Data Quality

Incoming

Ongoing

Assessment

Aggregate Report

2020 – Quarter 4

Background

In 2015, AIRA launched a testing and discovery project to determine the level of alignment between current immunization information systems (IIS) and community-vetted standards and recommendations. The testing and discovery project, still currently in place, connects with IIS pre-production systems directly and submits sample messages to these IIS development platforms.

The testing project is the first stage in an overall IIS Measurement and Improvement process. The next stage is IIS Assessment. The results from the testing and discovery project are used to inform the IIS Assessment process, which is also heavily guided by IIS Functional Standards[1] and Operational Guidance Statements. A third stage following IIS Assessment is Validation.

In early 2016, the Measurement for Assessment and Certification Advisory Workgroup (MACAW) was convened to systematically research and formulate key IIS assessment components, develop measures, and implement the IIS assessment and validation process. MACAW utilizes the testing and discovery project results to identify and develop assessment measures for particular IIS components. Those measures are then vetted and informed by the IIS community. Data Quality: Incoming/Ongoing content area within the Measurement and Improvement (M&I) Initiative focuses on IIS detection of poor data quality during the submission of records. This report contains the aggregate results of the assessment completed in Quarter 4 of 2020. This process will be repeated in Quarter 1 of 2021 and every quarter thereafter to determine if progress is being made toward broader standards adoption throughout the community.

In addition to this aggregate report, a detailed individual report is provided to each jurisdiction for use within their own projects for improvements. AIRA will not redistribute any individual IIS results outside of their respective jurisdiction and self-selected sharing settings within the Aggregate Analysis Reporting Tool (AART).[2]

Data Quality: Incoming/Ongoing Measures

The Data Quality: Incoming/Ongoing Assessment[3] spans 27 measures in all; these measures are guided by the following Functional Standard overarching principle.

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[1] http://www.cdc.gov/vaccines/programs/iis/func-stds.html

[2] https://app.immregistries.org/aart/home

[3] https://repository.immregistries.org/resource/measures-and-tests-for-assessment-data-quality-incoming-ongoing/

> *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 broken into three categories (patient demographic, vaccination event, and additional aspects). The first two categories (patient demographic and vaccination event) expect the IIS to detect when poor quality data is submitted to the IIS. The third category (additional aspects) expects the IIS to be good stewards of the data which is submitted and ensure the data still represents 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[4].

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.

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[4] https://www.cdc.gov/vaccines/programs/iis/core-data-elements/iis-func-stds.html

17. The IIS detects data quality issues with contraindications/precautions and contraindication/precaution observation date.
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) which 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.
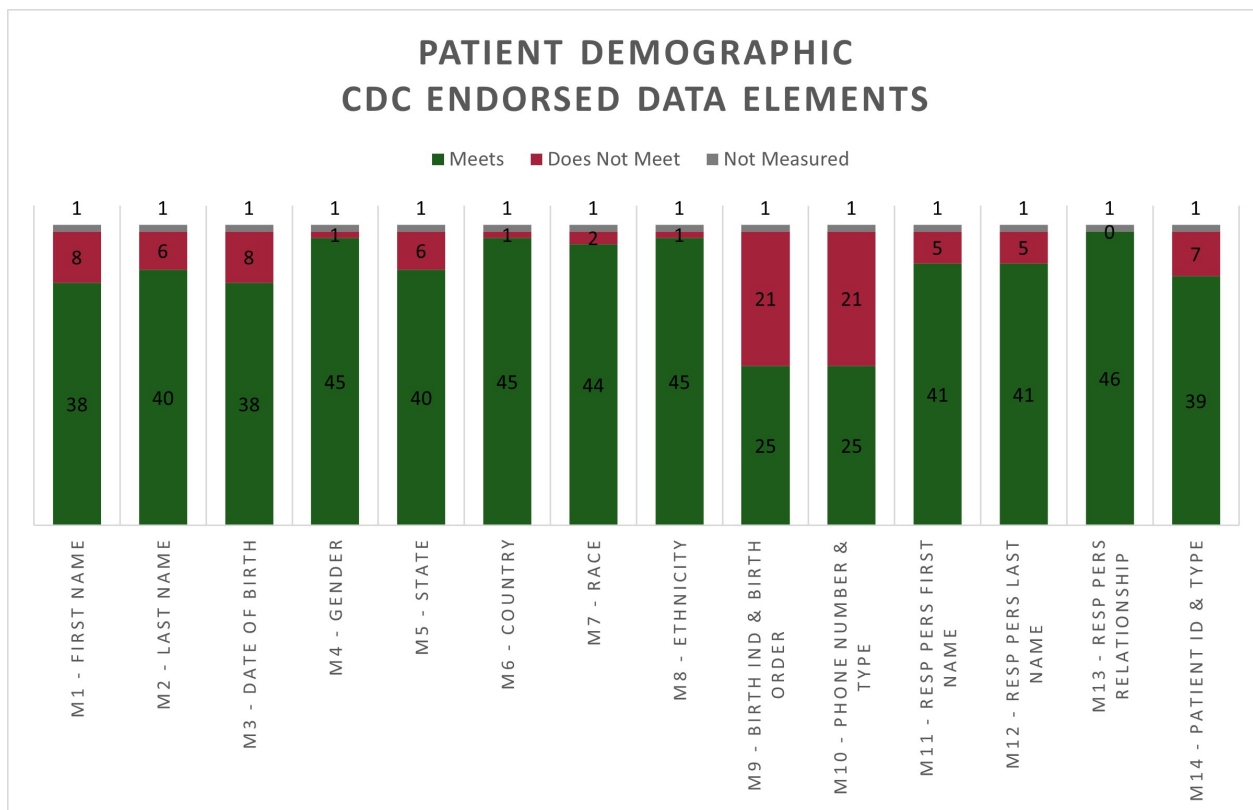
Results

