AIRA
AMERICAN IMMUNIZATION REGISTRY ASSOCIATION

Data at Rest (DAR)

Aggregate Report

2024 (Baseline)

M&I
MEASUREMENT & IMPROVEMENT

Table of Contents

Introduction

Overview: The measurement process for Data at Rest (DAR) uses the National Institute of Standards and Technology (NIST) Immunization Test Suite Validation Tool. This tool provides consistent conformance-based results for all measured IIS. In addition, the technical requirements for data quality are documented in the HL7 Version 2.5.1: Implementation Guide for Immunization Messaging, Release 1.5 and addendum. This is referred to as the National IG.

A key role of immunization information systems (IIS) is combining vaccination records from many sources to create complete and accurate histories. To do this well, IIS need data from most immunizers in their area, sent through standardized electronic channels. For over 20 years, the IIS community has used messaging standards, which have become even more important with the rise of electronic health record (EHR) integration. VXU, or unsolicited vaccine update, is an HL7 version 2 message that contains demographic and vaccination data that is submitted to an IIS by an outside EHR. ACK, or acknowledgment, is an HL7 v2 message used to relay information back to the EHR regarding the status of the VXU. "Additional electronic interfaces (e.g., flat file, Vital Records, Medicaid) also provide data for IIS. Finally, IIS continue to collect data through the IIS user interface. Once consolidated, the data reside in the IIS database for use by public health programs as well as for clinical encounters. The data residing in an IIS database are often referred to as "data at rest" (DAR).

Background: DAR moved into the Measurement and Improvement (M&I) stage of Assessment in 2023. This report contains the aggregate results of the IIS remeasurement completed in **2024.** IIS can access their individual measurement reports in the Aggregate Analysis Reporting Tool (AART).

Measures: The Measurement for Assessment and Certification Workgroup (MACAW), the advisory body for the Measurement and Improvement (M&I) initiative, approved measures and tests for DAR in December 2022. The detailed measures and tests document is located on the AIRA Repository. Measures and tests are based on the IIS Functional Standards v5.0. DAR measures and tests are specifically based off the following:

- **Functional Standard B4.0:** The IIS validates patient demographic and vaccination data.
- **Guidance Statement B4.2:** The IIS monitors data quality within the IIS in accordance with policies and procedures.
- **Guidance Statement B4.4:** The IIS delivers feedback and training to IIS partners and providers to ensure complete, timely, and accurate patient demographic and vaccination records.

- **Guidance Statement B4.5:** The IIS meets federal and jurisdictional data quality metrics.

Testing Method: For DAR testing, data is extracted from IIS production databases into a patient file and an immunization file according to the file specifications on AIRA's DAR technical resources webpage. Within these extracts some fields such as date of birth, vaccine type, vaccine manufacturer, and vaccination administration date are expected to be the actual value stored in the IIS database. However, for most fields, instead of the actual value, IIS are directed to extract whether a data element is present, not present, or not captured. The data extracted represents children aged zero to two years as of December 31 of the last calendar year. For example, the 2024 period uses a cohort a children born in 2022 and 2023. After extracting data, IIS then transform the data using and AIRA provided Command Line Interface (CLI) tool. The CLI summarizes line level data into an aggregate detections file (ADF). The ADF contains counts of data quality detections grouped by age, vaccine, and other grouping factors. The ADF is then uploaded securely using AART. Afterwards, AIRA staff retrieve the ADF and create reports on behalf of participating IIS.

Thresholds: Each measure has predefined threshold for which an IIS must meet. For example, when being evaluated on record completeness, IIS are expected to have the first, last name, and date of birth of each patient in their registry, therefore the established threshold for these completeness measures is at least 99%. Similarly, IIS were expected to have a middle name for at least 75% of their extracted patients. For some measures an IIS must be above a given threshold to meet. For example, more than 99% of patients should have a last name. For other measures, IIS must be below a given threshold. For example, no more than 4% of patients should be born on the first of the month. Thresholds were initially determined by the Data at Rest Guide Workgroup and enumerated in their 2018, IIS Data Quality Practices to Monitor and Evaluate Data at Rest document. Thresholds were further refined by MACAW.

Possible Results: IIS can achieve one of three possible results in both test and measure outcomes – **meets, does not meet,** or **not measured**.

Summary Results

IIS Participation - Sixty-one (61) IIS participate in M&I.[1] **Twenty-four (39%)** opted to participate in Data at Rest in 2024 and are included in this report. While a small number of IIS (9 of 61 or 15%) participated in DAR – Assessment in 2023, this was not enough to be

[1] 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.

representive of the IIS community. Therefore, 2024 serves as the baseline year to compare to future assessments.

