The Quest for the Best: Developing a Data Quality Protocol and Tools for Incoming Data
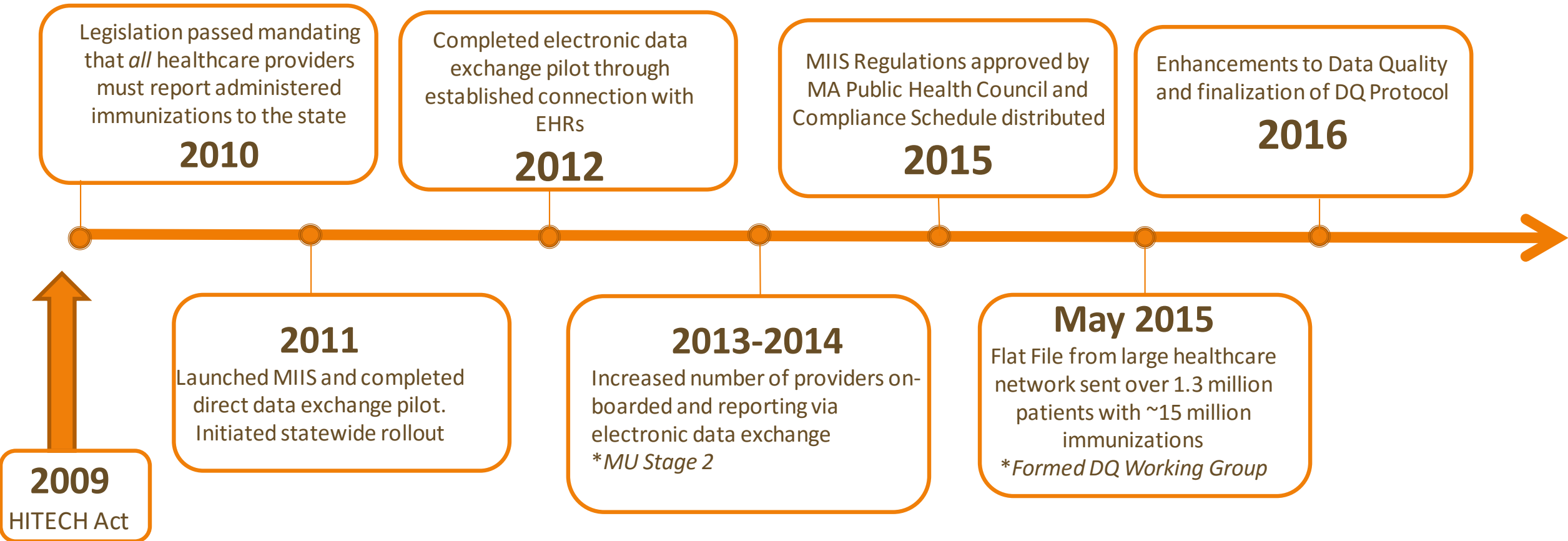
Kimberly Lay

Data Quality Analyst and Trainer

Massachusetts Immunization Information System

Immunization Program, Massachusetts Department of Public Health

AIRA 2016

Presentation Agenda

- History of the MIIS

- System Usage and Growth

- Identification of Data Quality Issues

- Development of Data Quality Tools and Protocol

- Questions

MIIS Timeline

Legislation passed mandating that *all* healthcare providers must report administered immunizations to the state
2010

Completed electronic data exchange pilot through established connection with EHRs
2012

MIIS Regulations approved by MA Public Health Council and Compliance Schedule distributed
2015

Enhancements to Data Quality and finalization of DQ Protocol
2016

2009
HITECH Act

2011
Launched MIIS and completed direct data exchange pilot. Initiated statewide rollout

2013-2014
Increased number of providers on-boarded and reporting via electronic data exchange
MU Stage 2

May 2015
Flat File from large healthcare network sent over 1.3 million patients with ~15 million immunizations
Formed DQ Working Group

Data Over Time

2012
- Total Sites: **55**
- Total Patients: **815,928**
- Total Shots: **3,371,434**

2014
- Total Sites: **532**
- Total Patients: **2,370,194**
- Total Shots: **13,597,285**

March 2016
- Total Sites: **1600**
- Total Patients: **4,754,856**
- Total Shots: **33,711,170**

2015*
- Total Sites: **1168**
- Total Patients: **4,427,623**
- Total Shots: **33,334,571**

2013
- Total Sites: **341**
- Total Patients: **1,539,629**
- Total Shots: **7,303,293**

