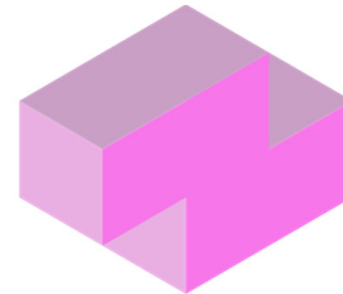
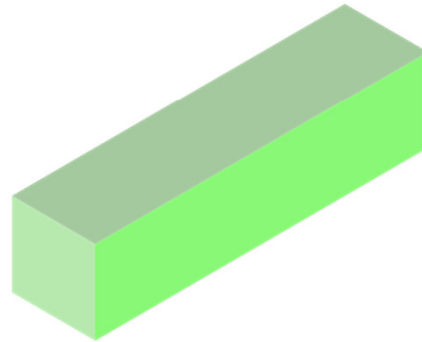
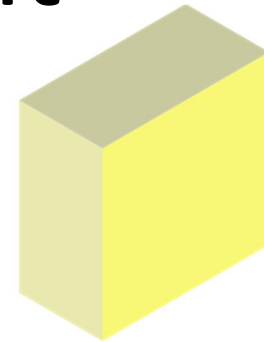


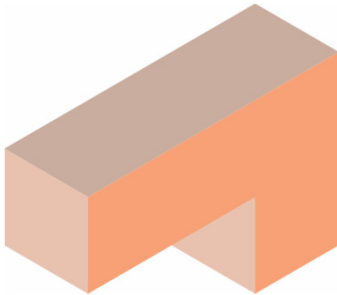
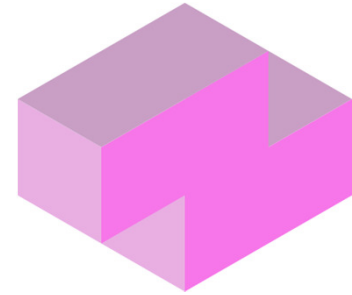
Adding CMV to EHDI Data Management



UTAH DEPARTMENT OF
HEALTH
Early Hearing Detection & Intervention

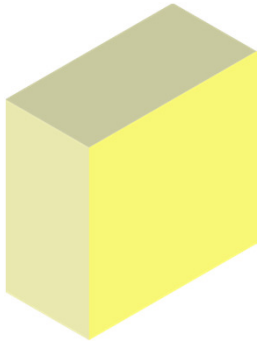
HiTrack 
EHDI Data Management System

Utah HB 81 (2013 General Session) Cytomegalovirus Public Health Initiative



26-10-10 UCA, “Cytomegalovirus (CMV) Public Education and Testing”

- **UDOH** establish and conduct public education program to inform *pregnant women and women who may become pregnant* about CMV (incidence, transmission, birth defects, diagnostic methods, preventative measures)
- Provide information to: *child care providers, school nurses, health educators, health care providers, religious organizations offering children’s programs as part of worship services*



26-10-10 UCA, “Cytomegalovirus (CMV) Public Education and Testing”

If a newborn infant fails the newborn hearing screening test(s).....

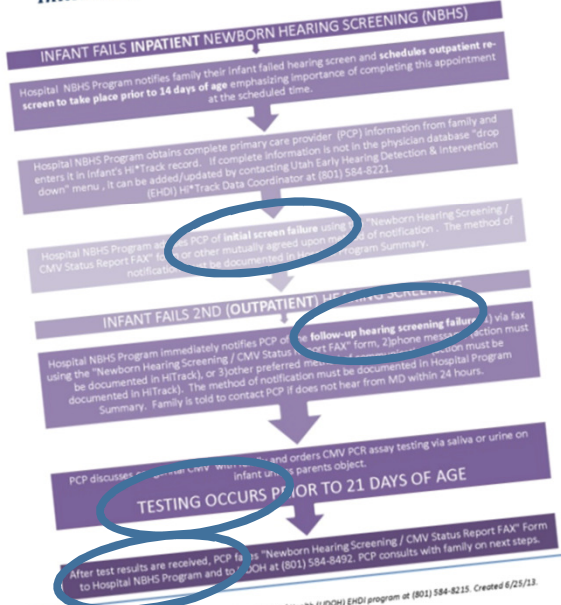
Medical Practitioner shall:

