Get Your ACKs Together!: Clinic Level Monitoring of Data Exchange (DX) Transactions
What is Data Quality?

• **Accurate Data**
  – Is the HL7 immunization message properly formatted (no errors)?
  – Is the patient information sent in the HL7 message accurate?
    • Are vaccine codes correct?
    • Is the EHR system being utilized properly (e.g. drop downs)?

• **Complete Data**
  – Are all patient data fields being sent (e.g. patient address, phone number, etc.)? The more info CAIR2 has, the higher the probability that incoming data will be merged correctly.

• **Timely Data**
  – How soon after admin are doses submitted?
# DX Data Quality – Standard Data Checks

<table>
<thead>
<tr>
<th>High Priority</th>
<th>Medium Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacc. Admin Date &gt; DOB</td>
<td>Prov. profile consistent with admin profile</td>
</tr>
<tr>
<td>Vacc. Admin Date &lt; Submission date</td>
<td>Not &gt;1 vaccine of same type on same day</td>
</tr>
<tr>
<td>Combo vaccine ≠ single event</td>
<td>Vacc. Admin Date &gt; Vacc. License date &lt; End License Date</td>
</tr>
<tr>
<td>Vacc. Admin Date ≠ DOB unless Hep B</td>
<td>Route and site consistent with vacc. type and patient age</td>
</tr>
<tr>
<td>MVX (manuf. code ) and CVX (vaccine code) should be consistent</td>
<td></td>
</tr>
<tr>
<td>Vac. Admin Date &lt; Expiration Date</td>
<td></td>
</tr>
<tr>
<td>Admin dose ≠ “unspecified” CVX code</td>
<td></td>
</tr>
<tr>
<td>Patient age not &lt; min age or &gt; max age for dose</td>
<td></td>
</tr>
</tbody>
</table>
## DX Data Quality – *Priority Fields for Data Completeness*

<table>
<thead>
<tr>
<th>Field</th>
<th>Recommended Completeness (%)*</th>
<th>HL7 Segment</th>
<th>CAIR2 Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRN</td>
<td>100%</td>
<td>PID-3</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Patient Name</td>
<td>100%</td>
<td>PID-5</td>
<td>Required (R)</td>
</tr>
<tr>
<td>DOB</td>
<td>100%</td>
<td>PID-7</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Gender</td>
<td>95-100%</td>
<td>PID-8</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Address</td>
<td>95-100%</td>
<td>PID-11</td>
<td>Required (RE)</td>
</tr>
<tr>
<td>Phone</td>
<td>95-100%</td>
<td>PID-13</td>
<td>Required (RE)</td>
</tr>
<tr>
<td>Mother/Father/Guardian</td>
<td>90-100%</td>
<td>NK1-2</td>
<td>If NK1, Required (R)</td>
</tr>
<tr>
<td>Mother’s Maiden Name</td>
<td>90% (&lt;18 yrs)</td>
<td>PID-6</td>
<td>Required (RE)</td>
</tr>
<tr>
<td>Vacc. Admin Date</td>
<td>100%</td>
<td>RXA-3</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Vacc. Code (CVX/NDC)</td>
<td>100%</td>
<td>RXA-5</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Admin Amt (volume or unit)</td>
<td>90%</td>
<td>RXA-6</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Admin/Historical Indicator</td>
<td>100%</td>
<td>RXA-9</td>
<td>Required (R)</td>
</tr>
<tr>
<td>Admin Prov Name</td>
<td>90% (admin)</td>
<td>RXA-10</td>
<td>If admin, Required (RE)</td>
</tr>
</tbody>
</table>

* AIRA Data Validation Guide (draft August 2016)
## DX Data Quality - Completeness

