



I-CARE Technical Assistance Participation in 2024

HL7 Onboarding Course & Immunization Integration Program (IIP) Data Quality TA

Joseph King—HL7 Project Coordinator, CDPH

David Juen—IIS Projects Administrator, CDPH



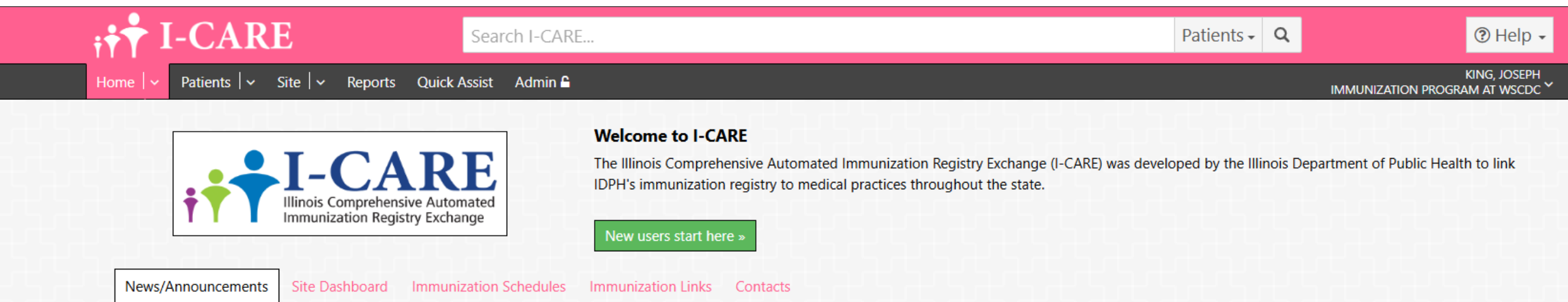
Agenda

- What is I-CARE?
- Describe the HL7 Onboarding Course
 - Background
 - Goals
 - Review of HL7 Onboarding Process
 - Takeaways & Examples
- Describe the IIP Data Quality TA:
 - Background
 - Goals
 - Review of 4 sessions with AIRA
 - Takeaways and Examples
- What is next?
 - Enhancing HL7 Errors & Acknowledgement (ACK) messages
 - Delivering value via HL7 Onboarding



★ What is I-CARE?

- Illinois Comprehensive Automated Immunization Registry Exchange
- Home-grown system created in 2007
- Providers are managed by their respective jurisdiction: Chicago & Downstate IL



The screenshot shows the I-CARE website interface. At the top, there is a pink header with the I-CARE logo on the left, a search bar in the center, and a 'Patients' dropdown menu and a 'Help' icon on the right. Below the header is a dark grey navigation bar with links for 'Home', 'Patients', 'Site', 'Reports', 'Quick Assist', and 'Admin'. On the right side of this bar, it says 'KING, JOSEPH IMMUNIZATION PROGRAM AT WSCDC'. The main content area has a light grey background with a grid pattern. On the left, there is a large I-CARE logo with the text 'Illinois Comprehensive Automated Immunization Registry Exchange'. To the right of the logo, there is a 'Welcome to I-CARE' section with a paragraph explaining the system's purpose and a green button that says 'New users start here >>'. At the bottom, there is a white navigation bar with links for 'News/Announcements', 'Site Dashboard', 'Immunization Schedules', 'Immunization Links', and 'Contacts'.



HL7 Onboarding Course



HL7 Onboarding Background

- **Who is being onboarded?**
 - Sites requesting a new HL7 connection
 - Sites restoring HL7 connection(s)
 - Identify VFC-enrolled sites who have not reported for some time using IIS Dashboard
 - Sites undergoing administrative changes (new EHR provider, acquisitions, etc.)
- **How were sites being onboarded?**
 - Providers or EHRs would have to email CDPH or IDPH to indicate interest
 - IDPH built a query within I-CARE to identify new providers that would be run manually
- **CDPH recognized the need for a formal, on-demand HL7 Onboarding Process, and partnered with IDPH and AIRA to develop one beginning in 2024**



★ HL7 Onboarding Course

What was the goal of this course?