2011
- Total Sites: **9**
- Total Patients: **3,902**
- Total Shots: **69,505**

*Large one time legacy load

Total Reported Immunizations by Data Type

Roster (Direct Data Entry) 0.7%

HL7 38.9%

Flat File 59.4%

GUI (Direct Data Entry) 1.0%

N = 33,711,170
As of 3/1/16
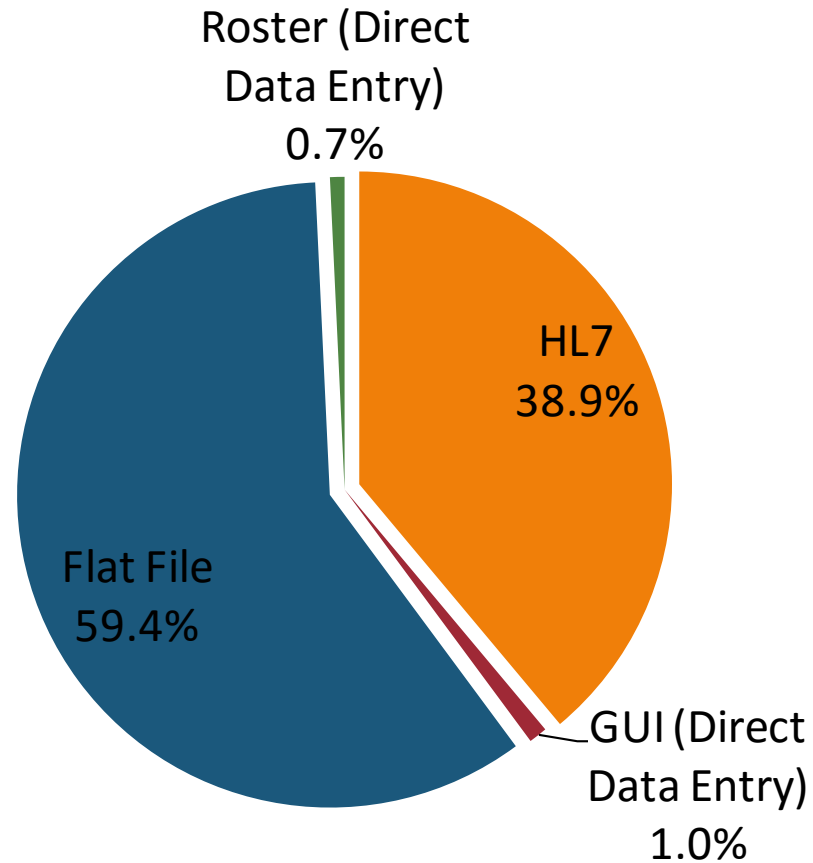
Majority of the information reported via electronic data exchange (with flat file)