<table>
<thead>
<tr>
<th>Field</th>
<th>Recommended Completeness (%)*</th>
<th>HL7 Segment</th>
<th>CAIR2 Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot Number</td>
<td>100% (admin, inv)</td>
<td>RXA-15</td>
<td>If admin, Required (R), 0</td>
</tr>
<tr>
<td>Lot Expiration Date</td>
<td>90% (admin)</td>
<td>RXA-16</td>
<td>If admin, Required (R), 0</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>95-100%</td>
<td>RXA-17</td>
<td>If admin, Required (R), 0</td>
</tr>
<tr>
<td>Route</td>
<td>90%</td>
<td>RXR-1</td>
<td>If RXR, Required (RE)</td>
</tr>
<tr>
<td>Body Site</td>
<td>90%</td>
<td>RXR-2</td>
<td>Required (RE)</td>
</tr>
<tr>
<td>VFC Eligibility Identifier</td>
<td>90%</td>
<td>OBX-3 (64994-7)</td>
<td>If admin, Required (RE)</td>
</tr>
<tr>
<td>VFC Eligibility Value</td>
<td>90%</td>
<td>OBX-5 (use CAIR codeset)</td>
<td>If VFC and admin, Required (RE)</td>
</tr>
</tbody>
</table>

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Setting Up DX Data Quality Monitoring in Your Practice

• Each DX Site needs to monitor its own DX process to ensure that only high quality data is sent to CAIR2

• ACK messages returned by CAIR2 will allow your Site to monitor ongoing DX activity and can help you identify errors, including both minor errors that impact CAIR2 data quality (MSA-1=‘AE’ ) and more serious errors that cause message rejection (MSA-1= ‘AR’).

• High message fail rates (>2-3%) may indicate common EHR mapping or user errors that can be readily fixed.

• ACKs with ‘warning’ errors also need to be addressed
Setting Up DX Data Quality Monitoring in Your Practice

• Important steps to prepare for DQ monitoring:
  1. Assign a staff member to monitor ACK messages to assure continuing successful submission
  2. Determine whether or not your EHR can receive and display ACK messages
  3. If your messages are sent by a Sending Facility (SF, e.g. HIE, cloud-based EHR, vendor data warehouse), contact the Sending Facility to determine whether they intend to return ACKs to you EHR.
  4. An additional important quality assurance step is to periodically compare selected patient records in your EHR with the same patient records in CAIR2 to ensure that the information in CAIR2 matches the information in your EHR.
Options for Monitoring ACK Messages

– Directly in EHR system (if SF sends and EHR displays)

– DX ‘Check Status’ functionality in CAIR2
To Request A New Account

• Go to CAIRWEB.ORG

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Find out more about CAIR2

Pharmacies and CAIR
Learn more about how pharmacies can report immunizations to CAIR.

CAIR IZ Portal – Please Login Now to Update Your Site Information!
So CAIR can continue to communicate with your data exchange Site, please login to the CAIR IZ Portal and update your Site info.

CAIR Enrollment/Account Management is Now Online! Learn more »
– To register for electronic data submission, go to the CAIR IZ Portal
– To enroll in CAIR to get web access, register at CAIR New Enrollment
– To update your Account/ add Users, go to CAIR Account Update
HL7 Message Types

- A **VXU** message (Vaccine Update, Unsolicited) is the HL7 message type that EHRs use to send patient vaccinations to CAIR.
- An **ACK** message is a HL7 positive ‘ACKnowledgement’ message sent to the submitter by CAIR2 indicating that the message has been accepted and uploaded.
- A **NACK** message is a negative HL7 ‘Acknowledgement’ message sent to the submitter by CAIR2 indicating the presence of an error that should be corrected. Messages with minor errors (‘warnings’) are usually accepted and uploaded. More serious errors result in the message being rejected.
HL7 ‘VXU’ Message Structure (Vaccination Update)