Summary statistics:

- Measured IIS: 24
- Number of measures: 45
- Measures met by IIS
    - Minimum: 27 (60% of measures)
    - Median: 36 (80% of measures)
    - Maximum: 41 (91% of measures)

Bar charts summarizing patient record completion, vaccine record complentess, as well as validty and timeliness are found below.

Completeness Measures

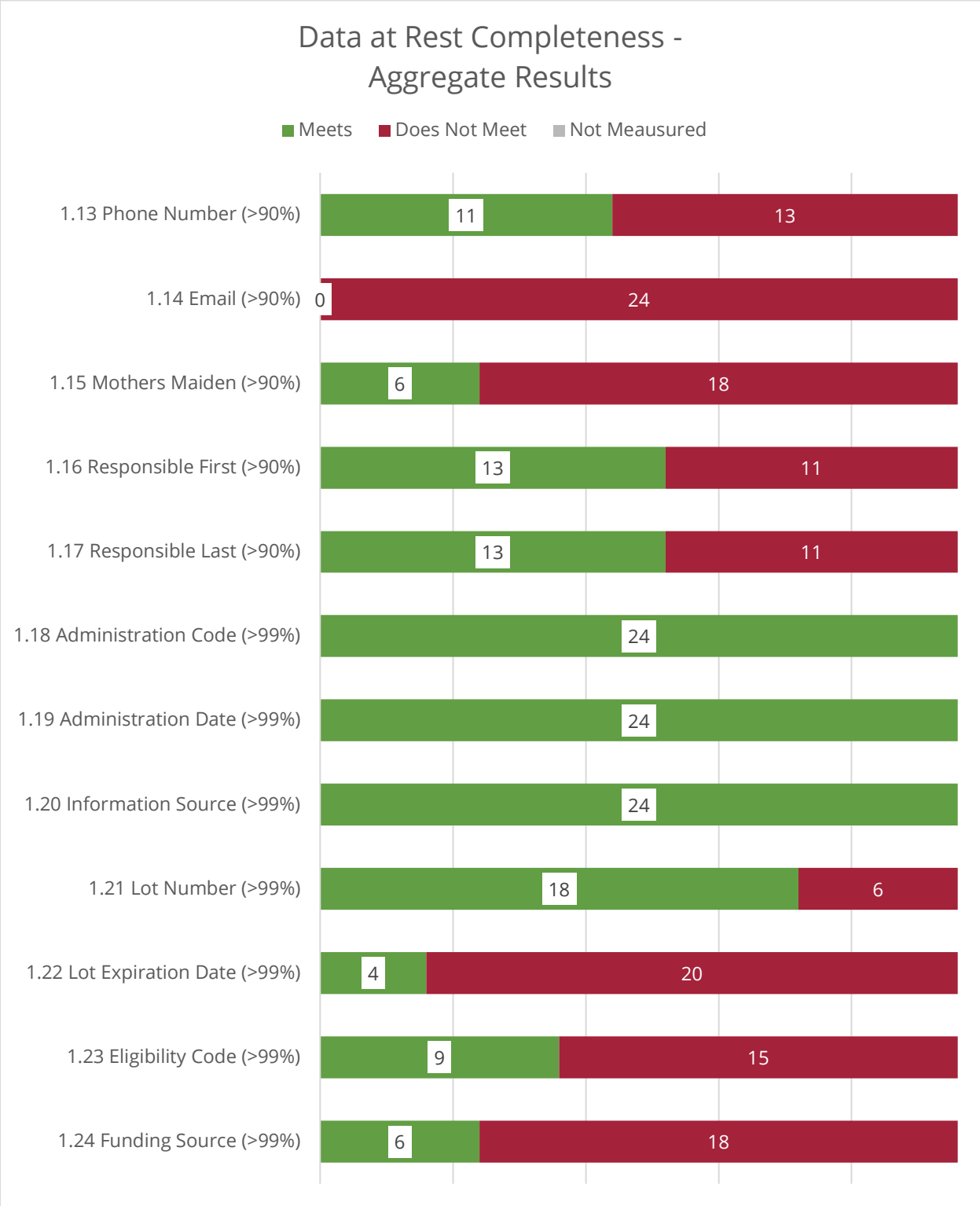
When critical fields within patient and vaccination records have a value, they are considered “complete”. It is important to note that although a value within field may be present, the value may not be considered valid. For example, placeholder names such as “Baby Boy” or “Unknown” may appear in a database. These placeholder names count towards complete measures but for validity measures that may be developed in the future, these would not be considered valid. The graph below shows the number of IIS meeting, not meeting, or not measured for each completeness measure.