Pre-DQ Protocol On-Boarding Process

test and live data to
test environment

one time legacy
data flat file load

test and live data
to test
environment

live data to live
environment

Pre-Certification — Review HL7 fields/EHR capacity

Certification — Testing and Validation

Production Monitor — Data Quality Checks

On-going Submission
- Reported issues
- AFIX

Focus of data quality during on-boarding
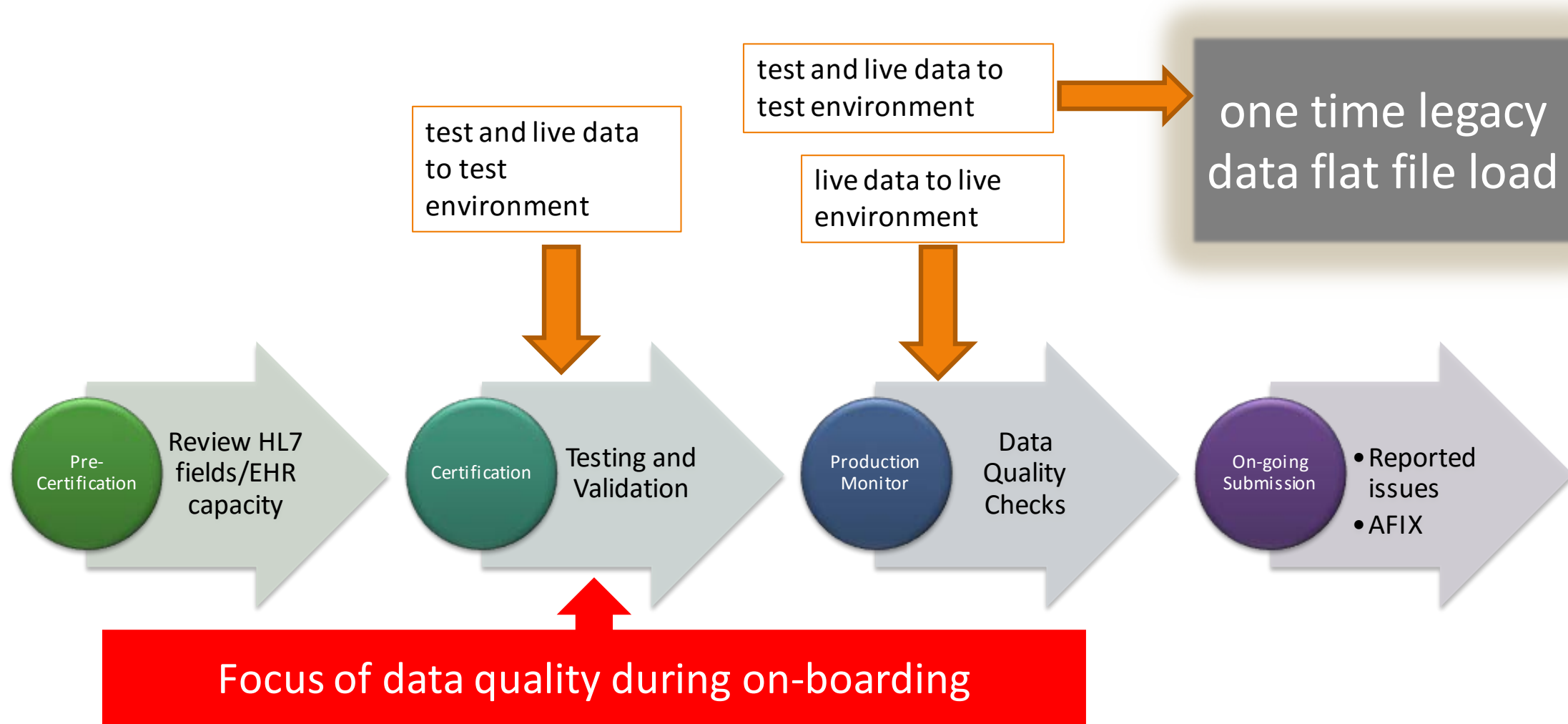
Pre-DQ Protocol On-Boarding Tools

- HL7 Transfer Specifications and HL7 Checklist
  - ensure format and document required fields
- HL7 Administration Console
  - review messages
- Data Quality Tool for Providers during Production Monitor
  - compare 5-10 patients in EMR and MIIS
- Flat File Specifications
  - ensure format and document required fields

Massachusetts Immunization Information System

MIIS

Data Quality Checks

Data Quality checks are performed to ensure that patient immunization data stored in your electronic health record (EHR) is accurately reflected in the MIIS. To perform data quality checks, follow the steps below:

• Select 5 patients who received immunization(s) on or after **XX/XX/XX** and search for them in both your EHR and the MIIS.
• Check that the name, date of birth, address, and basic demographic information was transmitted to the MIIS correctly. Please ensure you match with the MRN, as patients may already exist in the MIIS.
• Ensure that the patient's immunization history matches in both systems (i.e. all shots that are in the EHR are reflected in the Vaccine Administration Record accessed from the Immunizations Tab of the patient's record in the MIIS). Pay particular attention to the date of administration, vaccine name, manufacturer and dose to ensure they match in both systems.
• Ensure that your practice's medical record number (MRN) was transmitted and is accurate in the MIIS.
• Check each patient's data sharing status to confirm it is set to "Unknown."
Complete Data Quality Checks by **XX/XX/XX**
Send completed worksheet to the MIIS Help Desk by **Fax: (617) 983-4301** _****Please call the MIIS Help Desk prior to sending the fax.**_

|	Provider Site Name: Associates in Women's Health Care, PC		Phone:
Date Conducted:	Vaccine PIN #: 40039		Email:

	EHR MRN#	MIIS ID#	Patient Last Name	Found record in MIIS (Y/N)	Records Match (Y/N)	If **immunizations** do not match, please list the shot(s) that are incorrect or missing, including vaccine, date of administration and/or description of fields that do not match for each shot.	If other, non-immunization related fields are incorrect or missing (ie. demographics), please indicate the field(s) below
	Example: XXXXX	XXXXX		Y	N	Hep B 7/1/13: Site of Admin in MIIS is Left Arm, it should be Right	Address missing apartment #: Should be 2
1							
2							
3							
4							
5							

What we discovered….