- Pipe-delimited, multiple segments
- Message Segments:
  - MSH (Message Header)
    - Sender ID, Receiver ID, HL7 version, Type of HL7 message, etc.
  - PID (Patient Identifier)
  - PD1 (Additional Demographic Segment)
    - Includes PD1-12 ‘Protection Indicator’ and PD1-13 ‘P.I. Effective Date’
  - NK1 (Next of Kin)
  - ORC (Order Control) – segment is required but fields ignored
  - RXA (Treatment/Vaccination info)
    - Various including Vaccine code, lot #, Exp. Date, Inventory vs. Historical, Admin provider, Location ID, etc.
    - RXA-9 must be coded as ‘00’ (admin from inv) for decrementing inventory; ‘01’ is code for historical doses
  - RXR (Vaccine Route /Site info)
  - OBX (Observation)
    - OBX-5 ‘Vaccine eligibility’ codes
Typical HL7 VXU Message

**MSH**

```
|^^\&|MyEMR|DE-000001| CAIRLO|20160701123030| VXU\^V04^VXU\_V04|CA0001|P|
```

**PID**

```
1| PA123456^^^MR| JONES\^GEORGE\^M\^JR| MILLER\^MARTHA\^G| 20140227|M|
```

2106-3\^WHITE\^HL70005| 1234 W FIRST ST\^BEVERLY HILLS\^CA\^90210\^H\^|

```
^PRN^^^555^5555555 | ENG\^English\^HL70296|
```

```
|2186-5^ not Hispanic or Latino ^HL70189| Y| 2
```

**PD1**

```
| 02\^REMINDER/RECALL – ANY METHOD\^HL70215| N| 20140730| A| 20140730|
```

**NK1**

```
1| JONES\^MARTHA| MTH\^MOTHER\^HL70063|
```

**ORC**

```
RE | 197023\^CMC|
```

```
^Clark\^Dave | ^Smith\^Janet
```

```
^MD
```

**RXA**

```
0| 20140730| 08\^HEPB-PEDIATRIC/ADOLESCENT\^CVX| .5|mL\^mL\^UCUM|
```

```
00\^NEW IMMUNIZATION RECORD\^NIP001| 1245319599\^Smith\^Janet
```

```
^^\^DE-000001| 0039F| 20200531| MSD\^MERCK\^MVX|
```

**RXR**

```
IM\^INTRAMUSCULAR\^HL70162| LA\^LEFT ARM\^HL70163
```

**OBX**

```
1| CE| 64994-7\^Vaccine funding program eligibility category\^LN| 1| V03\^VFC eligibility – Uninsured\^HL70064|
```

```
20110701140500
```
HL7 ‘ACK’ Message Structure

- **Segments**
  - *MSH (Message Header)* - same as VXU
  - *MSA (Message Acknowledgment code)*
    - *MSA-1 (Ack Code)*
      - ‘AA’ (Accepted)
      - ‘AE’ (Error, ‘informational warning’ or ‘rejected’)
      - ‘AR’ (Error, rejected)
    - *MSA-2 (Message Control ID)*
      - Corresponds to MSH-10 (Message Control ID) in submitted VXU
  - *ERR (Error segment)*
    - *ERR-2 (Error Location, e.g. Segment, field)*
    - *ERR-3 (HL7 Error Code, see Table HL7 0357)*
    - *ERR-4 (Severity: “E” if rejected, “W” if warning)*
    - *ERR-8 (User Message) – description of error and outcome*
Typical ACK/NACK Messages

VALID MESSAGE

MSH|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160630|ACK^V04^ACK|1791129|P|
2.5.1|||||CAIR IIS|DE-000001
MSA|AA|1791129

REJECTED MESSAGE (System Error, ‘NACK’)

MSH|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160630|ACK^V04^ACK|1791129|P|
2.5.1|||||CAIR IIS|DE-000001
MSA|AR|1791129
ERR| MSHT|11|202|Unsupported processing ID^HL70357|E|4|Invalid value^HL70533||MESSAGE REJECTED. INVALID PROCESSING ID. MUST BE ‘P’

REJECTED MESSAGE (Formatting error, ‘NACK’)

MSH|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160630|ACK^V04^ACK|1791129|P|
2.5.1|||||CAIR IIS|DE-000001
MSA|AE|1791129
ERR| PID|1^3|0|101|Required field missing^HL70357|E|6|Required observation missing^HL70533||MESSAGE REJECTED - REQUIRED FIELD PID-3-5 MISSING
Typical ACK/NACK Messages

ACCEPTED MESSAGE (‘warning’, informational)

<table>
<thead>
<tr>
<th>MSH</th>
<th>^~&amp;</th>
<th>CAIR IIS4.0.0</th>
<th>CAIR IIS</th>
<th>DE-000001</th>
<th>20160630</th>
<th>ACK^V04^ACK</th>
<th>17911291</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| MSA | AE | 1791129 |

<table>
<thead>
<tr>
<th>ERR</th>
<th>RXA^1^10^1^13</th>
<th>Message accepted^HL70357</th>
<th>W</th>
<th>5</th>
<th>Table value not found^HL70533</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Informational error - No value was entered for RXA-10.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Common Error/Warning Messages

• MSH-4

MSH\^\&|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160921|ACK^V04^ACK|123456541|P|2.5.1|CAIR IIS|SF-000001
MSA|AE|123456541
ERR|MSH^1|100^Segment sequence error^HL70357|W|3^Illogical Value error^HL70533|Record rejected. The "SENDING FACILITY" in MSH-4 is not identified as a parent or vendor of the "SENDING RESPONSIBLE ORGANIZATION" in MSH-22.

• PID-3.4

MSH\^\&|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160921|ACK^V04^ACK|123456541|P|2.5.1|CAIR IIS|SF-000001
MSA|AE|123456541
ERR|PID^1^3^1^4|101^Required field missing^HL70357|W|6^Required observation missing^HL70533|Informational Error - REQUIRED FIELD PID-3.4 MISSING.

• PID-12

MSH\^\&|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160921|ACK^V04^ACK|123456541|P|2.5.1|CAIR IIS|SF-000001
MSA|AE|123456541
ERR|PD1^1^1^12|102^Data type error^HL70357|E|4^Invalid value^HL70533|Informational error - required field PD1-12 missing.

• RXA-10.13

MSH\^\&|^~&|CAIR IIS4.0.0|CAIR IIS|DE-000001|20160921|ACK^V04^ACK|123456541|P|2.5.1|CAIR IIS|SF-000001
MSA|AE|123456541
ERR|RXA^1^10^1^13|0^Message accepted^HL70357|W|5^Table value not found^HL70533|Informational error - No value was entered for RXA-10.13.
CAIR2 HL7 Error Messages

- http://cairweb.org/docs/CAIR2_HL7Errors.pdf
- Lists:
  - HL7 ACK error types,
  - Message segment involved,
  - Severity/ CAIR2 response
Using DX Check Status to Monitor ACK Messages

- Only available to ‘DX Power’ and ‘DX QA’ users
- Login using your CAIR ID, Username, and Password
Using DX Check Status to Monitor ACK Messages

- Click ‘Check status’ under Data Exchange
Using DX Check Status to Monitor ACK Messages

- From the ‘Show’ dropdown, choose over what period you would like to review recent messages.
- Choose ‘Yes’ from the ‘Realtime?’ dropdown as most Sites are submitting messages in real-time.
Using DX Check Status to Monitor ACK Messages

- The **Job Name** lists each message received by CAIR2 from your Site during the period shown.

- The status of messages that are **COMPLETE** can be viewed by clicking on the **Job Name**.
Using DX Check Status to Monitor ACK Messages

- The *Summary Information* table reveals whether the patient record has been updated and what information was added or updated.

- Both the submitted HL7 VXU message (‘Inbound HL7 251 File’) and the HL7 ACK (‘HL7 251 Response’) sent back to the submitter can be viewed.
Questions?

- CAIRDataExchange@cdph.ca.gov

A higher volume of emails is expected around the launch of CAIR2 so the response time may be longer than usual.

We appreciate your patience during this transition!