Data at Rest Completeness - Aggregate Results
Meets
Does Not Meet
Not Meausured
1.01 First Name (>99%)
23
1
1.02 Middle Name (>75%)
14
10
1.03 Last Name (>99%)
24
1.04 Birth Date (>99%)
24
1.05 Gender (>99%)
24
1.06 Address Street (>85%)
24
1.07 Address City (>85%)
24
1.08 Address State (>85%)
24
1.09 Address Zip Code (>85%)
24
1.10 Complete Address (>85%)
24
1.11 Race (>95%)
10
14
1.12 Ethnicity (>95%)
6
18

The following observations provide additional context for reading and interpreting the aggregate results graph above:

- **Measure 1.01 First Name:** One IIS narrowily did not meet the threshold of 99% by just over two percentage points with a score of around 97%.
- **Measure 1.02 Middle Name:** Ten IIS did not meet the 75% threshold. Three of those had completetion rates below 50%.
- **Measure 1.11 Race:** Almost 60% (14) of participating IIS did not meet the threshold of 95%.
- **Measure 1.12 Ethinicity:** Two-thirds (18) of participating IIS did not meet the threshold of at least 95%.

Additional complentesss measures are detailed on the following page.


Data at Rest Completeness - Aggregate Results
Meets
Does Not Meet
Not Meausured
1.13 Phone Number (>90%)
11
13
1.14 Email (>90%)
0
24
1.15 Mothers Maiden (>90%)
6
18
1.16 Responsible First (>90%)
13
11
1.17 Responsible Last (>90%)
13
11
1.18 Administration Code (>99%)
24
1.19 Administration Date (>99%)
24
1.20 Information Source (>99%)
24
1.21 Lot Number (>99%)
18
6
1.22 Lot Expiration Date (>99%)
4
20
1.23 Eligibility Code (>99%)
9
15
1.24 Funding Source (>99%)
6
18

The following observations provide additional context for reading and interpreting the aggregate results graph above:

- **Measure 1.13 Phone Number:** Less than half (11) of participating IIS met the threshold of at least 90%.
- **Measure 1.14 Email:** No IIS met the at least 90% threshold for email address complentess.
- **Measure 1.15 Mother's Maiden Name:** One IIS reported not having collected mother's maiden name (Measure 1.15) for any patient.
- **Measure 1.16 Responsible Person Name:** Three of the 11 IIS not meeting the responsible person name measures discovered a problem within their extract scripts well after they had submitted data. In these three cases mother's first and last name were found to be present in more cases than for responisble person.
- **Measure 1.21 Lot Number:** Three IIS had lot number completeness rates above 98%, nearly meeting the threshold of 99%. Two more IIS had lot number completeness rates above 94%, and one IIS did not capture lot number.
- **Measure 1.22 Lot Number Expiration Date:** Two IIS had lot number expiration date complentess rates above 98%, nearly meeting the threshold of at least 99%. Three IIS did not capture lot number expiration date.
- **Measure 1.23 Eligibility Code:** One IIS had vaccine program eligibility code rates above 98%, nearly meeting the threshold of at least 99%. One IIS did not collect vaccine program eligibility code. This IIS' jurisdiction is a universal child vaccine state.
- **Measure 1.24 Funding Source:** Three IIS did not collect vaccine funding source. Four IIS had 100% completion rates for vaccine funding source.

Validity & Timeliness Measures

Validity measures assess if IIS conform with generally accepted standards. Timeliness refers to the lag between a vaccine event occurs and is recorded in the IIS. Below, readers will find graphs summarizing IIS performance in validity and timeliness measures.