- Incorrect mapping of CVX codes to vaccine names
- Missing data
- Training issues
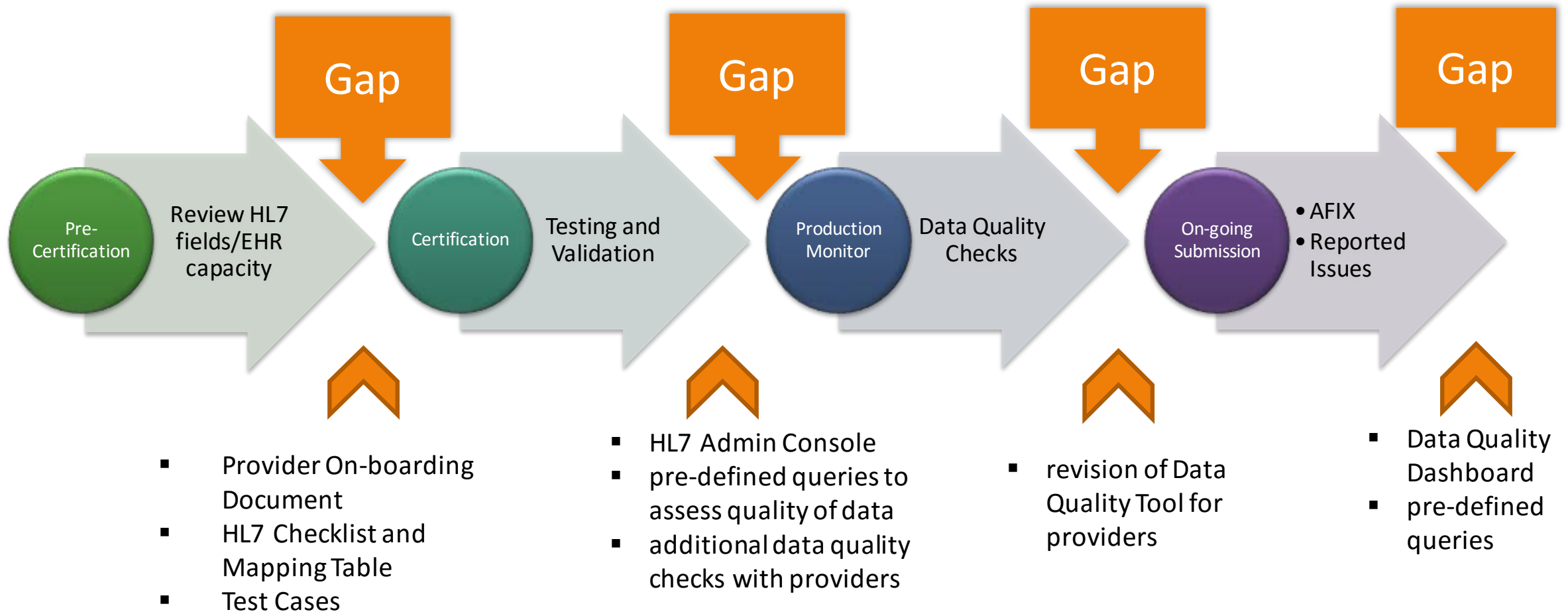- Partial historical information
- Delays in sending information
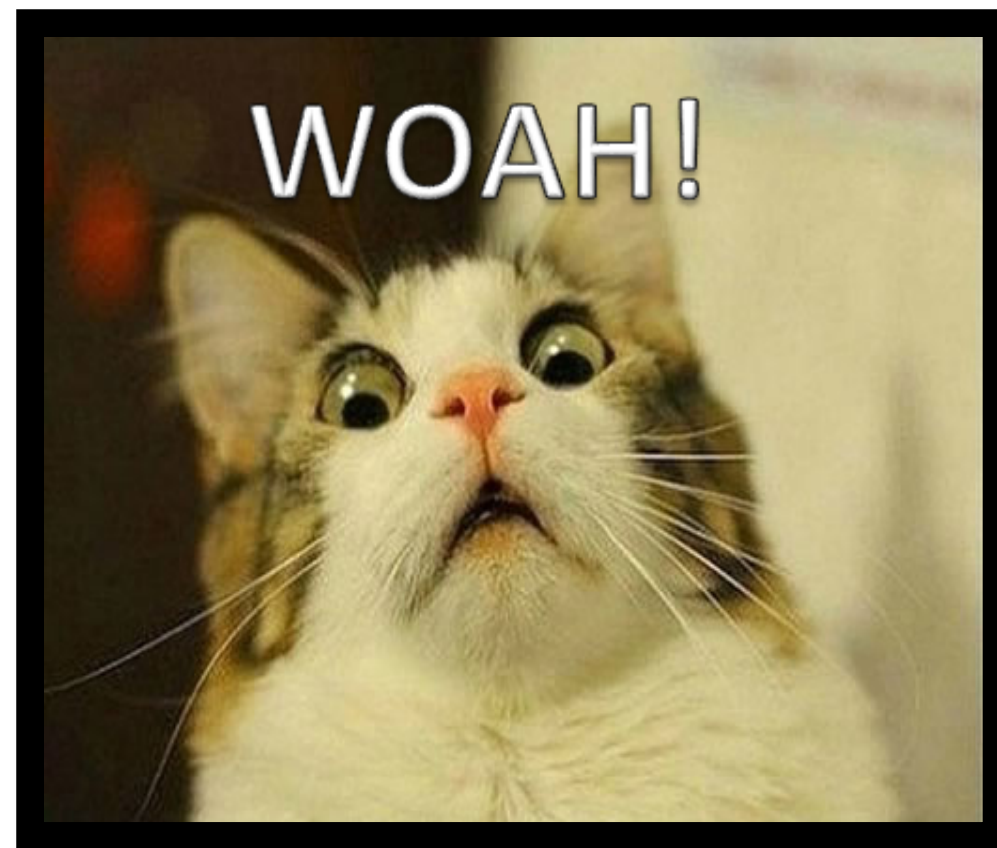
How do we ensure
the quality of
data through
every step of
the process?