- *Test the newborn infant for CMV before 21 days of age...unless the parent objects; **and***
- *Provide to the parents information re: birth defects caused by congenital CMV and available methods of treatment.*

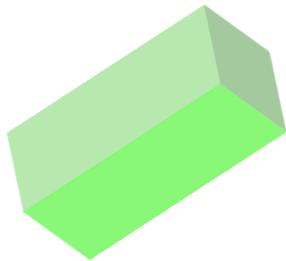




H.B. 81 (2013 General Session) Cytomegalovirus Public Health Initiative (UCA 26-10-10) Sequence of Events



If questions, please contact the Utah Department of Health (UDOH) EHDI program at (801) 584-8215. Created 6/25/13.



Newborn Hearing Screening (NBHS) / CMV Status Report FAX (1 form with 3 options)

Date: _____

PILOT
Version:
August 26,
2013
COMPLETE
ONE OPTION
ONLY

TO: _____
FROM: _____ CLINIC/HOSPITAL: _____ FAX: _____ PHONE: _____

OPTION 1 (NBHS Program)

PER H.B. 81 (2013 General Session) UCA 26-10-10 Cytomegalovirus (CMV) Public Health Initiative, the following infant who lists you as their Primary Care Physician, has **FAILED** the **INITIAL** newborn hearing screen and will **require** a follow-up re-screen. This follow-up appointment is scheduled as noted. Should you have contact with the family prior to the follow-up date please encourage them to keep the appointment as this should be completed no later than 14 days of age. Otherwise, no action on your part is necessary at this time.

Notification of failed INITIAL HEARING SCREEN – to be completed by HOSPITAL

Infant's Name	D.O.B.	Mother's Name	Contact#	Follow-up Appt.

OPTION 2 (NBHS Program)

This is to advise the PCP that the following infant has **FAILED** the **FOLLOW-UP (2nd) HEARING SCREENING** and is a candidate for **congenital CMV testing before 21 days of age** per H.B. 81. He/she has also been referred to a pediatric audiologist for a diagnostic hearing evaluation.

Notification of failed FOLLOW-UP HEARING SCREEN – to be completed by HOSPITAL

Infant's Name	D.O.B.	Mother's Name	Contact#	Diagnostic Appt.

OPTION 3 (Primary Care Provider)

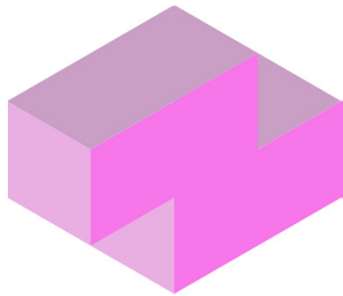
After congenital CMV PCR assay testing has been completed, PCP office should fax this form back to the Hospital NBHS program at the above listed fax # **AND** to the Utah Department of Health Early Hearing Detection and Intervention (EHDI) program at (801) 584-8492.

Notification of CMV TEST RESULTS – to be completed by PHYSICIAN

Infant's Name	D.O.B.	Urine (U) or Saliva (S)	RESULT: Pos (+) or Neg (-)

If questions, please contact the Utah Department of Health Early Hearing Detection and Intervention program at (801) 584-8215.

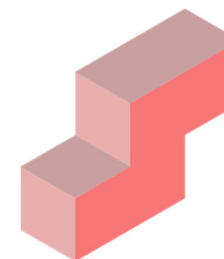
“Notebook” Data: First 6 Months



Babies eligible for CMV testing = 183

of CMV tests reported back to UDOH = 27

Prior Implementation: Overview



- Risk Indicator Data Entry

The screenshot displays the 'JCIH Risk Indicators for Ruby, Satin' application. The top navigation bar includes 'All Folders', 'No Action', and 'Action Needed' buttons, along with a 'Facility' dropdown set to 'Flower Regional Hospital' and icons for 'Letters', 'Reports', 'Merge', 'Tools', 'Settings', and 'Log Out'. The user is identified as 'sammy'.