Data at Rest Validity - Aggregate Results
Meets
Does Not Meet
2.01 DOB on 1st (<4%)
24
2.02 DOB on 15th (<4%)
24
2.03 DOB on Last (<4%)
23
1
2.04 Vaccine Count (<1%)
24
2.05 Admin > Expiration (<1%)
22
2
2.06 Admin < DOB (<1%)
24
2.07 Admin 1st (<4%)
24
2.08 Admin 15th (<4%)
24
2.09 Admin Last (<4%)
24
2.10 Improbable Age (<1%)
20
4
2.11 NOS Administered (<1%)
22
2

The following high-level observations provide additional context for reading and interpreting the above aggregate result:

- **Measures 2.01 – 2.03 Date of birth distribution:** One participating IIS did not meet the less than 4% threshold for a normal distribution of dates of birth on the last day of the month, exceeding the threshold by 0.12 percentage points.
- **Measure 2.05 Expired doses administered:** Two participating IIS did not meet the threshold of less than 1% for doses administered after the vaccine expiration date. However, both IIS had less than 2% of their records falling into this category.
- **Measure 2.10 Improbable age:** Four participating IIS did not meet the threshold of less than 1% of doses administered at an improbable age. For IIS not meeting the threshold, rates varied from barley exceeding the threshold (equal to 1%) to a maximum of 4.14%.
- **Measure 2.11 Not Otherwise Specified Vaccine Code Used for Administered Dose:** Two participating IIS did not meet the threshold of less than 1% of doses administered with an unspecified vaccine code. These rates varied from a minimum of 1.47% to a maximum of 7.34%.


Data at Rest Validity and Timeliness - Aggregate Results
Meets
Does Not Meet
Not Meausured
2.12 Lot Prefix (<1%)
23
1
2.13 Lot Infix (<1%)
23
1
2.14 Lot Suffix (<1%)
18
5
1
2.15 Lot Characters (<1%)
16
7
1
2.16 Lot Length (<1%)
23
1
2.17 Admin Code (<1%)
24
2.18 Manuf. Code (<1%)
21
3
2.19 Route (<1%)
24
2.20 Body Site (<1%)
23
1
3.01 Dose Entry ≤ 1 Day (>95%)
6
18

The following high-level observations provide additional context for reading and interpreting the above aggregate result:

- **Measures 2.12 – 2.14 Lot Number**: One IIS reported not capturing lot number. This single IIS could therefore not be measured for validity of lot number prefixes, infixes, and suffixes.
- **Measure 2.20 Body Site**: One IIS exceeded the threshold for the reporting of unrecognized body sites by 1.3 percentage points. It is assumed the invalid body site reported by the IIS was "oral". Vaccines administered through the route of oral need not have a body site code as the body site is self-evident from the route. It is not possible to give a vaccine orally anywhere but in the mouth.
- **Measure 3.01 Vaccine entry timeliness**: Six IIS met the benchmark of at least 95% doses entered into the IIS within one calendar day. Thirteen IIS had timeliness rates above 90% but below the at least 95% benchmark. Four IIS had timeliness rates above 85% and below 90%. One outlying IIS had a timeliness rate of 66%.

Summary of Progress

This report serves as the baseline; therefore, no trends are available. Subsequent reports for DAR Assessment will include analysis of trends over time.

Questions and/or Comments

Please direct questions and/or comments via AIRA's Technical Assistance Request form.

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Appendix A: Report Limitations and General Recommendations

Report Limitations

There are several limitations to consider when reviewing this report:

- Unlike most M&I content areas, DAR requires additional action by IIS to be measured. IIS may lack the necessary time or staff to carry out the required process. They may also lack access to their data or have the expertise needed to successfully extract data leading to lower than desired participation.
- Each IIS extracts their own data, therefore, there may be inconsistencies in the way in which extract specifications are interpreted and implemented across IIS.
- This content area uses a cohort of children aged two years and under as of the end of the last calendar year. Data quality for other birth cohorts may differ.
- Benchmarks for evaluating DAR data quality were established independently of results. For example, the median participating IIS's patient email address field was complete less than 30% of the time, and the best performing IIS had a completion rate of 82%. The benchmark for patient email address is set at 90% or higher. The existing benchmark may have been set too high. Benchmarks may be changed in the future by MACAW and the IIS Community.
- Validity measures use code sets for exchanging data via HL7 2.5.1 messages. Local codes are mapped to standard codes by participating IIS. This activity may not be consistent between IIS.
- Lack of

General Recommendations

1. Greater participation
    a. Less than half of IIS participated in DAR in the last calendar year. Greater participation would clarify benchmark levels for IIS rates of completeness, validity, and timeliness. Once a critical mass of participation has been reached MACAW and the broader IIS Community may wish to reevaluate the current benchmarks.
    b. Estimates indicate that first time participation requires about 10 hours and subsequent participation requires about two hours.
2. Data quality is a shared responsibility
    a. Maintaining high data quality requires partnership between IIS and provider organizations. Data should be regularly evaluated both in real time and at rest. Participating IIS can leverage provider-based reports available in qDAR via AART.