Data Quality Protocol Development: The Process

Working Group

Tools

Data Quality Protocol

Assessment: Gaps and New/Enhanced Tools

Pre-Certification — Review HL7 fields/EHR capacity

Gap

- Provider On-boarding Document
- HL7 Checklist and Mapping Table
- Test Cases

Certification — Testing and Validation

Gap

Production Monitor — Data Quality Checks

- HL7 Admin Console
- pre-defined queries to assess quality of data
- additional data quality checks with providers

Gap

On-going Submission — AFIX / Reported Issues

- revision of Data Quality Tool for providers

Gap

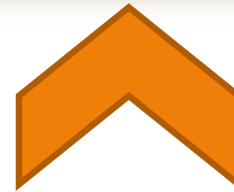- Data Quality Dashboard
- pre-defined queries

Legacy Data Flat File Load

- During on-boarding process or after
- Historical versus Administered immunizations
- Unspecified formulations

one time legacy data flat file load

Gap

- pre-defined queries

Registra...e

Purpo...
conta...

Massachusetts Immunization Information System
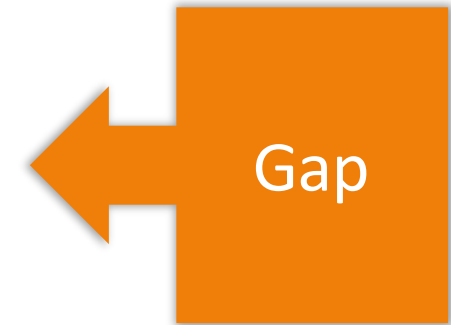
MIIS

On-Boarding Checklist

This document outlines the high level steps provider sites must complete to be ready to use the MIIS both technically and in their daily clinical practice. The on-boarding checklist is categorized into **4 distinct phases**. Provider sites are able to move onto the next phase of the on boarding when the steps within current phase are completed.

Site Name:		EHR Vendor/Company:	
Site PIN:		EHR Product & Version:	
Site Address:		EHR Vendor Rep Name:	
Site Phone:		EHR Vendor Rep Phone:	
Site Email:		EHR Vendor Rep Email:	

Registration → Clinical & Technical Integration → Production Monitor → MIIS Go-Live

PHASE 1: Registration

MIIS CLINICAL REGISTRATION	MIIS TECHNICAL REGISTRATION	HIWAY REGISTRATION
☐ Review MIIS Legislation & Regulations	☐ Complete and submit HL7 Checklist and Mapping Table to MIIS Help Desk	
☐ Obtain buy-in from site leadership	☐ Establish HL7 2.5.1 compliant message	
☐ Identify clinical "champion(s)"	☐ Identify technical leads for testing	
☐ Complete MIIS registration & Meaningful Use registration of intent (if applicable)	☐ MIIS IT connects site's IT/Vendor with HIway leads	☐ Initial HIway registration

PHASE 2: Integration

MIIS CLINICAL INTEGRATION	MIIS TECHNICAL INTEGRATION	HIWAY INTEGRATION
☐ Submit site's informing process workflow (with instructions for handling objection / withdrawal of objection forms) to MIIS	☐ Decide if and how site will complete legacy immunization load	☐ Setup transport protocols with authorization to MIIS CERT
☐ Train on MIIS functionality	☐ MIIS IT sets up site in CERT and begins receiving test data	☐ Complete testing
☐ Set tentative timelines and Go Live date	☐ Complete CERT testing and notify MIIS Clinical Lead	☐ HIway indicates is ready for connectivity
☐ Conduct data quality checks in CERT	☐ Assist with any DQ issues identified	

PHASE 3: Production Monitor

MIIS CLINICAL TEAM	MIIS TECHNICAL TEAM	HIWAY TEAM
☐ Conduct Data Quality Checks in Production	☐ MIIS IT notifies HIway site ready to be moved to Production	☐ HIway provides production credentials & confirms connectivity

PHASE 4: Go-Live

MIIS CLINICAL TEAM	MIIS TECHNICAL TEAM	HIWAY
☐ Confirm ready to GO Live	☐ Confirm ready to GO Live	☐ Confirm ready to GO Live
☐ MIIS Lead enters Go Live Date		
☐ GO LIVE and implement workflow		

- HL7 Tr...
- HL7 C...
  - capa...
  - spec...
  - map...
  - site...
  - test...