The left sidebar contains a patient overview for 'Ruby, Satin' (Medical ID: 12345678A, Birth Date: 3/5/2013) and a list of navigation options: Record Overview, Tracking Options, Demographics, Screening, Risk Indicators (highlighted), Diagnostics | Manage, Hearing Disposition, Amplification, EI Services, Letters, and Transfer. Recommended actions include 'Schedule Outpatient Screening' and 'Manage'.

The main content area shows a table of risk indicators for 'JCIH 2007'. The table has three columns: 'Result', 'Indicator', and 'Detail'. The 'In utero infections' row is highlighted with a blue box.

Result	Indicator	Detail
Unknown	Caregiver concern regarding hearing, speech, language, or developmental delay.	
Unknown	Family history of permanent childhood hearing loss.	
Unknown	Neonatal intensive care (All infants with or without risk factors) for greater than 5 days, including any of the following: ECMO,* assisted ventilation, exposure to ototoxic medications (gentamycin and tobramycin) or loop diuretics (furosemide/torsemide) in addition, regardless of length of stay, hyperbilirubinemia requiring exchange transfusion.	
Yes	In utero infections such as CMV, herpes, rubella, syphilis, and toxoplasmosis.	
Unknown	Cranio-facial anomalies including those that involve the pinna, ear canal, ear tags, ear pits, and temporal bone anomalies.	
Unknown	Physical findings such as white forelock, that are associated with a syndrome known to include a sensorineural or permanent conductive hearing loss.	
Unknown	Syndromes associated with hearing loss or progressive or late-onset hearing loss, such as neurofibromatosis, osteopetrosis, and Ushersyndrome; other frequently identified syndromes include Waardenburg, Alport, Pendred, and Jervell and Lange-Nielson.	
Unknown	Neurodegenerative disorders such as Hunter syndrome, or sensory motor neuropathies, such as Friedreich's ataxia and Charcot-Marie-Tooth syndrome	
Unknown	Culture-positive postnatal infections associated with sensorineural hearing loss, including confirmed bacterial and viral (especially herpes viruses and varicella) meningitis.	
Unknown	Head trauma especially basal skull/temporal bone fracture that requires hospitalization.	
Unknown	Chemotherapy	

A 'Save' button is located at the bottom right of the table.

Prior Implementation: Overview

- Notes Data Entry



The screenshot shows a medical software interface for 'Notes for Ruby, Satin'. The window title is 'Notes for Ruby, Satin'. The interface includes a top navigation bar with 'All Folders', 'No Action', and 'Action Needed' buttons. A facility dropdown is set to 'Flower Regional Hospital'. The main content area is titled 'Notes for Ruby, Satin' and contains a table with columns: Type, Value, Date Created, Modified on, and User. A single row is visible with Type 'Baby' and Value 'This infant has seen Dr. Ronald at FHS. CMV testi ...'. Below the table, there is an 'Edit Entry' form with a text area containing the text: 'This infant has seen Dr. Ronald at FHS. CMV testing was positive. He has recommended imaging and follow up ABR after imaging. Ophthalmology consultation was also recommended.' The form has 'Delete', 'Save', and 'Cancel Add' buttons. A left sidebar contains patient information for 'Ruby, Satin' (Medical ID: 12345678A, Birth Date: 3/5/2013) and various navigation options like 'Record Overview', 'Tracking Options', 'Demographics', 'Screening', 'Risk Indicators', 'Diagnostics | Manage', 'Hearing Disposition', 'Amplification', 'EI Services', 'Letters', and 'Transfer'. A 'Recommended Actions' section lists 'Schedule Outpatient Screening' and 'Manage'. A 'Messages' section shows 'Milestones: 0/-', 'PC: Glimmer Ruby', and 'Phone: ?'. The user 'sammy' is logged in.

