Automating the Receipt of CMV Lab Testing Results

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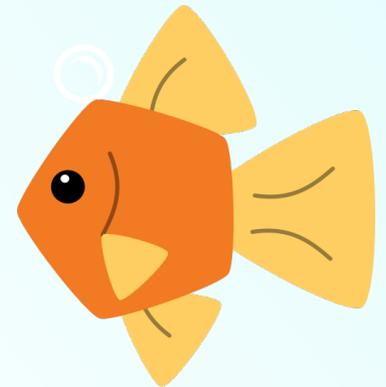Krysta Badger, BS
Utah EHDI Data Coordinator

UTAH DEPARTMENT OF
HEALTH
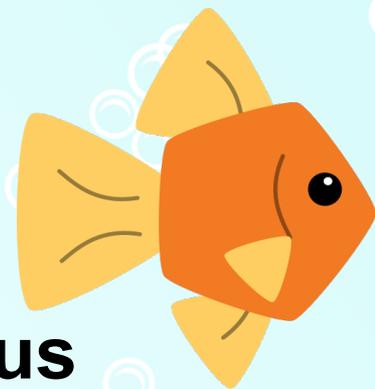Early Hearing Detection & Intervention

HiTrack
EHDI Data Management System

Background

- Legislation
- Reporting
- Communicable Disease Rule
- Change of Staff - Impact on data reporting

Background: **UTAH 2013**

26-10-10 UCA, "**Cytomegalovirus (CMV)** Public Education and **Testing**"

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

   The 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.

Background
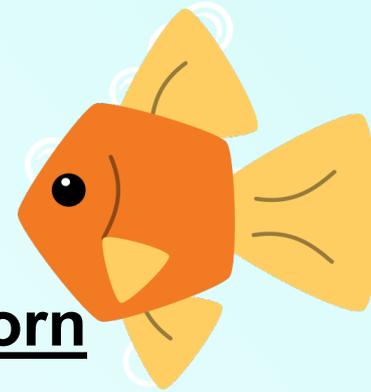
R398-4-3. Clarification of when a newborn fails a hearing screen.

The newborn must fail both hearing screens, the initial hearing screen routinely done at birth **and** the subsequent follow-up screen

or

if/when the initial failed hearing screen is obtained after 14 days of age before the medical practitioner is required to test for CMV.

Background

R398-4-5. Reporting Requirements.

Medical practitioners are required to **submit** results of the CMV testing **to UDOH** for each newborn under their care who is referred for CMV testing **within 10 days of receiving results.**
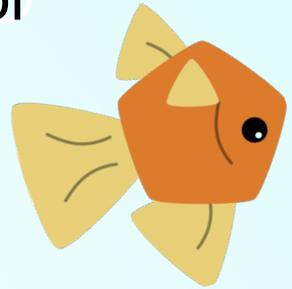
Policy Change for Data Integration

- Obtain access to EMRs

- Develop relationships with Labs

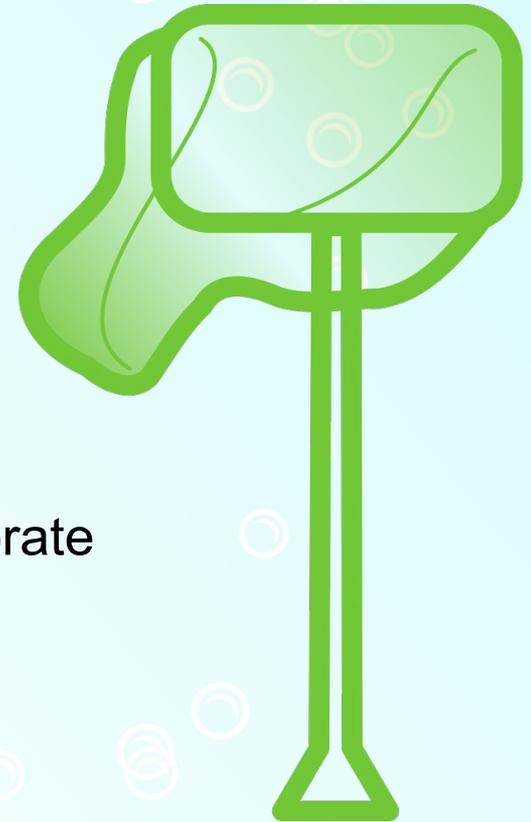- Direct lab reporting BEST!

Utah Rule R-386-702 Communicable Disease Rule (2/11/16)

7) added "Cytomegalovirus (CMV), congenital" via ELR. This is already reportable as per Section R398-4-5. Inclusion in Rule R386-702 will reinforce the reporting requirement, and facilitate laboratory reporting that is indicative of this condition
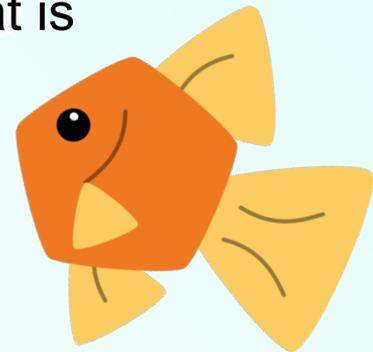
Need Analysis and Kickoff

- Less reporting of CMV testing occurred than anticipated.
- Change in Staff
  - New Leadership willing to collaborate
- Automation needed to reduce effort and data entry errors, ensure receipt of results
  - "Grey List" holding folder
- October 2017 brainstorming meetings

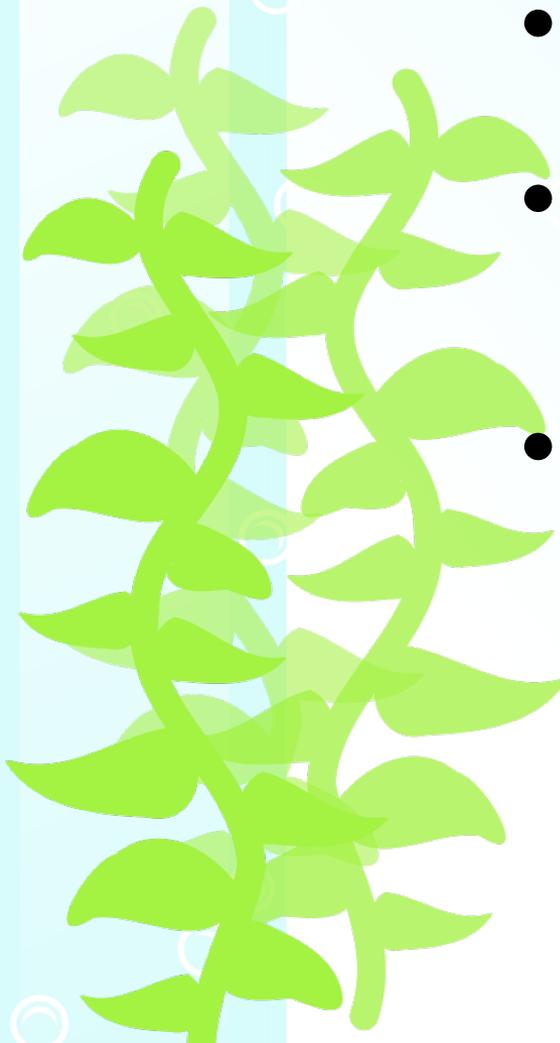# HiTrack Lab Testing Module - 2013 to current

Data Privacy Agreements

- Essential Requirement for developing automated CMV receipt
- Pre-existing privacy agreements covered HiTrack team
  - Data Privacy is part of software contract
- HiTrack staff HIPAA certified

Scope of Work

- Chose One Lab to Start - Pilot
  - Initial research showed that each lab reported a unique "flavor" of HL7v2 messages
- Iterative
  - "Small test of change" approach used
  - Include more labs as time goes on
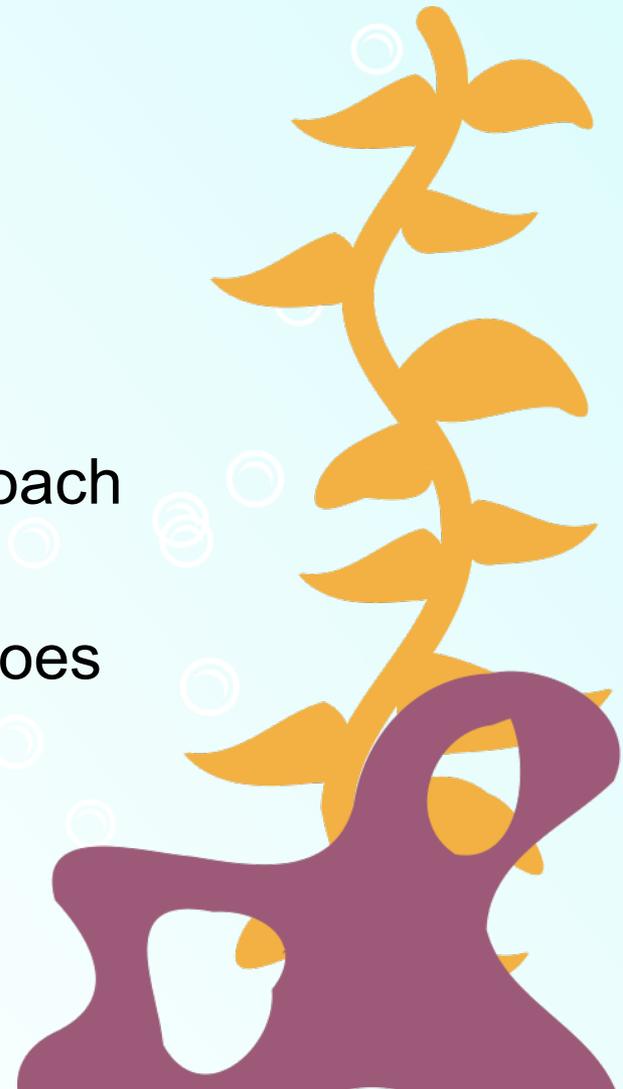
Technical Research Phase

- Learning HL7 version 2
    - Message Structure
    - Field Domain Values
- Lab specific idiosyncrasies
    - Fields Used
    - Result Output Differences
        - Text (human readable)
        - Numeric (interpreted)

Lab Field Use Differences

HiTrack Field VV Source >>	LabCorp (231)	ARUP (231)	Quest Diag (251)	IHC (251)	MtnStar (251)
Patient Record Number	PID-3-1	PID-3-1	PID-3-1	PID-3-1	PID-3-1
Baby/Patient Last Name	PID-5-1	PID-5-1	PID-5-1	PID-5-1	PID-5-1
Baby/Patient First Name	PID-5-2	PID-5-2	PID-5-2	PID-5-2	PID-5-2
Baby/Patient Middle Name	PID-5-3	PID-5-3	PID-5-3	PID-5-3	PID-5-3
Baby/Patient DOB	PID-7-1	PID-7-1	PID-7-1	PID-7-1	PID-7-1
Baby/Patient Sex	PID-8-1	PID-8-1	PID-8-1	PID-8-1	PID-8-1
Contact Last Name				NK1-2-1	NK1-2-1
Contact First Name				NK1-2-2	NK1-2-2
Contact DOB					
Contact/Patient Zip	PID-11-5	PID-11-5	PID-11-5	PID-11-5	PID-11-5
Contact/Patient Phone	PID-13-5&6	PID-13-5&6	PID-13-5&6	PID-13-5&6	PID-13-5&6
Date and Time Sample Collected	OBR-7-1	OBR-7-1	OBR-7-1	OBR-7-1	OBR-7-1
Date and Time Helper Field 1			SPM-17-1		
Type (Saliva,Urine,Blood)	OBR-4	OBR-4	SPM-4	SPM-4	OBX-3
Type Helper Field 1	OBX-3	OBX-3		OBR-4	
Type Helper Field 2					
Ordering/Testing Facility Name	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1
Birth Facility (will not overwrite on matches)	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1
Result (Detected,Not Detected,Equivocal)	OBX-5	OBX-5	OBX-5	OBX-5 (Number)	OBX-5
Result Data Type Check Field	OBX-2	OBX-2	OBX-2	OBX-2	OBX-2
Result Helper Field 1	OBX-7-1	OBR-12			
Result Helper Field 2	NTE-2-3??				
Result Helper Field 3	NTE-8-3??				
Result Note					
Ordering physician	OBR-16-??&??	ORC-12	OBR-16-???	ORC-12	ORC-12
Sending Lab	MSH-4	MSH-4	MSH-4	MSH-4	MSH-4

Lab Field Use Differences

HiTrack Field VV Source >>	LabCorp (231)	ARUP (231)	Quest Diag (251)	IHC (251)	MtnStar (251)
Patient Record Number	PID-3-1	PID-3-1	PID-3-1	PID-3-1	PID-3-1
Baby/Patient Last Name	PID-5-1	PID-5-1	PID-5-1	PID-5-1	PID-5-1
Baby/Patient First Name	PID-5-2	PID-5-2	PID-5-2	PID-5-2	PID-5-2
Baby/Patient Middle Name	PID-5-3	PID-5-3	PID-5-3	PID-5-3	PID-5-3
Baby/Patient DOB	PID-7-1	PID-7-1	PID-7-1	PID-7-1	PID-7-1
Baby/Patient Sex	PID-8-1	PID-8-1	PID-8-1	PID-8-1	PID-8-1
Contact Last Name				NK1-2-1	NK1-2-1
Contact First Name				NK1-2-2	NK1-2-2
Contact DOB					
Contact/Patient Zip	PID-11-5	PID-11-5	PID-11-5	PID-11-5	PID-11-5
Contact/Patient Phone	PID-13-5&6	PID-13-5&6	PID-13-5&6	PID-13-5&6	PID-13-5&6
Date and Time Sample Collected	OBR-7-1	OBR-7-1	OBR-7-1	OBR-7-1	OBR-7-1
Date and Time Helper Field 1			SPM-17-1		
Type (Saliva,Urine,Blood)	OBR-4	OBR-4	SPM-4	SPM-4	OBX-3
Type Helper Field 1	OBX-3	OBX-3		OBR-4	
Type Helper Field 2					
Ordering/Testing Facility Name	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1
Birth Facility (will not overwrite on matches)	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1	ORC-21-1
Result (Detected,Not Detected,Equivocal)	OBX-5	OBX-5	OBX-5	OBX-5 (Number)	OBX-5
Result Data Type Check Field	OBX-2	OBX-2	OBX-2	OBX-2	OBX-2
Result Helper Field 1	OBX-7-1	OBR-12			
Result Helper Field 2	NTE-2-3??				
Result Helper Field 3	NTE-8-3??				
Result Note					
Ordering physician	OBR-16-??&??	ORC-12	OBR-16-???	ORC-12	ORC-12
Sending Lab	MSH-4	MSH-4	MSH-4	MSH-4	MSH-4