Fifty-eight IIS (comprising all 50 states, plus the Commonwealth of the Northern Mariana Islands, the District of Columbia, Guam, New York City, Philadelphia, Puerto Rico, San Diego, and the Virgin Islands[5]) were encouraged to be measured in the IIS Assessment. Of the 58, 47 (81%) 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.

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[5] Note that four of the Pacific Islands were not initially targeted for measurement due to limited transport technology. As capabilities and ability to be measured expand, additional Pacific Islands are being included in this report.
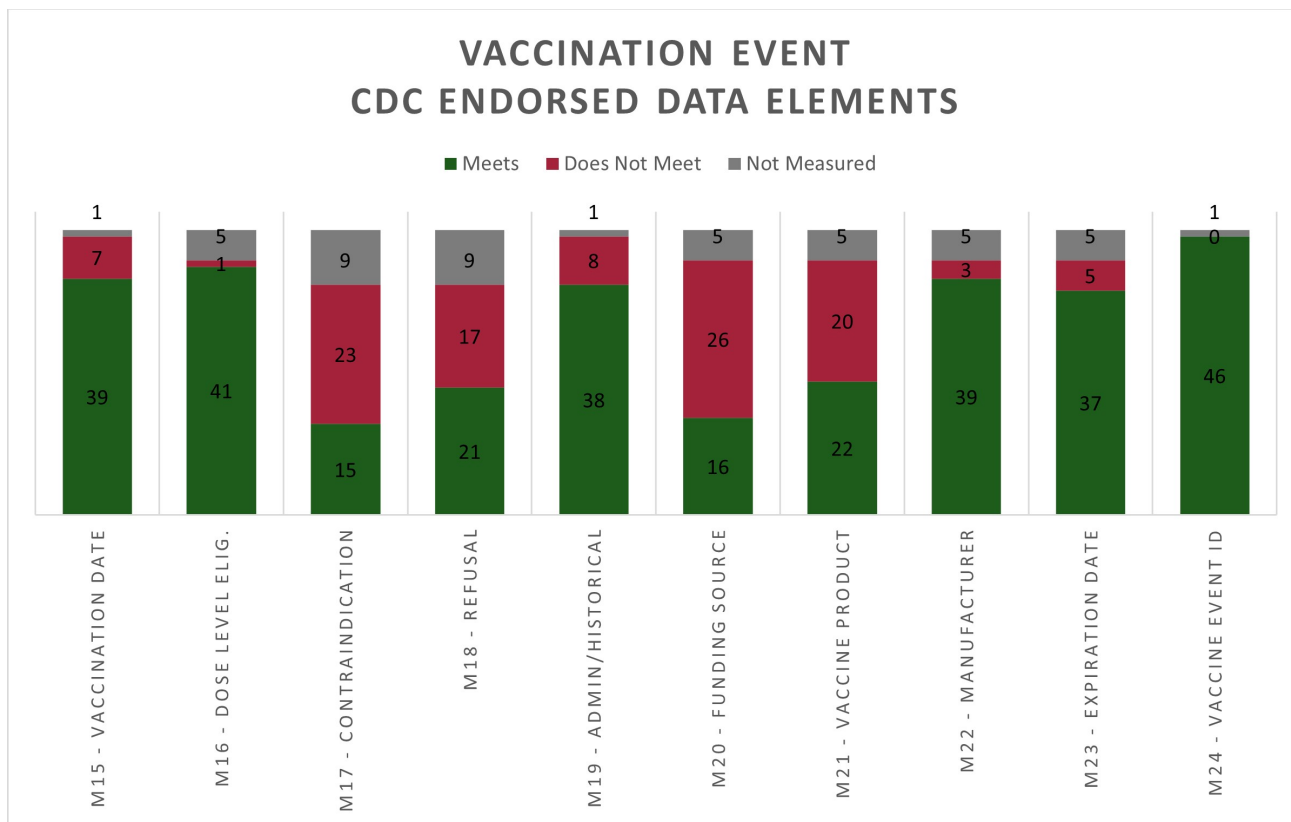
**PATIENT DEMOGRAPHIC
CDC ENDORSED DATA ELEMENTS**

