Developing a Statewide Web-Based EHDI Tracking and Referral System

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Wisconsin Department of Health Services
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Today’s Topics

- Simulation of Wisconsin’s WE-TRAC system
  - All sample data!
- Considerations when building a custom web-based system
- Real-Life Example: Applying these considerations to Wisconsin’s enhancement plans
Welcome to Wisconsin! A few facts to get us started:

- Births ~ 72,000/year
- Birthing Hospitals = 100
- Population ~ 5.4 million cheeseheads

Home of the Wisconsin Sound Beginnings (WSB) EHDI program and WE-TRAC
**WE-TRAC**, the **Wisconsin EHDI Tracking Referral and Coordination System**:

- supports the **1-3-6 goals** of the national EHDI algorithm.
- allows **electronic referrals** to appropriate organizations.
- denotes a clear **transfer of responsibility** for follow-up activities.
- acts as a safety net assuring timely and appropriate coordination of care throughout the EHDI continuum.
- provides a mechanism for the **tracking and reporting** of individual, hospital, and statewide aggregate hearing screening data.
WE-TRAC is a part of the WI PHIN, which

- Is the portal into applications supporting public health in Wisconsin, including WE-TRAC, West Nile Virus, SPHERE (public health records), and Birth Defects Surveillance PAMs.
- Hosts a centralized directory of users and organizations
- Brings together:
  - The WI Health Alert Network (HAN),
  - PAMs
  - Wisconsin State Lab of Hygiene (SLH) Electronic Laboratory Reporting, and
  - The WEDSS system.
- Will be the platform for integrated public health data in Wisconsin
WE-TRAC is a workflow system that allows hearing care coordination.

- WE-TRAC currently has 170 active user organizations
  - 92 birthing units, 18 NICUs, 60 audiology clinics
  - 99.7% of WI births occur at WE-TRAC hospitals.

- A common intuitive interface is shared by nursery staff, NICU staff, and audiologists, and may be shared by physicians in the future.

- Organizations have “look-back, look-ahead” capability to see the status of a baby for which they have provided care.

- Users can monitor that timely and appropriate hearing-related care is provided to all babies associated with their organization and can generate org. specific reports.
WE-TRAC uses data collected on the SLH newborn blood card.
Behind the Scenes...

- WE-TRAC hearing screening data is entered at the SLH.
- Blood card data used by WE-TRAC is sent from the SLH by secure messaging to the WE-TRAC server.
- Records are sent nightly.
- Records for babies passing the hearing screening are archived in WE-TRAC.
- Babies who refer or were not screened are placed in the WE-TRAC birth hospital “queue” for follow-up.
- At this point, only the birth hospital (and State WE-TRAC Administrators) can view or manage records for babies born at their organization.
Role-Based Security

- Three roles: User, Local Administrator, WE-TRAC Administrator

  - **Users** can view site news, modify their individual profile and preference information, view records and manage care for babies associated with their organization, manage hearing-related care of these babies, and enter other information about the baby.

  - **Local Administrators** can in addition: modify organization profile and preferences, manage organization user information and roles, and approve or reject requests for secondary authorization to the organization.

  - **WE-TRAC Administrators** can in addition: manage site news, role-based system access, and user feedback; create, manage, and “map” organizations; manage ALL cases needing additional follow-up.
**WE-TRAC** users must obtain a WAMS ID and register for the WI HAN.

- The State of Wisconsin's Web Access Management System provides a single user ID for user authentication to all state sites for which the user has authorization.

- The HAN stores user information in a central directory.

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**WE-TRAC Login**

Please enter your Wisconsin User ID (WAMS ID).

<table>
<thead>
<tr>
<th>Username:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Password:</td>
<td></td>
</tr>
</tbody>
</table>

If you forgot your Username or Password, click [here](#) for WAMS account recovery.

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First time users: If you do not have a WAMS account, you must register for WAMS and the Wisconsin Health Alert Network (HAN) before using WE-TRAC. Click [here](#) to begin WAMS registration.

Click [here](#) to begin HAN registration (do this after completing WAMS registration).

Click here to download complete instructions for WAMS and HAN registration.
WE-TRAC queues ensure secure case management.

Case Management

WE-TRAC Birthing Unit - Open Cases

4 Cases - Merge Cases

<table>
<thead>
<tr>
<th>NICU</th>
<th>Child's Name</th>
<th>DOB</th>
<th>Days on List</th>
<th>Last Procedure</th>
<th>Recommended Next Procedure</th>
<th>Manage Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>![NICU]</td>
<td>Conway, Beth</td>
<td>11/09/03</td>
<td>Female</td>
<td>1</td>
<td>Not Screened: Other - NICU</td>
<td>Outpatient Screen by: 02/07/2004</td>
</tr>
<tr>
<td>![NICU]</td>
<td>Dearborn, Vanessa</td>
<td>11/17/03</td>
<td>Female</td>
<td>1</td>
<td>Not Screened: Other - NICU</td>
<td>Outpatient Screen by: 02/15/2004</td>
</tr>
<tr>
<td>![NICU]</td>
<td>Harlow, Jacob</td>
<td>11/18/03</td>
<td>Male</td>
<td>1</td>
<td>Not Screened: Other - NICU</td>
<td>Outpatient Screen by: 02/16/2004</td>
</tr>
<tr>
<td>![NICU]</td>
<td>Mouse, Michael</td>
<td>11/19/03</td>
<td>Male</td>
<td>1</td>
<td>Inpatient Screen</td>
<td>Outpatient Screen by: 12/19/2003</td>
</tr>
</tbody>
</table>
WE-TRAC allows users to enter screening results.

- NICU organizations can enter repeat inpatient screening results, other organizations enter outpatient re-screening results.
WE-TRAC supports timely and appropriate hearing follow-up.

- System prompts guide users to complete the next step (referrals, CHL form) immediately after test results are entered.

Screening Results Successfully Entered

Screening results have successfully been entered.

Enter a referral to an Organization
Enter a referral to an Individual

Return to Case List
WE-TRAC allows easy transfers and referrals to follow-up organizations.
**WE-TRAC** allows entry of **diagnostic audiology results**.

### Cases - Diagnostic Audiology Report

<table>
<thead>
<tr>
<th>Date:</th>
<th>02 / 16 / 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baby's Name:</td>
<td>ANGELO GOMEZ</td>
</tr>
<tr>
<td>DOD:</td>
<td>01/27/2004</td>
</tr>
<tr>
<td>Age:</td>
<td>7 months (21 days)</td>
</tr>
<tr>
<td>Gender:</td>
<td>Male</td>
</tr>
<tr>
<td>Mother's Name:</td>
<td>MARIA GOMEZ</td>
</tr>
<tr>
<td>Audiologist:</td>
<td>felstehausen, susan</td>
</tr>
<tr>
<td>Exam Facility:</td>
<td>Children's Hospital of Wisconsin - Audiology</td>
</tr>
</tbody>
</table>

**Diagnostic Approach:**
- Behavioral
- Bone Conduction Auditory Brainstem
- Click Auditory Brainstem
- Distortion Product Otoacoustic Emissions
- Tone Burst Auditory Brainstem
- Transient Evoked Otoacoustic Emissions
- Tympanometry and/or Acoustic Reflex
- Other

<table>
<thead>
<tr>
<th>Right Ear:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Normal Limits</td>
<td></td>
<td>Hearing Loss</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Left Ear:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Normal Limits</td>
<td></td>
<td>Hearing Loss</td>
</tr>
</tbody>
</table>
WE-TRAC allows completion of the Confirmed Hearing Loss form (CHL).

- The CHL Report is the first place WI collects Risk Factors.
- At this point, audiologists will enter a referral to Early Intervention and, with parental consent, notify others, including the
  - Birth Hospital
  - Guide-By-Your-Side Program
  - and Primary Care Physician

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**Confirmation of Hearing Loss Report**

<table>
<thead>
<tr>
<th>Child's Information</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Child's Name:</td>
<td>Andrew Sacier</td>
<td>Gender: M</td>
<td>Birth Date: 02/19/2004</td>
</tr>
<tr>
<td>Mother's Name:</td>
<td>Ann Bailer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Father's Name:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child's Primary Address:</td>
<td>123 Fast Times Lane</td>
<td>City: Ridgeman</td>
<td>State: WI</td>
</tr>
<tr>
<td>Phone:</td>
<td>(920) 256-6582</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Hospital:</td>
<td>WE-TRAC Birthing Unit</td>
<td>Primary Care Provider: LILY HWANG</td>
<td></td>
</tr>
<tr>
<td>Hearing Screenings:</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diagnostic Information**

- Audiologist: Susan Falsenhausen
- Facility: WE-TRAC Audiology Clinic
- Address:
  - City:                | State: WI | Zip:                |
  - Phone:               |          |                    |
- Risk Factors:         |            |                     |
  - Family History
  - Parent/Carer Concern
  - Admission into the NICU (75 days)
  - Admission to the NICU for > 40 hours
  - Otoschisis, Usherian Tube Dysfunction, Down Syndrome
- Birth Weight: 3430g

**Diagnostic Approach:**

- Bone Conduction Auditory Brainstem, Otoch Trigonal Brainstem, Distortion Product Otoacoustic Emissions, Other, Tone Burst Auditory Brainstem, Transient Evoked Otoacoustic Emissions, Tympanometry and/or Auditory Reflex

**Results:**

<table>
<thead>
<tr>
<th></th>
<th>Right Ear</th>
<th>Left Ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure Tone Average</td>
<td>95 db</td>
<td>95 db</td>
</tr>
<tr>
<td>Degree of Hearing Loss</td>
<td>Profound</td>
<td>Moderate</td>
</tr>
<tr>
<td>Type of Hearing Loss</td>
<td>Mixed</td>
<td>Mixed</td>
</tr>
</tbody>
</table>

**Reporting**

Summary data or individual data will be forwarded to the Wisconsin Sound Development Program and the Jefferson County DHS to the Services Coordinator for the following purposes:

1. To facilitate coordination of care and other follow-up services that may be required.
2. To forward this information to another provider if a referral is necessary.
3. To forward information to the school district and/or state agencies as needed.

Check any personal/agencies that you wish to receive information about your child’s hearing. Include name and address if possible.

- Birth Hospital
- WE-TRAC Birthing Unit
- Guide-By-Your-Side Program
WE-TRAC “time-outs” promote timely and appropriate care.

- A next recommended procedure and date appear by each baby’s name in the queue.

- If the procedure does not occur by the “time-out date,” the baby’s name and the date will turn red.

| ! | Mouse, Michael | 11/19/03 | 1 | Inpatient Screen | Outpatient Screen by: 12/19/2003 |

WE-TRAC Timed-out Queue Item Detail

- On time-out, an e-mail is sent to providers, and a copy of the baby’s record is placed in the WE-TRAC “timed-out queue” for follow-up.
PCP/Medical Home

• Frequent system prompts remind users to enter PCP/Medical Home information.
Child’s Chart

Includes:

- Parent Information
  - adoption (hides birth parent information)
  - foster care (allows addition of guardian information)
- Hearing screening & follow-up history
- Address and Medical Home information
- Blood Card Information
  - Includes graphic representation
WE-TRAC Login

Please Note: To meet security standards, PHIN applications do not allow your web browser to store your password. If you have forgotten your password, use the WAMS Account Recovery by clicking on this link to it.

Enter your Wisconsin Web Access Management System (WAMS) ID and password.

Username: 
Password: 
Login

If you forgot your Username or Password, click here for WAMS account recovery.

First time users: If you do not have a WAMS account, you must register for WAMS and the Wisconsin Health Alert Network (HAN) before using WE-TRAC.
Click here to begin WAMS registration.
Click here to begin HAN registration (do this after completing WAMS registration).
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### Reporting Capabilities

**SAS Web Report Viewer** - **WE-TRAC Birthing Unit and NICU Case Status Report**

**Case Status Report**

Tuesday, October 14, 2008 11:39:58 AM CDT

**(BU) Generic Birth Hospital**

**Applied Filters:** My Org Type equal to Birthing Unit, NICU AND Data of Birth between 01Jan2008 and 31Dec2008

<table>
<thead>
<tr>
<th>Status</th>
<th>WE-TRAC ID</th>
<th>Initial Specimen ID</th>
<th>Name</th>
<th>Date of Birth</th>
<th>Gender</th>
<th>Mother's Name</th>
<th>Birth Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active</td>
<td>134455</td>
<td>OBI0012312</td>
<td>LAST, FIRST</td>
<td>08/09/008</td>
<td>Female</td>
<td>LAST, SECOND</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
<tr>
<td>Timed out</td>
<td>590021</td>
<td>OBI0012358</td>
<td>BABY, PRESTON</td>
<td>09/09/008</td>
<td>Female</td>
<td>BABY, JULIA</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
<tr>
<td>Timed out</td>
<td>454252</td>
<td>OBI0056003</td>
<td>MONTANA, RHEINH</td>
<td>09/09/008</td>
<td>Female</td>
<td>MONTANA, HELGA</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
<tr>
<td>Timed out</td>
<td>459459</td>
<td>OBI0024506</td>
<td>MOUSE, MICKEY</td>
<td>09/09/008</td>
<td>Male</td>
<td>MOUSE, MINNEKA</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
<tr>
<td>Refused care</td>
<td>255677</td>
<td>OBI0024506</td>
<td>DATA, MAKEUP</td>
<td>09/09/008</td>
<td>Male</td>
<td>DATA, ENTER</td>
<td>(BU) A Different Birth Hospital</td>
</tr>
<tr>
<td>Lost to follow up</td>
<td>245814</td>
<td>OBI0045734</td>
<td>BADGER, BUCKY</td>
<td>09/09/008</td>
<td>Male</td>
<td>BADGER, BELINDA</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
<tr>
<td>Lost to follow up</td>
<td>600089</td>
<td>OBI0024506</td>
<td>SPEARS, BRITNEY</td>
<td>09/09/008</td>
<td>Female</td>
<td>SPEARS, LYNNE</td>
<td>(BU) Generic Birth Hospital</td>
</tr>
</tbody>
</table>
Development:
Challenges, Considerations, and Tips