- Create a formal process for providers to establish an HL7 interface with I-CARE




Provider Organization Onboarding for IIS, AIRA (2024)



HL7 Onboarding Course

- I-CARE team completed a 7-session course designed to teach IIS staff how to develop and manage an on-demand HL7 Onboarding process:
 - Session 0 – Course Prep
 - Session 1 – Introduction to Onboarding
 - Session 2 – Discovery and Planning
 - Session 3 – Development and Testing, overview
 - Session 4 – Development and Testing, in-depth
 - Session 5 – Production Approval and Go-Live
 - Session 6 – Ongoing Monitoring, Special Topics, and Course Wrap-Up





CDPH/IDPH HL7 Onboarding Process

Complete form indicating interest and readiness to connect to I-CARE

Schedule a Kickoff Call with their jurisdiction and EHR representative

Complete testing using the I-CARE Test Environment and test patients

- Jurisdiction will check for completeness & accuracy

Complete an Ongoing Monitoring period, addressing any issues as they may arise



Smartsheet Onboarding Form

- This form is intended to be completed by the site *and* EHR
- This form is used to gather contact information, understand the type of onboarding needed, assess EHR provider and their ability to send HL7 messages to I-CARE, and more



I-CARE HL7 Onboarding Registration and Questionnaire

Thank you for registering to onboard with I-CARE via HL7. Please complete this questionnaire to prepare for onboarding and data exchange with I-CARE.

The State of Illinois immunization information system (IIS), I-CARE, serves two jurisdictions within Illinois: Chicago Department of Public Health (CDPH) and Illinois Department of Public Health (IDPH). Municipalities that are within the City of Chicago boundaries are supported by CDPH. Municipalities that are not within the City of Chicago are supported by IDPH.

I-CARE HL7 Onboarding Registration and Questionnaire:

Please complete this form to the best of your ability (it is acceptable to leave questions blank if you are not sure of the answer).

Provider organizations with complete submissions are placed in queue by the order in which they are submitted and processing is complete.

Submitter Information:

What is your full name? *

What is your email address? *

What is your title?

What is your phone number? *

Add extension if applicable.

Organization and Site Information:





Test I-CARE

Site: **PEDIATRICARE** ID: 1343880546

[Site](#)
[Vaccines](#)
[COVID](#)
[Mpox](#)
[VFC](#)
[Temp Logs](#)
[VIS](#)
[Employees](#)
[Campaigns](#)
[Import \(3\)](#)
[My Sites](#)
[Registration](#)

Select View: [Vaccine Lots](#) [Transactions](#) → [Add Lot](#) [Reconcile](#)

Filter: [In Stock](#) [Out of Stock](#) [All](#) [VFC*](#) [VFC/State](#) [CHIP](#) [317](#) [Private](#) [All](#)

Lot	Vaccine	Type	Status	Expire	Group	Default	Balance
123KB	Pediarix [SKB]	VFC	In Stock	12/31/2026	DTP,HBV,POL	--	10
27PE9	Varivax [MSD]	VFC	In Stock	12/31/2026	VAR	--	10
312AU	Arexvy [SKB]	Private	In Stock	12/31/2026	RSV	--	10
845312A	Spikevax COVID-19 (2023-2024 12+ years) [MOD]	317	In Stock	12/31/2026	COVID-19	--	10
HA2259	PREVNAR 20 [PFR]	Private	In Stock	12/31/2026	PNE	--	10
W024966	ProQuad [MSD]	VFC	In Stock	12/31/2026	MMR,VAR	--	10

Showing 1 to 6 of 6 entries Search:

Site: **PEDIATRICARE** ID: 1343880546

[Site](#)
[Vaccines](#)
[COVID](#)
[Mpox](#)
[VFC](#)
[Temp Logs](#)
[VIS](#)
[Employees](#)
[Campaigns](#)
[Import \(3\)](#)
[My Sites](#)
[Registration](#)

Select View: [HL7 IDs](#) [HL7 Users](#) [Data](#) [Stats](#) [Logs](#)

Showing 1 to 3 of 3 entries

Msg #	Errors	Import on	Patient	Birth Date	Priority	Processed	From	File Name	Seq #
+ 3	[...]	1/23/2025 12:55:54 PM	⋈		High	Processed	HL7	Web_Service.C.88140346_888TEST.txt	1
+ 2	[...]	1/23/2025 12:50:55 PM	⋈		High	Processed	HL7	Web_Service.C.cf88a222_888TEST.txt	1
+ 1		7/30/2024 8:14:00 AM	⋈		High	Processed	HL7	Web_Service.C.b15746ec_888TEST.txt	1

Show entries Previous Next



HL7 Onboarding Metrics

- Since February 2024, CDPH and IDPH combined have onboarded 130 sites:
 - 30 have been Onboarded within Chicago
 - 100 have been Onboarded within Illinois
- Currently, CDPH and IDPH are actively engaged with 117 sites completing HL7 Onboarding
- So far in 2025 50 sites have been connected to I-CARE!
 - A key win with this process is onboarding large organizations at once





