</td>
</tr>
<tr>
<td>Workflow</td>
<td>user activity support, frequency of use, training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Accuracy, timeliness, completeness, ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
System Components under review

- Add or edit patient information and notes
- Search patient
- Import test result (screening, diagnosis, etc.)
- Add or edit professional contact information
- Search professional contact information
- Appointment scheduling
- Letters
- Configure report
- Search report
- Training
- Integration with other health information (EHR, public health surveillance, Newborn Screening, etc.) systems
Outline

- Background
- Framework
- Method
- Results and Findings
- Discussion
Evaluation Method

- Feasibility
- Direct vs. Indirect
- Subjective vs. Objective
- Qualitative vs. Quantitative
## Performance Indicators

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Function/Process</th>
<th>Birth</th>
<th>Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use</td>
<td>User friendliness</td>
<td>Reportability</td>
<td>Reportability</td>
</tr>
<tr>
<td>Workflow</td>
<td>User activity support, frequency of use, training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Accuracy, timeliness, completeness, ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Performance Indicators

<table>
<thead>
<tr>
<th>Function/Process</th>
<th>Birth</th>
<th>Referral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcomes</strong></td>
<td></td>
<td>Reportability</td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>User friendliness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usefulness</td>
<td></td>
</tr>
<tr>
<td><strong>Workflow</strong></td>
<td>user activity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>support, frequency of use, training</td>
<td></td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>Accuracy, timeliness, completeness, ...</td>
<td></td>
</tr>
</tbody>
</table>
Performance Indicators

Outcomes

Use
- User friendliness
- Usefulness

Workflow
- User activity
- Support, frequency of use, training

Data

Function/Process

Birth
- Reportability
  - # of birth reported by TEHDI/# of birth reported by vital records
  - Direct, Objective, Quantitative

Referral

Survey TEHDI system users
- Indirect, Subjective, Qualitative
Reportability

- Sept. 08-Aug. 09
- Births report by BVS
  - Total 409,453
  - Home births 1622
  - Exempt facilities 8710
- Births reported by TEHDI
  - 389,248
  - 95.07% of all BVS births
  - ~95.44% of all BVS births excluding home birth
  - ~97.53% of all BVS births excluding home birth and exempt facilities
An on-line survey on TEHDI system users

- Questionnaire Design
- Test and Implementation
- Result and findings
- Limitations
Questionnaire Design

- General Information about the site being surveyed – 4 questions
- General information about the respondent – 3 questions
- System use, work-flow, and functionality – 11 questions
- User satisfaction toward overall system – 5 questions
- User satisfaction toward individual function or system component – 4 questions
- Training – 4 questions
- Additional comments – 3 questions
Part II  General Information about your site

1. Location of your site
   City/Town: 
   ZIP/Postal Code: 

2. Type of practice (check all that apply)
   - Birth Hospital (well baby)
   - Birth Hospital (NICU)
   - Audiological clinic or private practice
   - Other birth facility
   - Early Childhood Intervention (ECI)
   - Case Management
   - Geneticists
   - Habilitation
   - Medicaid
   - Other (please specify)
   - Ophthalmology
   - Otological Evaluation
   - Parent Group
   - PCC/Medical Home
   - Family Practice
   - Resource Specialist
   - Social Services
   - Speech Language Pathology

3. Is the site exempt from conducting hearing screening for newborns?
Test

- Tested by
  - CDC EHDI
  - Texas EHDI

- Time to take the survey
- Question validity and clarity
Implementation

**http://www.surveymonkey.com**
Activate the Survey

http://www.surveymonkey.com/s/PKD6YCX

Dear User,

The TEHDI program is undergoing an evaluation. As part of this effort we are asking for your help by completing a survey about your experience reporting hearing screening and follow-up diagnosis data. Your feedback will be used to improve the TEHDI program’s ability to identify all infants with hearing loss as soon as possible. This survey should take no more than 20 minutes to complete. Your name and individual responses will be kept confidential.

If you have any questions about this survey please contact Mary Gwyn Allen, TEHDI Coordinator at MaryGwyn.Allen@dshs.state.tx.us.

Once the evaluation is finished, you can request a copy of the results from Kimberly A. Fols, Ph.D., Quality Assurance Specialist Kimberly.Fols@dshs.state.tx.us.