Type	Value	Date Created	Modified on	User
Baby	This infant has seen Dr. Ronald at FHS. CMV testi ...	3/5/2014 2:47:13	3/5/2014 2:47:13	sammy

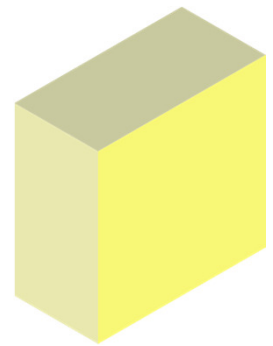
Edit Entry

This infant has seen Dr. Ronald at FHS. CMV testing was positive. He has recommended imaging and follow up ABR after imaging. Ophthalmology consultation was also recommended.

Delete Save Cancel Add

Prior Implementation: Limitations

- Limited Reporting Capacity
- Free text entries make hard to quantify the data



User Requirements: Ease of Use

- “Up front” on the User Interface
- Consistent with current User Interface culture.



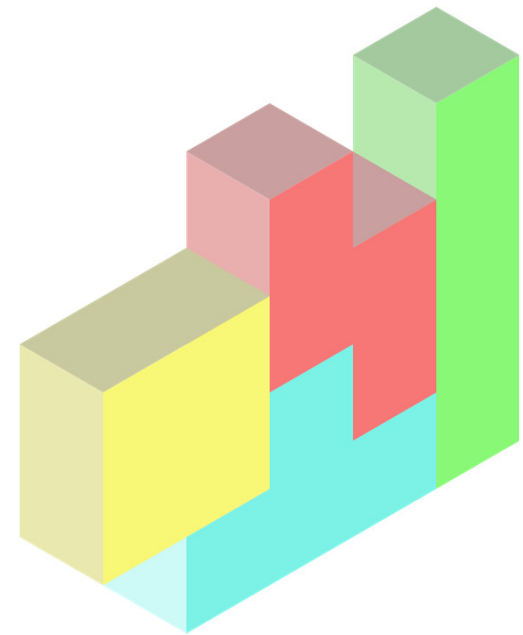
User Requirements: Reporting & Exporting

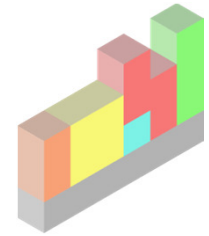
- Built in Lab Result Report
- Flexible Lab Result filter for existing EHDI-related Reports
- Exporting Functionality
- XML for data exchange with data other systems



Implementation: Data Fields

- Analyzed current system to determine optimal long-term database placement.
- Leveraged HiTrack's existing tables and code with little system impact.
 - Introduced new Lab Testing types and outcomes.
 - Introduced new CMV specific Recommendation Types.





Implementation: Data Collection

- Iterated User Interface prototypes for Notice data entry.
- Finalized design with users.

The image displays a web application interface for patient data management. On the left, a patient record for Ruby, Satin is shown, including medical ID, birth date, and various tracking options. A blue box highlights the 'Recommended Actions' section, which lists several actions like 'Schedule Outpatient Screening' and 'Notify PCP of Failed Screening'. A line connects this section to a larger, detailed view of a 'New Recommended Action' form on the right. This form includes fields for the recommendation type, target date and age, confirmed date and age, status, notes, responsible party (person or organization), contact method, last and first names, and a date field. The form is titled 'New Recommended Action for Ruby, Satin' and has a 'User: sammy' indicator in the top right corner.