■ Meets ■ Does Not Meet ■ Not Measured

Measure	Meets	Does Not Meet	Not Measured
M1 - FIRST NAME	38	8	1
M2 - LAST NAME	40	6	1
M3 - DATE OF BIRTH	38	8	1
M4 - GENDER	45	1	1
M5 - STATE	40	6	1
M6 - COUNTRY	45	1	1
M7 - RACE	44	2	1
M8 - ETHNICITY	45	1	1
M9 - BIRTH IND & BIRTH ORDER	25	21	1
M10 - PHONE NUMBER & TYPE	25	21	1
M11 - RESP PERS FIRST NAME	41	5	1
M12 - RESP PERS LAST NAME	41	5	1
M13 - RESP PERS RELATIONSHIP	46	0	1
M14 - PATIENT ID & TYPE	39	7	1

* M1, M2, M3, etc. denote the measure number found in the <u>Data Quality: Incoming/Ongoing Measures</u> section above.

The following high-level notes relate to the patient demographic data elements where less than 80% of the 47 IIS assessed met the measure:

- **Multiple Birth Indicator & Birth Order:** Most of the IIS who 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 2) or defaulted the patient to values against MIROW business rules.
- **Phone Number & Phone Number Type:** IIS were split for reasons why they did not meet the measure between Phone Number and Phone Number Type being invalid. In both cases, the IIS either failed to detect the issue in the ACK or returned the invalid data back in the RSP.

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.

**VACCINATION EVENT
CDC ENDORSED DATA ELEMENTS**

Legend: ■ Meets ■ Does Not Meet ■ Not Measured

Measure	Meets	Does Not Meet	Not Measured
M15 - VACCINATION DATE	39	7	1
M16 - DOSE LEVEL ELIG.	41	1	5
M17 - CONTRAINDICATION	15	23	9
M18 - REFUSAL	21	17	9
M19 - ADMIN/HISTORICAL	38	8	1
M20 - FUNDING SOURCE	16	26	5
M21 - VACCINE PRODUCT	22	20	5
M22 - MANUFACTURER	39	3	5
M23 - EXPIRATION DATE	37	5	5
M24 - VACCINE EVENT ID	46	0	1

* M15, M16, M17, etc. denote the measure number found in the Data Quality: Incoming/Ongoing Measures section above.

The following high-level notes relate to the vaccination event data elements where less than 80% of the 47 IIS assessed met the measure

- **Contraindication:** Most IIS did not communicate missing or invalid values properly.
- **Refusal:** Most IIS did not communicate missing or invalid values properly.
- **Funding Source:** Most IIS did not communicate missing or invalid values properly.
- **Vaccine Product:** Most IIS did not detect when CVX, NDC, and MVC were conflicting with each other.