ContactMIIS Resource Center

Home | Registration | Meaningful Use | Technical Integration | Clinical Integration | Training Center | Support | RSS

Technical Integration

The Massachusetts Immunization Information System (MIIS) is a secure, web-based system, that supports the tracking of vaccine administration within the Commonwealth. While the MIIS has a graphical user interface (GUI) that allows health care providers to enter, query, and update patient immunization records, the MDPH recognizes that some provider sites already store immunization data in their own electronic health record system (EHR). To best support these provider sites, MDPH has also implemented the MIIS HL7 Gateway. The Gateway has the capability to accept data from existing EHR systems in real time, thus eliminating the potential burden of duplicate data entry (e.g. entering information into existing EHR systems and then also into the MIIS). The Gateway accepts HL7 version 2.5.1 vaccine messages and fulfills one component of the "meaningful use" criteria defined for provider sites by The Health Information Technology for Economic and Clinical Health Act (HITECH).

Transport (Connection) Options

EHR systems can connect to the MIIS using SOAP or LAND via the Mass HIway.

SOAP instructions are found within Appendix V of the MIIS HL7 Transfer Specifications. To learn more about transport via LAND, please visit the Mass HIway website at www.masshiway.net.

Connecting and Testing Requirements

If you are interested in establishing a connection to the MIIS with your EHR, please first review and complete the following:

- HL7 Checklist and Mapping Tables (xslx)
- CDC Certification WSDL (Save locally and then open the compressed file. The file is a .WSDL)
- Transport Instructions for Soap Web Services

4/12/2016

15

Certification: HL7 Administration Console

Massachusetts Immunization Information System

Data Quality Overview

Selected Site PIN: **12345**
Date Received From: 01/12/2016 01:59 PM   Date Received To: 01/20/2016 01:59 PM

Total HL7 Messages: 9

Description	Value
Number of Administered Immunizations given to patients >= 19	2
Number of Historical Immunizations given to patients >= 19	0
Number of Administered Immunizations given to patients < 19	7
Number of Historical Immunizations given to patients < 19	0
Total Immunizations	9
Percentage of Administered Immunizations given to Patients < 19 with VFC eligibility at the Shot Level	86%
Percentage of Administered Immunizations with lot number	100%
Percentage of Administered Immunizations with vaccine manufacturer	100%
Percentage of Administered Immunizations with Route of Administration	100%
Percentage of Administered Immunizations with Site of Administration	56%
Percentage of Administered Immunizations with Missing Units or Units Not Equal to ML	0%
Percentage of Administered Immunizations missing dose size	0%
Total # of Administered Immunizations for each CVX code	
DTaP-Hib-IPV (120)	1 (11.1%)
DTaP-IPV (130)	1 (11.1%)
Flu-IIV3(TIV) (141)	1 (11.1%)
Flu-IIV4 Peds, p-free (161)	1 (11.1%)
HepB Adult (43)	1 (11.1%)
Invalid CVX Code	1 (11.1%)
Rotavirus, pentavalent (116)	2 (22.2%)
Tdap (115)	1 (11.1%)

Select Report Type

○ HL7 Message Details   ⦿ Da...

Filter by PIN or Provider site name:

Available Site PINs:

AAAA - 80002
AAA DEPARTMENT - 88889

Message Status   --Sel...
*Date Received (From):   5/13/...
*Date Received (To):   5/20/...

HL7 Message: Cont...
Is nu...
Equa...
Does...

Acknowledgement: Cont...