- System needs
- Developing workflow around real life, to handle the exceptions
- Standards and interoperability
- Integration with other systems
- Vision – there are many directions to go
Funding: Challenges, Considerations, and Tips

• Sustainability
• Keeping up with technology
• Developer resources
• Good specs and estimates before requesting money
• Funding from different sources
• Development costs more than you expect!
Prioritizing: Considerations

- Available resources (developer time, money)
- Integration timelines
- End user ease vs. administrator ease
- New functionality vs. user interface & reporting enhancements
- User needs/wants vs. sponsor needs/wants
Basic Specification Design

1. Workflow (all possible scenarios)
   • Include user consultation
2. Data elements
3. Validation checks
4. Screen mockups
5. Detailed description of functionality
WE-TRAC Future Directions

• Automated referrals to Birth to Three providers (integrating with the state Early Intervention system)
• Continue integration efforts (Immunization Registry, Vital Records)
• Expand risk factor collection for late onset cases
• Expand collection of lost-to-follow-up data
• Continue to develop reporting capabilities
• Expand child chart and case notes information
• Improve diagnostic audiology data collection
Prioritizing WE-TRAC Development

• Automated referrals to Birth to Three providers
• Continue integration efforts (WIR, SVRO)
• Expand risk factor collection for late onset cases
• Expand collection of lost-to-follow-up data
• Continue to develop reporting capabilities
• Expand child chart and case notes information
• Improve diagnostic audiology data collection

Available resources (developer time, money)
Integration timelines
End user ease vs. administrator ease
New functionality vs. user interface & reporting enhancements
User needs/wants vs. sponsor needs/wants
Early Intervention Referral Specs: Workflow

- Must occur within 48 hours of diagnosis
Early Intervention Referral Specs: Validations

- If a child is adopted, send primary guardian’s first and last name instead of mother’s.

- If demographic information is not complete, send user to child chart and request completion.

- If hearing loss is not specified, send user to diagnostic audiology exam results and request completion.
Early Intervention Referral Specs: Data Elements

- Child’s first and last name
- Mother’s first and last name
- Address
- Primary Phone
- Race
- Ethnicity
- County of Referral
Early Intervention Referral Specs: Screen Mockup

The Code of Federal Regulations (CFR) 34 Part 300 requires Medicaid healthcare providers to refer all children who may be eligible for Birth to 3 Program services. In Wisconsin, this includes any child with any degree or configuration of hearing loss.

Providers are encouraged to explain the need for the Birth to 3 Program referral to the child’s parent/guardian; however, consent for referral is not required.

Parental consent is required for voluntary programs, such as Guide By Your Side.
Early Intervention Referral Specs: Details

When the user selects "Refer to Early Intervention," send the user to a controller page. The user never sees this page, since it sends nothing to the browser, but it transparently redirects to either:

i. The referral page, if all information is present.
ii. The OHL (eventually a diagnostic audiologist form), which would automatically display the "Unspecified Hearing Loss Popup" if hearing loss is unspecified. On the OHL, the type of hearing loss button will have a red arrow pointing to it, and red bold text across the top of the screen says, "Information required to make a referral is incomplete. Please provide the necessary information, save, and attempt your referral again." After the audiologist saves the change, they should be sent to a "success screen" where the user can choose to continue, or return to the case list.

iii. Back to the case list and pop up the child chart if hearing loss is specified, but one or more required fields from the chart is missing. This would appear to the user as the page refreshing and the child chart popping up. If the data is not complete, the user is directed to the child chart to enter required fields. On the chart, any fields that are missing have a red arrow pointing to them, and red bold text across the top of the screen says, "Information required to make a referral is incomplete. Please provide the necessary information, save, and attempt your referral again." The following fields are required to make a referral to Birth to 3:

- Child’s first name
- Child’s last name
- Address

Start ➔}
RE: updated Birth to Three specs; more questions

Miranda,

Thanks for answering these!

2. Yes, that’s possible and a much better solution than what I was thinking of. Let’s go with the error checking you suggested.
   a. Regarding the screenshot, 8 races are displayed at one time. Is that the number you would like, or more/less? 6-8 should be fine... I think this is more of an aesthetic concern than anything. Let’s start with 6.
   b. Also, I am assuming that the blood card link, NICU checkbox, and adoption/foster care checkboxes would appear under the horizontal line in a manner consistent with the original screenshot in the specs. Yes, these should appear under the race and ethnicity listboxes. The horizontal lines are there to make it clear that the Race and Ethnicity labels go with the listboxes (Elizabeth’s idea).

3. Actually, it would require a little work to create a primary contact field for organizations, including some design issues.
   a. So in view of this, if I understand you correctly we should not create a primary contact field at this time (= let’s not worry about requiring a name)? That is correct.

Mike
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