Recommended Actions:

- Schedule Outpatient Screening
- Notify PCP of Failed Screening
- PCP Referral for CMV PCR
- Manage

New Recommended Action for Ruby, Satin

Recommend: Notify PCP of Failed Initial Scre

Target

Date: Age: 1 Months

Confirmed

Date: Age: 1 Months

Status: Scheduled

Notes:

Responsible Party

Person Organization Contact Method: Email

Last Name: Sondag

First Name: Brandon

Find Person

Recommended By

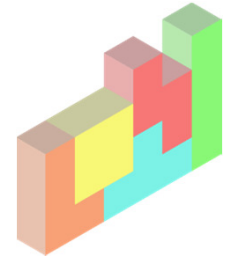
Last Name:

First Name: Find Person

On: 3/ 5/2014

Save Cancel

Implementation: Data Collection



- Iterated User Interface prototypes for Lab Results.
- Finalized design with users.

Lab Tests for Ruby, Satin User: sammy Help

New Lab Result

Stage: Laboratory Testing Type: CMV - Saliva Facility: Flower Regional Hospital

Date: 9/ 5/2013 Time: 00:00

Result: Negative Ordering Physician: Sonday, Brandon Note:

Apply

Lab Test History - Select an item to Edit or Delete the result

Test Date	Type	Result	Physician	Facility	Stage	User
7/5/2013 12:00 AM	CMV - S	Negative	Sonday, Brando	State Lab 221	Laboratory Tes	sammy

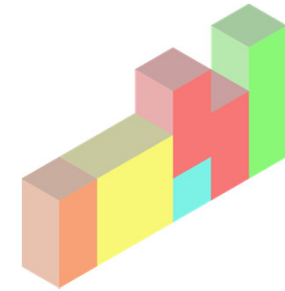
Save Cancel

Sidebar:

- All Folders No Action
- Action Needed
- Ruby, Satin
- Medical ID: 12345678A
- Birth Date: 3/5/2013
- Action: Need Outpatient Appt.
- Status: In Progress
- Record Overview
- Tracking Options
- Demographics
- Screening
- Risk Indicators
- Diagnostics | Manage
- Hearing Disposition
- Amplification
- EI Services
- Letters
- Transfer
- Lab Testing
- Recommended Actions:
- Schedule Outpatient Scre
- Notify PCP of Failed Scre
- PCP Referral for CMV PCI
- Manage
- Messages:
- Milestones: 0/-
- PC: Glimmer Ruby
- Phone: ?

Implementation: Reporting

- Iterated Report Design prototypes.
- Finalized design with users.



Lab Testing Report Selection Criteria

Facility: Flower Regional Hospital

Letters Reports Merge Tools Settings

Action Needed

Lab Testing Report Selection Criteria

Birth Date From: 1/1/2013 To: 9/30/2013
 Inpatient Screening Date
 Outpatient Screening Date
 Enter Date

Birth Facility: [All]
 Inp. Screening Site: [All]
 Nursery: [All]

Any technology OAE Only Include Contact Info?
 A-ABR and OAE A-ABR Only Yes
 for: [] No

Include report explanation: Yes No
 Generate: Printable Report

Lab Result:
 Include All Children
 Include Only Children with:
 Positive
 Negative
 Refused

Lab Test Type:
 Include All Children
 Include Only Children with:
 CMV - Saliva
 CMV - Urine

Lab Test Date:
 Sort By: Child's Birthday
 Generate

HI*TRACK 4.5.8 Lab Testing Report - Generated on 3/5/2014 3:27 PM

SAP CRYSTAL REPORTS

HI*TRACK Version 4.5.8
Lab Testing Report
 Generated On: 3/5/2014

Report Selection Criteria
 • Birth Date: From 1/1/2013 To 9/30/2013
 • Babies needing Inpatient screening are included.
 • LabDate Range: 4/1/2013 to 9/30/2013

Sort by: Child's Birthday

Child's Name	Medical ID	Birthdate	Inpatient Hearing Results	Outpatient Hearing Results
Ruby, Satin	12345678A	5 Mar 2013	Referred	3/5/13

Birth Hospital: Flower Regional Hospital
Physician: .