[Reset] [Submit Report] [Close]

Certification: Predefined Database Queries

- Predefined metrics to review assess data accuracy
  - count of vaccines administered by age
  - count of vaccines administered by year
  - count of invalid/valid doses with certain thresholds
- Also used during flat file testing
- Data quality checks with providers

No. of Patients by Age with Meningococcal, unspecified
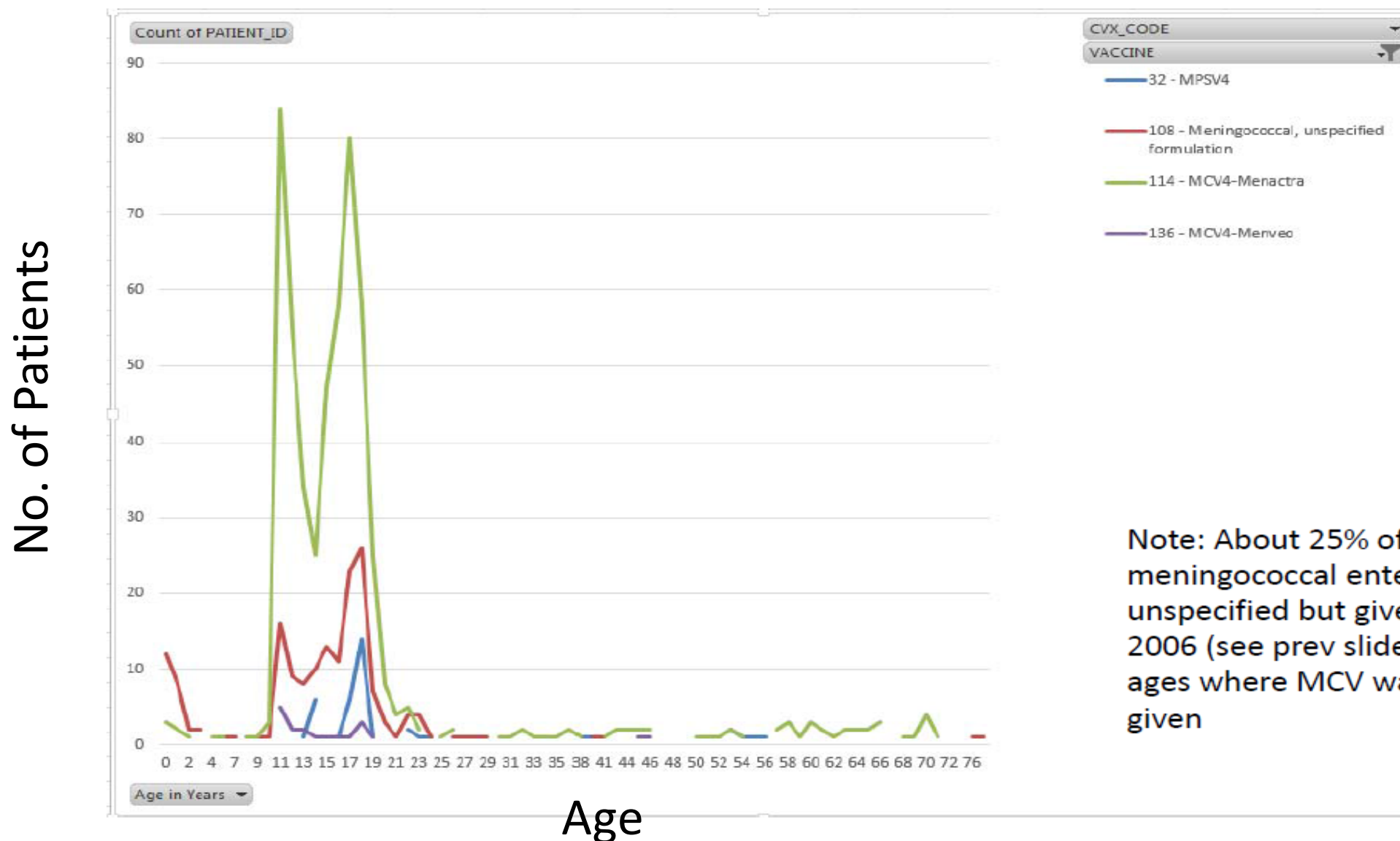
Production Monitor: Data Quality Tool for Providers

Data Quality Checks in MIIS Production

Name: **Provider Site Name:**   **Phone:**

Date Conducted: **Vaccine PIN #:**   **Email:**

Revised

Instructions

1.) Log into the MIIS through the Virtual Gateway.
2.) Click the Immunization Registry Module.
3.) Search for the patient in the MIIS. Click on the patient name to open up the record in the MIIS.
4.) Compare the patient record in the MIIS to the record in your electronic system.
5.) Record the requested information for each patient checked. Indicate "yes" if information matches. Please remember to give vaccine details on any discrepancies or missing information.
6.) Send completed worksheet to the MIIS Help Desk by Fax to: (617) 983-4301 ****_Please call the MIIS Help Desk (617-983-4335) prior to sending the fax._**