Thank you for your time and attention.

The TEHDI Program
Response rate

- Survey period
  July 22, 2009 – Sept. 09, 2009
- Total Completed Survey: 134
Sites and respondents

Other includes: technical assistance, hearing screener, NICU (not a birth hospital)

Other includes: Nurses (RNC-LRN, LVN), coordinator (hearing screen, audiology evaluation, patient, pediatrics), assistant (admin, speech), Dept. manager, Resource Specialist, secretary/receptionist, OB director, Hearing screener, audiology tech, program director, audiologist and program manager.
Major findings

- Strength of the system
  - User-friendliness
  - Usefulness
  - Workflow

- Areas that may benefit from modification
  - Workflow
  - The letter function
  - Training
Q: The system is easy to use

- 59% Agree
- 22% Disagree
- 18% Strongly disagree
- 1% Strongly agree
Q: The functions provided by the system are appropriate for the purpose they were intended.

- 74% Agree
- 18% Strongly agree
- 7% Disagree
- 1% Strongly disagree
Q: The functions provided by the system are sufficient for my work

- Strongly agree: 69%
- Agree: 17%
- Disagree: 12%
- Strongly disagree: 2%
Q: The functions provided by the system are appropriate for the purpose they were intended.

% of Disagreed/ Strongly Disagreed

- All types of practice
- Hospital/ Birth facility
- Audiological clinic/ Private practice
- Early Childhood Intervention (ECI)
Q: The functions provided by the system are sufficient for my work

% of Disagreed/ Strongly Disagreed

- All types of practice
- Hospital/ Birth facility
- Audiological clinic/ Private practice
- Early Childhood Intervention (ECI)
Q: Use of the TEHDI system is easily integrated into my routine workflow

% of Disagreed/ Strongly Disagreed

- All types of practice
- Hospital/ Birth facility
- Audiological clinic/ Private practice
- Early Childhood Intervention (ECI)
Q: The TEHDI system output (e.g. report generated, data exported) can be used for fulfilling my routine work responsibilities without any extra work.
Q: Using the TEHDI system helps me be more productive

![Bar chart showing the percentage of disagreed/strongly disagreed responses by type of practice.](chart.png)

- **All types of practice**: 70.0%
- **Hospital/Birth facility**: 60.0%
- **Audiological clinic/Private practice**: 50.0%
- **Early Childhood Intervention (ECI)**: 40.0%
Q: Using the TEHDI system gives me more control over the activities in my work.

![Bar chart showing percentage of disagreed/strongly disagreed across different types of practice.]

- All types of practice: 43%
- Hospital/Birth facility: 30%
- Audiological clinic/Private practice: 50%
- Early Childhood Intervention (ECI): 70%

% of Disagreed/Strongly Disagreed
Q: The design of this function or system component is appropriate and sufficient for the purpose it was intended.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add or edit patient information and notes</td>
<td>2.9% (4)</td>
<td>1.4% (2)</td>
<td>65.9% (91)</td>
<td>23.9% (33)</td>
<td>5.8% (8)</td>
</tr>
<tr>
<td>Search patient</td>
<td>2.9% (4)</td>
<td>5.1% (7)</td>
<td>67.2% (92)</td>
<td>24.1% (33)</td>
<td>0.7% (1)</td>
</tr>
<tr>
<td>Import test result (screening, diagnosis, etc.)</td>
<td>5.1% (7)</td>
<td>5.8% (8)</td>
<td>58.7% (81)</td>
<td>21.0% (29)</td>
<td>14.4% (13)</td>
</tr>
<tr>
<td>Add or edit professional contact information</td>
<td>2.9% (4)</td>
<td>8.1% (11)</td>
<td>63.2% (86)</td>
<td>19.1% (26)</td>
<td>6.6% (9)</td>
</tr>
<tr>
<td>Search professional contact information</td>
<td>2.9% (4)</td>
<td>2.8% (4)</td>
<td>63.0% (87)</td>
<td>21.0% (29)</td>
<td>10.1% (14)</td>
</tr>
<tr>
<td>Appointment scheduling</td>
<td>3.0% (4)</td>
<td>6.7% (9)</td>
<td>40.7% (55)</td>
<td>16.3% (22)</td>
<td>33.3% (45)</td>
</tr>
<tr>
<td>Letters</td>
<td>6.7% (9)</td>
<td>6.7% (9)</td>
<td>56.3% (76)</td>
<td>17.8% (24)</td>
<td>12.6% (17)</td>
</tr>
<tr>
<td>Configure report</td>
<td>3.0% (4)</td>
<td>4.5% (6)</td>
<td>48.1% (64)</td>
<td>16.5% (22)</td>
<td>27.8% (37)</td>
</tr>
<tr>
<td>Search report</td>
<td>2.3% (3)</td>
<td>4.5% (6)</td>
<td>48.9% (65)</td>
<td>16.5% (22)</td>
<td>27.8% (37)</td>
</tr>
</tbody>
</table>
**Q: It is easy to use this function or system component**