Additional Aspects

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

ADDITIONAL ASPECTS OF DATA QUALITY

Legend: ■ Meets ■ Does Not Meet ■ Not Measured

	M25 - CODE MAPPING	M26 - RETURNS KEY INFORMATION	M27 - CONSOLIDATED HISTORY
Not Measured	6	0	0
Does Not Meet	2	45	11
Meets	39	2	36

* M25, M26, M27 denote the measure number found in the Data Quality: Incoming/Ongoing Measures section above.

The following high-level notes are provided on additional areas where less than 80% of the 47 IIS assessed met the measure:

- **Returns Key Information:** IIS either failed to return either expiration date, partial dose information (or both).
- **Consolidated History:** Most IIS failed this measure because they did not update the record requested via HL7.

Summary of Progress

Data Quality Incoming/Ongoing Trends
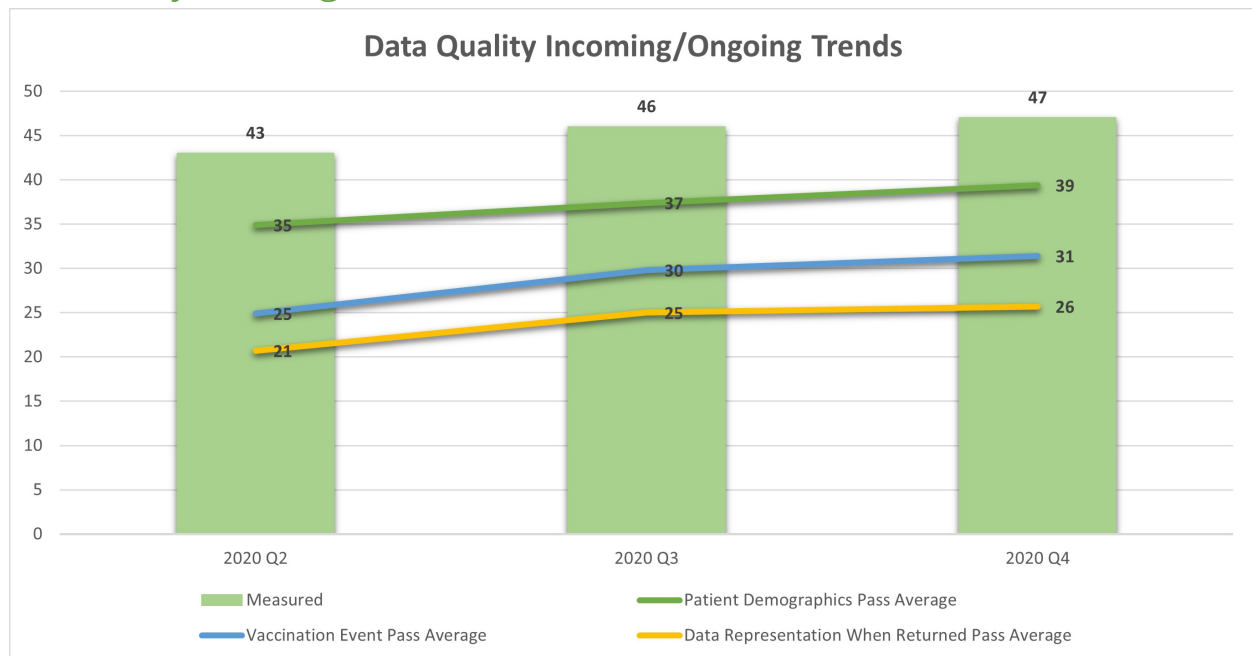
This remeasurement showed progress in the following areas:

- **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 26%. This is down from 31% Does Not Meet outcome rate during the initial baseline. Over the same period, we have seen an increase in IIS being measured.
- **First Name:** The number of IIS who met the measure increased by 10 from initial baseline, resulting in 83% passing the measure.

Remeasurement

The next remeasurement will take place in Quarter 1 of 2021, and we hope to show increases in both the number of IIS being measured and in the number of IIS that meet measures for this content area of measurement.

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.

- 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 in an attempt 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 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 real-time) fashion if the submitted data was 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. Operationally, IIS should coordinate with their interface partners in jointly aligning 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 on this aggregate report to the AIRA Technical Assistance Team.