Notices Recommendation	Date Rec'd	Recommended To	Appt Date	Entered By
Notify PCP of Failed Initial Screening	3 Jul 2013	Sunday, Brandon via E		sammy

Laboratory Testing Date	Type	Result	Ordering Provider	Facility	Note	Entered By
7/5/2013 1:	CMV - Saliva	Negative	Sunday, Brandon	State Lab 221		sammy

This report lists babies who have lab testing results recorded and provides lab related notice history .

Implementation: Reporting

- Iterated filter designs for EHDI-related Reports
- Finalized design with users.

Hearing Status Report Selection Criteria

Action Needed

Birth Date From: 1/ 1/2013 To: 12/31/2013
 Inpatient Screening Date
 Outpatient Screening Date
 Enter Date

Confirmed losses
 Suspected losses
 Confirmed

Include All Children
 Include Only Children

Birth Facility: [All]
 Inp. Screening Site: [All]
 Nursery: [All]

Any technology OAE Only A-ABR and OAE A-ABR Only
 Include Contact Info? Yes No

Include report explanation: Yes No
 Generate: Printable Report

Advanced Selection Criteria

Name	Criteria
Condition	Lab Result Equals Negative
Condition	Lab Result Equals Refused

HI*TRACK Version 4.5.8
Hearing Status Report
 Generated On: 3/5/2014

Report Selection Criteria Sort by: Child's Name
 • Birth Date: From 1/1/2013 To 12/31/2013
 • Babies needing Inpatient screening are included.
 • Included: Confirmed Losses, Confirmed Normal, Suspected Losses
 • Advanced Selection Criteria: Lab Result Equals Negative OR Lab Result Equals Refused

Child's Name	Medical ID	Birthdate	Type	Inpatient Result	Date	Type	Outpatient Result	Date
Ruby, Satin	12345678A	5 Mar 2013	R: TBOAE L: TBOAE	Refer Pass	3/5/2013 3/5/2013	R: L:	No Out. Scrn->Eval	

Milestones: 0/1/
Ear: Type of Loss Degree Confirmed? Date Age (months)
 R: Permanent Conductive Mild-Moderate Yes 5 Apr 2013 1
 L: Mixed Moderate Yes 5 Apr 2013 1