Immunization Integration Program (IIP) Data Quality TA



IIP Data Quality TA Background

- **What is the Immunization Implementation Program (IIP)?**
 - AIRA Program aimed at increasing IIS Data Quality and improving EHR and IIS interoperability
 - Part of the Collaborative to identify and solve common IIS problems
- **What was I-CARE looking to address?**
 - The team needed further guidance on the best way to track, display, and communicate HL7 Warnings & Errors to providers in plain, easy to understand terms
- **CDPH and IDPH agreed to participate in the AIRA Data Quality TA in Summer 2024**





Describe the IIP Data Quality TA

Goal

- Better communicate Import Errors and Warnings to enhance data coming into I-CARE

The I-CARE Team wanted to:

- Create a report in I-CARE listing all import warnings and errors (rejections) along with their HL7 message location
- Enhance acknowledgement (ACK) messages so they can be interpreted by site and technical staff





What did I-CARE and AIRA discuss?

- **There were 4 sessions between I-CARE and AIRA June-July 2024**
 - Session 1: Introduction and presentation of AIRA solutions
 - Session 2: Incoming business data rules, cleansing of incoming data, race & ethnicity fields
 - Session 3: Import error table, how to handle blank or unknown values
 - Session 4: RXA with missing date, MRN reuse, missing vaccine admin route, DAR overview





What did I-CARE and AIRA discuss?

- **AIRA provided 4 solutions:**

1. Develop internal ACK reports to more efficiently review provider data quality; develop a repository of all errors in understandable terms
2. Develop best practice recommendations for providers to assist with DQ efforts
3. Develop provider audit report
4. Create a follow up plan for providers to address their own data quality



IIP Data Quality TA Charter Takeaways & Outcomes

I-CARE Data Quality Improvements

I-CARE team has developed an Import Error Table displaying import warnings, errors, and rejections

ACK messages tell the provider in plain language if their message was accepted with errors, without errors, or rejected

I-CARE can now display all HL7 errors and warnings at the shot-level or log-level

Enhancements to Ongoing Monitoring activities and HL7 Onboarding



HL7 Import Error Table for City of Chicago, March 2025

- HL7 Errors indicate that a shot was *rejected* by I-CARE
 - Providers will need to resubmit the entire message
- Most common Errors are 1052 & 1025
 - Most likely data entry errors
- 1052: Invalid CVX and NDC codes
- 1025: Shot Date before Birth Date

Error/Warning	Error
Row Labels	Count of Error
1052	194
1025	116
1027	80
1053	17
Grand Total	407



HL7 Import Error Table for City of Chicago, March 2025

- HL7 Warnings indicate there may be a data quality issue within an HL7 message
 - Some warnings are *informational*, meaning they are sharing some non-critical information
 - Other warnings can mean that a site needs to resubmit or edit a segment of their vaccination data (i.e., Missing address)
- Most Common HL7 Warnings are 1064 & 1072
 - Non-critical warnings
- 1064: MVX code is empty. Changed to UNK
- 1072: Missing Funding Source

Error/Warning	W
Row Labels	Count of Error
1064	108047
1072	105146
-----	-
Grand Total	517789



ACK Messages

Accepted by IIS

Copy Text

```
MSH|^~\&|ICARE|ICARE|TEST|TEST|20250122131549-0600||ACK^V04^ACK|8912179|P|2.5.1|||NE|NE|||Z23^CDCPHINVS
MSA|AA|1r9b-SA.1.1.1
ERR|||207^Application internal^HL70357|I||999^Parser Information|01/22/2025 13:15:43 -- Process Message [Created:01/22/2025 13:15:43]
ERR|||207^Application internal^HL70357|I||999^Parser Information|Patient Site ID (PID-3) - F91V147673
ERR|||207^Application internal^HL70357|I||999^Parser Information|Did not find any matching candidates (deduped ON-FLY). New patient will be inserted.
ERR|||207^Application internal^HL70357|I||999^Parser Information|PATIENT_ID = 1344008396
ERR|||0^Message accepted^HL70357|I||01^Message Accepted|The message has been accepted by the ICARE system
```

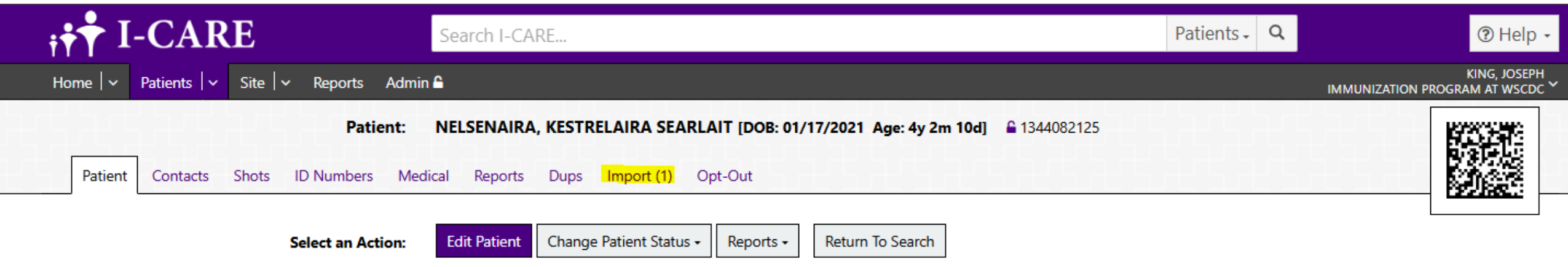
NOT Accepted by IIS

Copy Text

```
MSH|^~\&|ICARE|ICARE|TEST|TEST|20250122131556-0600||ACK^V04^ACK|5482226|P|2.5.1|||NE|NE|||Z23^CDCPHINVS
MSA|AR|1r9b-SA.13.2.1
ERR|||PID^1^7|101^Required field missing^HL70357|E||1118^Invalid Birth Date|Message has been Ignored. Invalid Birth Date
```

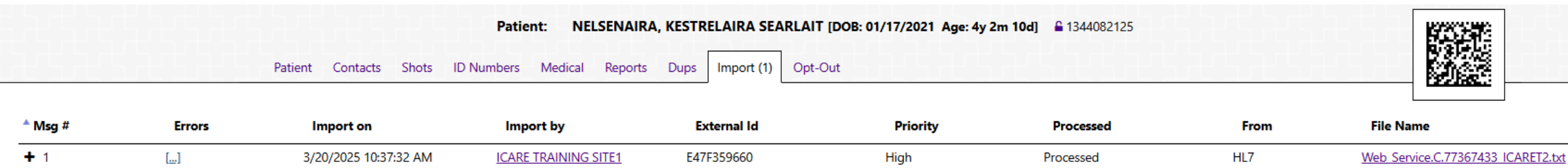
★ Shot-Level HL7 Errors: Patient Record View

- The Import tab on the patient record will contain shot data from the provider:



The screenshot shows the I-CARE patient record interface. At the top, there is a search bar labeled "Search I-CARE..." and a "Patients -" dropdown menu. The main navigation bar includes "Home", "Patients", "Site", "Reports", and "Admin". The patient information is displayed as "Patient: NELSENAIRA, KESTRELAIRA SEARLAIT [DOB: 01/17/2021 Age: 4y 2m 10d] 1344082125". Below this, there are tabs for "Patient", "Contacts", "Shots", "ID Numbers", "Medical", "Reports", "Dups", "Import (1)", and "Opt-Out". The "Import (1)" tab is highlighted in yellow. Below the tabs, there is a "Select an Action:" section with buttons for "Edit Patient", "Change Patient Status -", "Reports -", and "Return To Search". A QR code is visible on the right side of the interface.

- From there, you can select to view a report of all Errors and Warnings for that shot:



The screenshot shows the I-CARE patient record interface with the "Import (1)" tab selected. The patient information is the same as in the previous screenshot. Below the tabs, there is a table of errors and warnings. The table has the following columns: "Msg #", "Errors", "Import on", "Import by", "External Id", "Priority", "Processed", "From", and "File Name".

Msg #	Errors	Import on	Import by	External Id	Priority	Processed	From	File Name
+ 1	[...]	3/20/2025 10:37:32 AM	ICARE TRAINING SITE1	E47F359660	High	Processed	HL7	Web_Service.C.77367433_ICARET2.txt

Shot-Level HL7 Errors: Patient Record View

HL7 Errors Report

Print Report for Individual Patient

Errors Reported on 03/20/2025

Printing Report Date: 3/27/2025 8:40 AM



MRN Patient_ID	Patient Name	Date of Birth	Error Type	Error ID	Error Description	HL7 Field	Error Date/Time	Source HL7 File
E47F359660 1344082125	KESTRELAIRA SEARLAIT NELSENAIR	01/17/2021	E	1053	Invalid Shot Administered Date Patient Shot Record # 1 - Shot Date is Empty, Invalid, or in the Future. Shot has been Ignored.	RXA^1^3	03/20/2025 10:37:32	Web_Service.C.77367433_ICARE2.txt



★ Shot-Level HL7 Errors: Site Profile View

- Imports can also be viewed for each site in I-CARE:

The screenshot shows the I-CARE interface for 'ICARE TRAINING SITE1 [VFC PIN: 012345] ID: 1103'. The navigation menu includes Home, Patients, Site, Reports, and Admin. The 'Site' sub-menu is open, showing options for Vaccines, COVID, Mpox, VFC, Temp Logs, VIS, Employees, Campaigns, Import (442.9K), My Sites, and Registration. Below the menu, there are action buttons: Change Site..., Edit Site, Add Site, and Add Group.

- From the import tab, you can view individual shots and their HL7 Error Logs:


The screenshot shows the 'Import (442.9K)' tab selected. The 'Select View' dropdown is set to 'Data'. Below the view selector is a table of error logs. The table has columns for Msg #, Errors, Import on, Patient, Birth Date, Priority, Processed, From, and File Name. Two entries are visible, both with error status and links to the original files.

Msg #	Errors	Import on	Patient	Birth Date	Priority	Processed	From	File Name
+ 442,858	[...]	3/20/2025 10:37:32 AM	NELSENAIRA, KESTRELAIRA	1/17/2021	High	Processed	HL7	Web_Service.C.77367433 ICARET2.txt
+ 442,857	[...]	3/20/2025 10:37:31 AM	DEFIANCEAIRA, LOUISEAIRA	1/17/2021	High	Processed	HL7	Web_Service.C.2bd8b5a3 ICARET2.txt

Log-Level HL7 Errors

- I-CARE generates daily logs for sites who send HL7 messages:

Site: ICARE TRAINING SITE1 [VFC PIN: 012345] ID: 1103

Site Vaccines COVID Mpox VFC Temp Logs VIS Employees Campaigns **Import (442.9K)** My Sites Registration 

Select View:

Showing 1 to 10 of 123 entries

Log #	Errors	From	Created on	Last Update	E-mailed
123	[...]	HL7	3/26/2025 9:10:06 AM	3/26/2025 3:38:14 PM	Yes
122	[...]	HL7	3/25/2025 10:26:18 AM	3/25/2025 12:20:29 PM	Yes
121	[...]	HL7	3/24/2025 5:00:34 AM	3/24/2025 5:18:42 PM	Yes



Log-Level HL7 Errors

- These logs also contain daily HL7 Error Reports with all Warnings and Errors per day:

HL7 Errors Report

Print Report for Site ICARE TRAINING SITE1

Errors Reported on 03/26/2025

Printing Report Date: 3/27/2025 8:50 AM



MRN Patient_ID	Patient Name	Date of Birth	Error Type	Error ID	Error Description	HL7 Field	Error Date/Time	Source HL7 File
10234568 1344082633	--	--	W	1072	Missing Funding source for Administered Vaccine	OBX^1^5	03/26/2025 15:38:14	Web_Service.C.079bf9a3_TESTICAREX2.txt
10234568 1344082633	--	--	W	1071	Missing or Invalid Shot Site Code for Administered Vaccine	RXR^1^2	03/26/2025 15:38:14	Web_Service.C.079bf9a3_TESTICAREX2.txt



HL7 Ongoing Monitoring



HL7 Ongoing Monitoring

- **For providers who have recently establish a *new* HL7 interface:**
 - After the site has been sending data to I-CARE for at least one month, CDPH will run the HL7 Errors Log
 - If the site has *no* HL7 errors, move on to check for critical HL7 Warnings
 - If the site *does have* HL7 errors, check if the shots are in I-CARE
 - Reach out to the site and provide a list of shots containing HL7 Errors or critical HL7 Warnings





What is Next?

Identify Opportunities for Improvement

- CDPH and IDPH are working to identify new TA opportunities with AIRA
- CDPH and IDPH continue to partner to find new enhancements to make within I-CARE

Enhance ACK Messages and HL7 Errors

- Team is working to make ACK messages shorter and more readable
- IIS Team is adding HL7 Errors and clarifying Error IDs and descriptions
- IIS Team is integrating HL7 errors into HL7 Onboarding and Ongoing Monitoring activities

Delivering Value via HL7 Onboarding

- Working directly with EHRs to eliminate testing barriers and ease administrative burden
- Revising Onboarding slides to allow for more open discussion in the Kickoff Meeting
- Prioritize showcasing helpful I-CARE features throughout the Kickoff Call and Onboarding Process



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Joseph.King2@cityofchicago.org

David.Juen@cityofchicago.org

CDPH.HL7@cityofchicago.org