MIIS module and where to find data is listed here:					Immunization Registry Module: Patient Demographics			Immunization Registry Module: Immunization Tab			
EHR MRN#	MIIS ID#	Patient Last Name	Patient record found in MIIS (Y/N)	Verified Patient Demographics (gender, race, phone, email, insurer, VFC eligibility)	Verified Patient Address and address type (home, mailing etc.)	Verified Caregiver (guardian) and Caregiver Address	Administered vaccines found in MIIS? (Y/N) If missing, please give vaccine name and date.	All details of Immunizations correct in MIIS (dose, route, admin by etc.)?	If a "No" is indicated in any previous column, please list the imm details that are incorrect or missing, (vaccine, date of admin and/or description of fields that do not match for each shot).	""Entered from Inventory" checkbox checked* for a vaccine currently in your inventory (Y/N) * indicates vaccine deduction
Example: XXXXX	_XXXXX_	_Doe_	_Y_	_Y_	_Y_	_Y_	_N - DTAP given 12/12/15 missing_	_Y_	_Hep B 7/1/15: Site of Admin in MIIS is Left Arm, it should be Right Arm_	_N - Hep B Peds did not deduct from inventory_
1										
2										
3										
4										
5										

On-going Submissions: Monitoring Tools

- Internal database report: Provider Compliance Report and HL7 Report
  - identification of patterns and gaps in data submission
- Documentation of EHR limitations and workarounds
  - ex: daily batch submission of data, manual triggers
- HL7 Admin Console
  - Data Quality Overview Report
- Existing Reports
  - Patients Vaccinated Report
  - Practice Population Report
  - Coverage Report
- Data Quality Dashboard (coming Fall/Winter 2016)

On-going Submissions: Data Quality Dashboard

Data Quality Dashboard

Filter by PIN or Provider Site Name: [____]   Filter by Score Category: [All ▾]   Date Range (FROM): [____] (TO): [____]

Select a Site PIN: [Select Provider Site ▾]

Overall Score - 64 POOR

Measurement	Score	Description	Weight
Completeness	90	Excellent	40%
- Patient	91	Excelent	20%
- Immunization	97	Excellent	20%
Timeliness	100	Excellent	20%
Accuracy	23	Problem	40%

Completeness Score - 90 Excellent
Patient Completeness
Total - 23,987

Measurement	Count	Percentage
Patients with middle name		
Patients with gender		
Patients with race		
Patients with ethnicity		
Patients with VFC eligibility		
Patients with mother's first name		
Patients with mother's middle name		
Patients with mother's maiden name		
Patients with mother's last name		
Patients with a Caregiver		
Patients with street address		
Patients with city		
Patients with state		
Patients with zip code		
Patients with phone number		
Patients with email		

Immunization Completeness
Administered - 100,999
Historical - 139,000
Total - 239,999

Measurement	Admin. Count	Admin. Percentage	Hist. Count	Hist. Percentage	Total Count	Total Percentage
Number given to patients >= 19						
Number given to patients <19						
Immunizations given to patients >= 19 with VFC Eligibility						
Immunizations given to patients < 19 with VFC Eligibility						
Immunizations with manufacturer						
Immunizations with lot number						
Immunizations with expiration date						
Immunizations with dose						
Immunizations with dosage other						
Immunizations with lot type						
Immunizations with site						
Immunizations with routes						
Immunizations with administered by						
Immunizations with VIS Date Given						
Immunizations with VIS Publication Date						

Timeliness Score - 100 Excellent
Administered - 100,999

Measurement	Count	Percentage
Immunizations reported <1 day of date given		
Immunizations reported between 1 day and <2 days of date given		
Immunizations reported between 2 days and <7 days of date given		
Immunizations reported 7 days of date given		
Immunizations reported between 8 days and < 14 days of date given		
Immunizations reported between 14 days and < 30 days of date given		
Immunizations reported 30 days or more of date given		

Accuracy Score - 23 Problem
Administered - 100,999
Historical - 139,000
Total - 239,999

Measurement	Admin. Count	Admin. Percentage	Hist. Count	Hist. Percentage	Total Count	Total Percentage
Invalid Immunizations						
Unspecified Immunizations						

- Given outside of licensure dates - Total 8

Measurement	Admin. Count	Admin. Percentage	Hist. Count	Hist. Percentage	Total Count	Total Percentage
Var given before 1995	0	0%	4	1%	4	1%
VZV given before 2006	0	0%	4	1%	4	1%

Administered outside recommended age - Total 0

[Print] [Close]

Future Enhancement

The New Process: Data Quality Protocol

"Quality is everyone's responsibility."
*- W. Edwards Deming*

Share the Responsibility

- Provider-facing and internal protocol
- Encompasses all the tools
- Collaboration
- