



AIRA

AMERICAN IMMUNIZATION
REGISTRY ASSOCIATION

Data Quality Incoming/Ongoing Assessment

Aggregate Report

2023 – Quarter 4



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Background

In 2015, AIRA launched an initiative to determine the level of alignment among current immunization information systems (IIS) with community-vetted standards and recommendations. The [Measurement and Improvement \(M&I\) Initiative](#) is an ongoing project that connects with IIS preproduction systems directly and submits sample messages to these IIS development platforms. AIRA is continuing to connect and test with a growing number of IIS interfaces, with more than 95% of IIS jurisdictions currently participating in M&I.

[Testing and Discovery](#) (T&D) is the first stage of the overall M&I process. The next stage is [IIS Assessment](#). The results from T&D are used to design the final measures and tests for the IIS Assessment stage, which also relies on [IIS Functional Standards](#) and operational guidance statements. The final stage following IIS Assessment is [Validation](#).

In early 2016, the [Measurement for Assessment and Certification Advisory Workgroup](#) (MACAW) was initiated to systematically research and formulate key IIS assessment components, develop measures, and implement the IIS Assessment and Validation process. MACAW uses T&D results to identify and develop assessment measures for specific IIS components. Those measures are then vetted and approved by the IIS community. **Data Quality: Incoming/Ongoing (DQI)** is the fifth content area of the M&I Initiative. DQI focuses on IIS detection of poor data quality during the submission of records. This report contains the aggregate results of the IIS assessment completed in **Quarter 4 of 2023**. This process will be repeated in Quarter 1 of 2024 to measure progress within the community.

In addition to this aggregate report, a detailed individual report is provided to each jurisdiction for their own projects. AIRA does not redistribute any individual IIS results outside of each respective jurisdiction and the self-selected sharing settings within the Aggregate Analysis Reporting Tool ([AART](#)).

Data Quality: Incoming/Ongoing Measures

The DQI Assessment spans 27 measures, which are guided by the following Functional Standard overarching principle. Visit the [AIRA repository](#) to review the detailed measures and tests.

As an IIS matures, the importance of data quality becomes more pronounced. Data quality is the cornerstone of successfully reaching all immunization-related goals. IIS Functional Standards related to data quality are woven into

the Essential Infrastructure Functional Standards and are reflected in multiple goals in this document. This underscores the importance of thinking about and applying data quality in all aspects of access and use of IIS data and functionality.

The measures are organized into three categories: patient demographic, vaccination event, and additional aspects. The first two categories expect the IIS to detect when poor quality data are submitted to the IIS. The third category expects the IIS to be a good steward of the data that are received and ensure the data still represent what was initially submitted when returned from a query. Patient demographic and vaccination event data elements are a select subset of CDC-endorsed core data elements.¹

Patient demographic CDC-endorsed data element measures

1. The IIS detects data quality issues with patient name: first.
2. The IIS detects data quality issues with patient name: last.
3. The IIS detects data quality issues with patient date of birth.
4. The IIS detects data quality issues with patient gender.
5. The IIS detects data quality issues with patient address: state.
6. The IIS detects data quality issues with patient address: country.
7. The IIS detects data quality issues with race.
8. The IIS detects data quality issues with ethnicity.
9. The IIS detects data quality issues with patient multiple birth indicator and patient birth order.
10. The IIS detects data quality issues with patient telephone number and patient telephone number type.
11. The IIS detects data quality issues with responsible person name: first.
12. The IIS detects data quality issues with responsible person name: last.
13. The IIS detects data quality issues with responsible person relationship to patient.
14. The IIS detects data quality issues with patient ID and patient ID: type.

Vaccination events CDC-endorsed data element measures

15. The IIS detects data quality issues with vaccination administration date.
16. The IIS detects data quality issues with dose level eligibility.
17. The IIS detects data quality issues with contraindications/precautions and contraindication/precaution observation date.

¹ <https://www.cdc.gov/vaccines/programs/iis/core-data-elements/iis-func-stds.html>

18. The IIS detects data quality issues with exemptions/refusals reasons and exemptions/refusals date.
19. The IIS detects data quality issues with vaccination event record type.
20. The IIS detects data quality issues with vaccine funding source.
21. The IIS detects data quality issues with vaccine product.
22. The IIS detects data quality issues with vaccine manufacturer name.
23. The IIS detects data quality issues with vaccine expiration date.
24. The IIS detects data quality issues with vaccine event ID.

Additional aspect measures

25. The IIS has the ability to map between coding systems.
26. The IIS returns critical information about a previously submitted vaccination event.
27. The IIS returns the consolidated immunization history following updates or deletes.

Test Cases

The MACAW members developed high-level strategies for establishing detailed test cases for each measure. Test cases were developed with the following guiding principles in mind:

- **Isolate the test case to the measure:** Each test case should be isolated to the measure to ensure consistent measurement across all IIS.
- **Expectations for a test case should be few, not many:** Multiple expectations—either in number or variation—lead to inconsistencies in assessment across all IIS. For example, IIS “A” could fail for one reason while IIS “B” could fail for a different reason. When results are aggregated across all IIS, it becomes difficult to tease apart the variation and develop actionable improvement strategies.

Measure and Test Outcomes

Each test case has a defined test case expectation. The test cases and test case expectations are used during testing to determine how well an IIS aligns with the published national standards. Once each test case is executed against an IIS, the IIS is slotted into one of the following four categories:

Meets: The IIS meets the test case expectation without modification to the test case or test case expectation(s).

Deviates: The IIS can meet the test case expectation with modification to the test case or test case expectation(s) which supports the local business need, policy, or law.

Does not meet: The IIS cannot meet the test case expectation.

Not measured: The IIS is unable to be measured, as the IIS does not currently support the capability being tested.

Testing Method

AIRA will submit an HL7 message (VXU) that reflects the condition described in the test case. Each test case will be isolated to one data quality error. Following the VXU, a query (QBP) will be sent for the patient. The information returned by the IIS in both the acknowledgment (ACK) and response (RSP) will be used to determine if the IIS has met the expectation of the test case. The expectations for the ACK and/or the RSP vary by test case and are fully defined in the [Data Quality: Incoming/Ongoing assessment measures and tests document](#).

Results

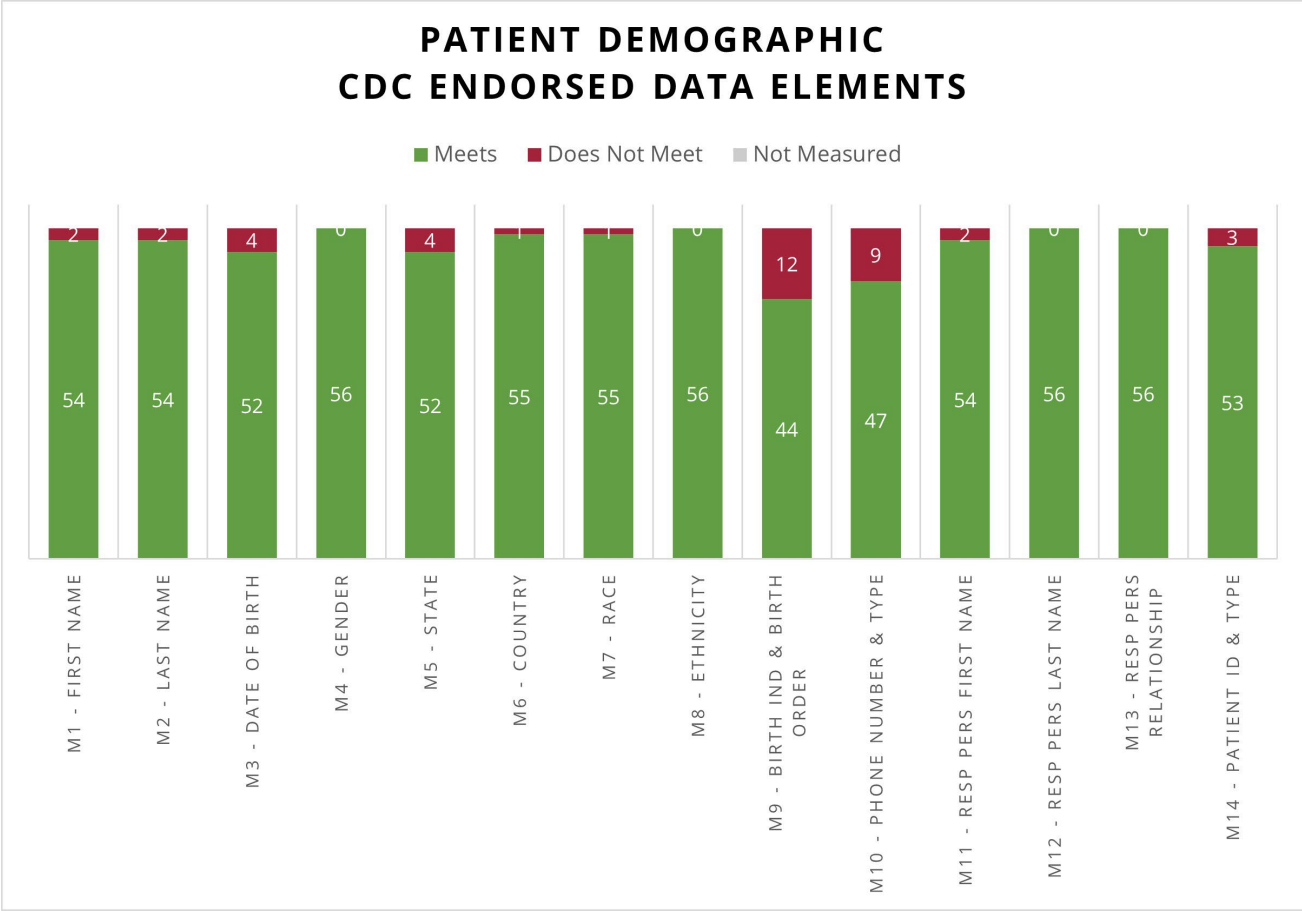
Sixty-one² IIS were encouraged to be measured in the IIS Assessment. Of the 61 participating IIS,³ **56 (92%)** could be measured and are included in this report.

Patient Demographic Results

Measures 1–14 focus on CDC-endorsed data elements related to patient demographics. The tests intentionally submit missing, invalid, or conflicting data to the IIS. The IIS is expected to identify the data-quality issue via the ACK message and/or not propagate the data-quality error in the RSP.

² The denominator for M&I participation decreased from 62 to 61 in Q2 2022 due to San Diego IIS's merge with California's state registry.

³ Includes all 50 states, American Samoa, the Commonwealth of the Northern Mariana Islands, the District of Columbia, the Federated States of Micronesia, Guam, New York City, Philadelphia, Puerto Rico, the Republic of the Marshall Islands, the Republic of Palau, and the Virgin Islands.



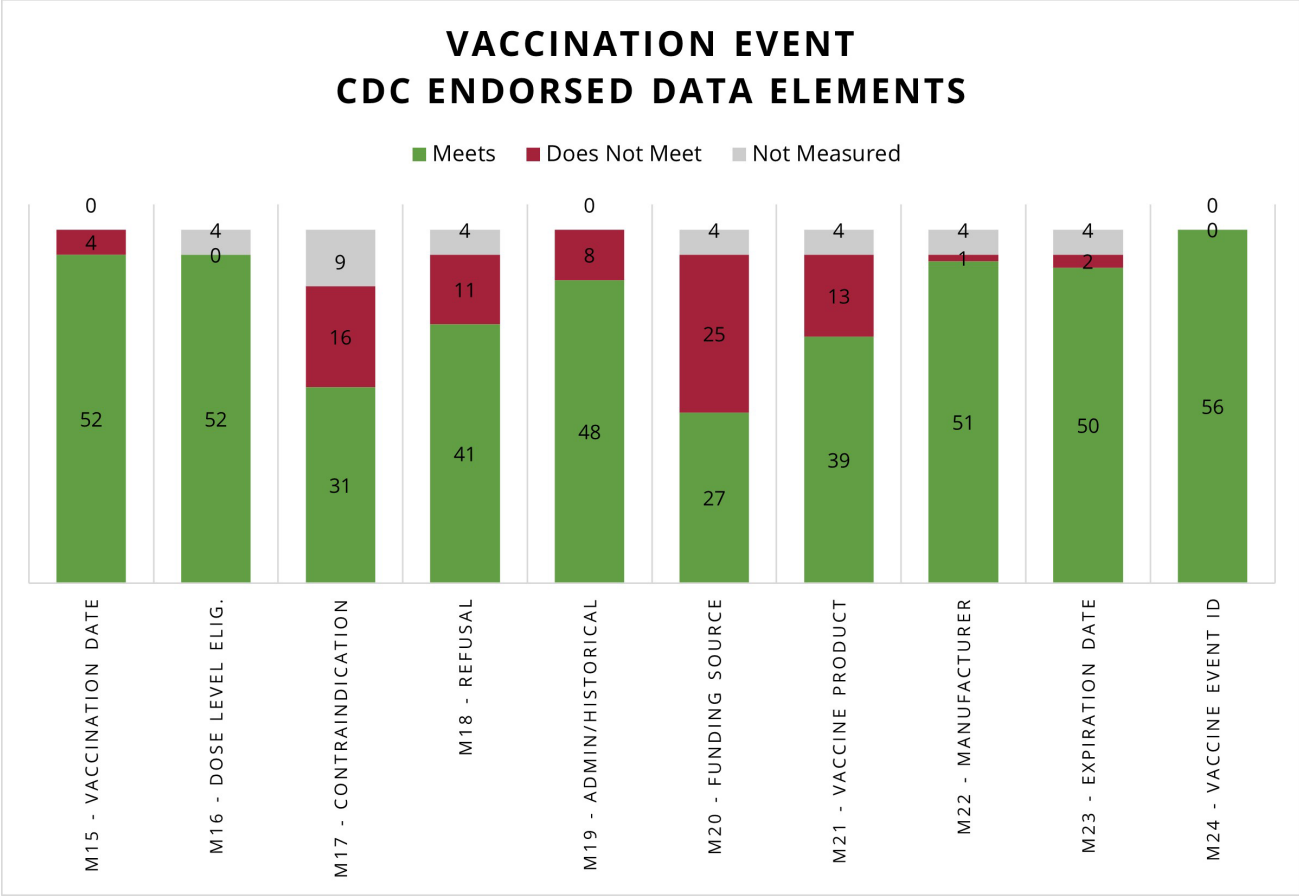
* M1, M2, M3, etc. denote the measure number reflected in the [Data Quality: Incoming/Ongoing Measures](#) section above.

The following high-level observations related to the patient demographic data elements where less than 80% met the measure provide additional context for reading and interpreting the aggregate results graph:

- **Multiple birth indicator and birth order:** Most of the IIS that did not meet the measure neglected to detect when these two data elements were conflicting (e.g., not a multiple birth with a birth order of two) or defaulted the patient to values against Modeling of Immunization Registry Operations Workgroup (MIROW) business rules.

Vaccination Event Results

Measures 15–24 focus on CDC-endorsed data elements related to vaccination events. The tests intentionally submit missing, invalid, or conflicting data to the IIS. The IIS is expected to identify the data-quality issue via the ACK message and/or not propagate the data-quality error in the RSP.



* M15, M16, M17, etc. denote the measure number reflected in the [Data Quality: Incoming/Ongoing Measures](#) section above.

The following high-level observations related to the vaccination event data elements where less than 80% met the measure provide additional context for reading and interpreting the aggregate results graph:

- **Contraindication:** Most IIS did not properly communicate missing or invalid values.
- **Refusal:** Most IIS did not properly communicate missing or invalid values.
- **Funding source:** Most IIS did not properly communicate missing or invalid values.
- **Vaccine product:** Most IIS did not detect conflicting messages among CVX, NDC, and MVX.

Additional Aspects

In contrast to Measures 1–24, Measures 25–27 focus on additional aspects of data quality to ensure data submitted are represented when returned.

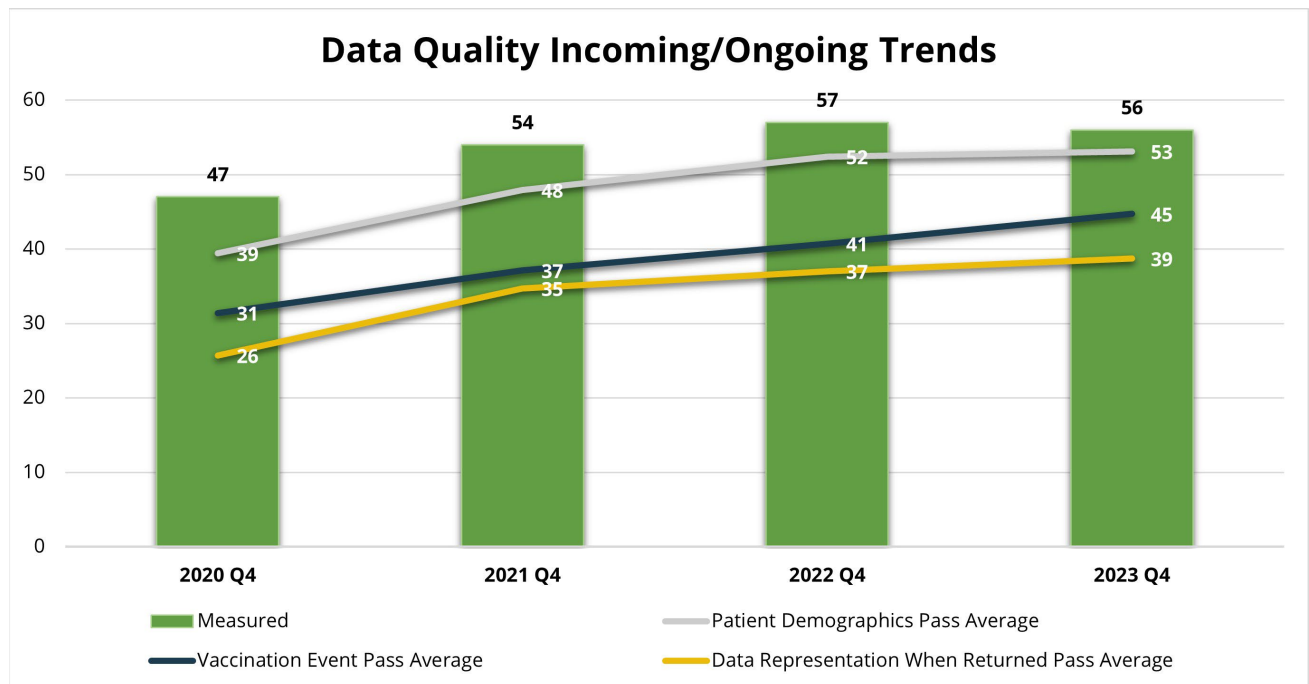
* M25, M26, M27 denote the measure number reflected in the [Data Quality: Incoming/Ongoing Measures](#) section above.



The following high-level observations related to the additional aspects where less than 80% met the measure provide additional context for reading and interpreting the aggregate results graph:

- **Returns key information:** IIS failed to return either expiration date, partial dose information, or both.

Summary of Progress



This remeasurement demonstrated progress in the following areas:

- **Reduction in “does not meet” outcomes:** The percent of measures with a “does not meet” outcome across all IIS and all measures is currently at 14%. This a decrease from the 31% established at the initial baseline. Over the same period, we have seen an increase in the number of IIS participating in this measurement content area.
- **Measure improvement:** Accounting for the increase in participating IIS, the following 13 measures have seen improvement since the initial baseline:
 - Patient First Name
 - Patient Address: State
 - Patient Address: Country
 - Patient Multiple Birth Indicator & Birth Order
 - Patient Telephone Number & Telephone Number Type
 - Responsible Person First Name
 - Responsible Person Last Name
 - Patient ID and Patient ID Type
 - Dose Level Eligibility
 - Contraindications/Precautions & Contraindication/Precaution Observation Date

- Exemptions/Refusals Reasons & Exemptions/Refusals Date
- Previously Submitted Vaccination Event
- Consolidated Immunization History Following Updates/Deletes

Remeasurement

The next remeasurement will take place in Quarter 1 of 2024. The goal of each remeasurement is to demonstrate increases in both the number of IIS that are measured and the number that meet measures and tests for this content area.

Limitations

- Some tests may not be able to leverage the ACK while others may not be able to leverage the RSP due to measure design and requirements.
- Analyzing the RSP will be used as a second method to determine success but may also lead to an occasional false positive.
 - This approach was preferred over not analyzing the RSP, which could lead to a larger set of false negatives as well as only one possible way to pass a test.
- IIS who meet a measure through their ACK message do not have their RSP analyzed.
 - The ACK message is used as evidence of detecting poorly submitted data. No further assessment is performed to verify how that poor data is stored and/or returned via query.
- The IIS does not need to have perfect ACK or RSP conformance for this content area.
 - HL7 conformance is measured in the Submission/Acknowledgment and Query/Response content areas. However, the IIS must populate key fields appropriately for them to be analyzed.
 - For example, ERR-2 is the error location where the error occurred in the VXU message. The IIS must populate this field properly. The testing program will not “look” in other ACK segments or fields to derive or imply the data-quality error was detected.
- The error severity found in ERR-4 (i.e., I, W, or E) will not be considered. Any severity is acceptable per local IIS business rules.

General Recommendations

1. Continued education and direction
 - a. Both are needed on ACK messaging to ensure IIS are implementing standards consistently across all systems. The ACK is becoming the face of the IIS and is the only way to determine in an automated and timely fashion

if the submitted data were accepted by the IIS. Positive movement is being seen by select IIS, but more work is needed to successfully communicate with certified electronic health records (EHRs) in a standardized way.

2. Standard alignment among partners

- a. Operationally, IIS should coordinate with their interface partners to jointly align with standards while, whenever possible, not disabling existing interfaces. It is important to communicate to partners that modifications may demand short-term work but yield long-term gains in faster and easier interoperability and interface development.

Questions and/or Comments

Please direct questions and/or comments via AIRA's online technical assistance [form](#).