Lab Result Output - Results as Text

OBR-4	OBR-8	OBR-9	OBR-10	OBR-11	OBR-12
7323 ^^LN^51813^CMV QNT^L					
7323 ^^LN^0051813^Cytomegalovirus DNA Quantitation by PCR^L					
2131 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
0525 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
3150 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
1505 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
1459 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
0389 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
1431 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
1433 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
1470 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
0843 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L	1	CE	5000-5^Cy	1	^^^^Not Detected^L
3327 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L					
9057 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L					
3926 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L					
4894 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L					
1991 ^^LN^0060040^Cytomegalovirus by Qualitative PCR^L					

Lab Result Output - Numeric Results

Data Type	Test Performed	OBX-4	Test Result	Units
OBX-2	OBX-3		OBX-5	OBX-6
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	5124-3^CMV IgG S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
SN	5126-8^CMV IgM S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
NM	5124-3^CMV IgG S	1	0.7	{EIA_index}^EIA index^UCUM^8995800
SN	5126-8^CMV IgM S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
NM	72494-8^CMV DNA	1	2.5	{Log_IU}/mL^log (base 10) internationa
SN	5126-8^CMV IgM S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
SN	5126-8^CMV IgM S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
NM	5124-3^CMV IgG S	1	0.7	{EIA_index}^EIA index^UCUM^8995800
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	5124-3^CMV IgG S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
SN	5126-8^CMV IgM S	1	<^0.2	{EIA_index}^EIA index^UCUM^8995800
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
NM	5124-3^CMV IgG S	1	7.5	{EIA_index}^EIA index^UCUM^8995800
NM	5124-3^CMV IgG S	1	4.7	{EIA_index}^EIA index^UCUM^8995800
NM	5126-8^CMV IgM S	1	1.8	{EIA_index}^EIA index^UCUM^8995800
NM	5126-8^CMV IgM S	1	1.5	{EIA_index}^EIA index^UCUM^8995800
NM	1742-6^ALT SerPl-(	1	1240	U/L^enzyme unit per liter^UCUM^319^
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa
SN	72494-8^CMV DNA	1	<^2.1	{Log_IU}/mL^log (base 10) internationa

Technical Research Phase

- Lab Messages have very sparse demographic information
  - Decided that matching for Labs had to be different than matching for hearing screening.
- Explored technology for making the lab data available to the HiTrack software
  - Mirth Connect Messages
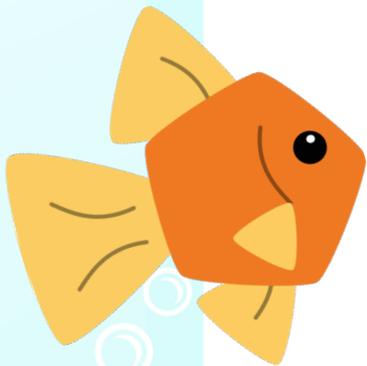 - Secure File transfer

Development Phase

- Challenges
  - Official Facility List - the Facilities list reported by the labs is more comprehensive than what is needed for HiTrack.
  - Unstandardized HL7 Message Content
- Interactions with lab data IT (Informatics – Division of Disease Control and Prevention Utah)
  - Responsive IT support was essential
- Secure Email System enhanced development process
  - Enabled discussion about specific records and troubleshoot import problems.

Testing Phase

- Secure Database Copy
  - BAA / Data Privacy Agreement
  - Data destruction policy
- Compared automatically imported results to hand entered results
- Looked for Unmatched Records
  - Match Scores
  - Surprised by records that came in prior to hearing screening results

Implementation

- UDOH IT Support
- UDOH Shared Folder Installation
  - Lab team built auto-extract process
- HiTrack 5.0.2 Update

Automated Import

Automated Import - Match Resolution

New Day-to-day Process

- Staffing Changes
  - Hospital data entry reduced
  - State staff
    - (fewer than 2 hours a week)
- UDOH efforts changed
  - Shift from data entry to import oversight efforts
  - More efficient
- Challenges
  - Unrecognized Doctor names
  - Not getting Saliva (Fall 2019)

Future Work

- More Labs
- Increased Automation with IT scripting

Questions?

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