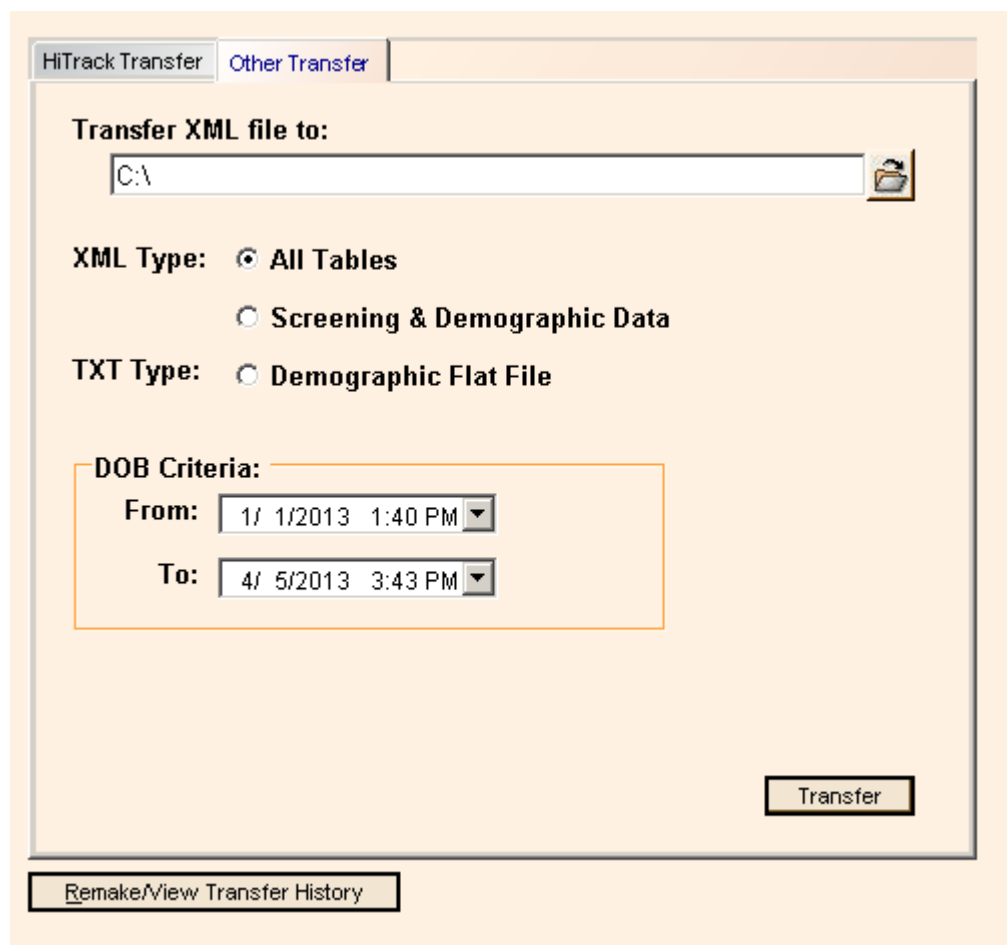
Enrolled With	Date	Status	Status Date

INPATIENT RESULTS (# AND %)	
Total:	1
Passed:	0 0%
Referred:	1 100%
Inconclusive:	0 0%
Missed:	0 0%
Refused:	0 0%
Transferred Out:	0 0%
Deceased:	0 0%
No Info.:	0 0%

OUTPATIENT RESULTS (# AND %)	
Total:	1
Passed:	0 0%
Referred:	0 0%
Inconclusive:	0 0%
No Out. Scrn->Eval:	1 100%
Scheduled:	0 0%
Broken Appt.:	0 0%
Discontinued:	0 0%
Refused:	0 0%
Deceased:	0 0%
No Info.:	0

Implementation: Exporting

- Existing XML exporting functionality.
- Reviewed new Lab Testing types and outcomes.



The screenshot displays a software dialog box titled "HiTrack Transfer" with a sub-tab "Other Transfer". The dialog is used for exporting data. It features a text field for the destination path, currently set to "C:\", with a folder icon to its right. Below this, there are radio button options for "XML Type" (with "All Tables" selected) and "Screening & Demographic Data". A "TXT Type" section has a radio button for "Demographic Flat File". A "DOB Criteria" section is highlighted with an orange border and contains two date-time pickers: "From:" set to "1/ 1/2013 1:40 PM" and "To:" set to "4/ 5/2013 3:43 PM". At the bottom right is a "Transfer" button, and at the bottom left is a "Remake/View Transfer History" button.

HiTrack Transfer Other Transfer

Transfer XML file to:

C:\

XML Type: All Tables
 Screening & Demographic Data

TXT Type: Demographic Flat File

DOB Criteria:

From: 1/ 1/2013 1:40 PM

To: 4/ 5/2013 3:43 PM

Transfer

Remake/View Transfer History

Learning Experiences

- Challenge
 - Learned that “Detected” / “Not Detected” terminology is preferred by users over “Positive” / “Negative”
- Solution
 - Flexible system allowed real-time update of the labels with no negative impact.
- Challenge
 - Blood test types were received although the State of Utah prefers CMV diagnosis based on saliva or urine.
- Solution
 - TBD, however, HiTrack allows for customization with little negative impact

Future Work:

- Collaboration with Laboratories
 - Electronic Data Interchange – e.g. HL7
 - Establish Matching Rules
 - Statewide Unique ID
 - Mother Demographics, DOB, etc.
 - Ensure Privacy
- Follow-through data entry in HiTrack by Healthcare providers
 - Web access user interface for providers



CMV Data Management Summary

- Effective Collaboration
 - Involve the User at Every Step
 - Include Knowledge Experts
 - Communicate effectively
 - Know when to upgrade the mode of communication as needs arise.
- Plan for future growth
- Use a data system with flexible database components and features