<table>
<thead>
<tr>
<th>Function Description</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add or edit patient information and notes</td>
<td>2.2% (3)</td>
<td>5.8% (8)</td>
<td>60.6% (83)</td>
<td>25.5% (35)</td>
<td>5.8% (8)</td>
</tr>
<tr>
<td>Search patient</td>
<td>2.9% (4)</td>
<td>7.2% (10)</td>
<td>63.0% (87)</td>
<td>26.1% (36)</td>
<td>0.7% (1)</td>
</tr>
<tr>
<td>Import test result (screening, diagnosis, etc.)</td>
<td>3.0% (5)</td>
<td>8.0% (11)</td>
<td>58.0% (80)</td>
<td>21.7% (30)</td>
<td>8.7% (12)</td>
</tr>
<tr>
<td>Add or edit professional contact information</td>
<td>3.7% (5)</td>
<td>11.0% (15)</td>
<td>55.9% (76)</td>
<td>21.3% (29)</td>
<td>8.1% (11)</td>
</tr>
<tr>
<td>Search professional contact information</td>
<td>2.9% (4)</td>
<td>5.9% (8)</td>
<td>59.6% (81)</td>
<td>22.8% (31)</td>
<td>8.8% (12)</td>
</tr>
<tr>
<td>Appointment scheduling</td>
<td>2.9% (4)</td>
<td>6.6% (9)</td>
<td>39.4% (54)</td>
<td>17.5% (24)</td>
<td>33.6% (46)</td>
</tr>
<tr>
<td>Letters</td>
<td>4.3% (6)</td>
<td>11.6% (16)</td>
<td>52.9% (73)</td>
<td>18.7% (23)</td>
<td>14.5% (20)</td>
</tr>
<tr>
<td>Configure report</td>
<td>2.9% (4)</td>
<td>7.4% (10)</td>
<td>45.6% (62)</td>
<td>15.4% (21)</td>
<td>28.7% (39)</td>
</tr>
<tr>
<td>Search report</td>
<td>2.3% (3)</td>
<td>9.2% (12)</td>
<td>46.2% (60)</td>
<td>14.6% (19)</td>
<td>27.7% (36)</td>
</tr>
</tbody>
</table>
Training

- Experienced/Expert computer user
- Experienced/Expert TEHDI user
- Learned to use TEHDI system quickly (agreed/strongly agreed)
- Need more training (disagreed/strongly disagreed)
Suggestion for system improvement

- Provide more training to the ECI staff to enhance user experience with the system.
- Integrate TEHDI with other information systems that ECI uses, or explore ways to use TEHDI to meet other needs of the routine ECI responsibilities.
- Work with the vendor to modify some system functions as needed, for example: add a “select all” function to generate all types of letters with a single mouse click.
- Work with the vendor to provide more systematic training on a regular basis.
Limitations

- On-line survey
  - Sample bias
  - Format
- Data quality not investigated
## Acknowledgement

<table>
<thead>
<tr>
<th>CDC NCBDDD</th>
<th>TEHDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Eichwald</td>
<td>Mary Gwyn Allen</td>
</tr>
<tr>
<td>Marcus Gaffney</td>
<td>Eugenia Dunham</td>
</tr>
<tr>
<td>Andy Autry</td>
<td>Kimberly Folse</td>
</tr>
<tr>
<td>Craig Mason</td>
<td></td>
</tr>
<tr>
<td>CDC PHI FP</td>
<td></td>
</tr>
<tr>
<td>Herman Tolentino</td>
<td></td>
</tr>
</tbody>
</table>
Questions?

Thank you!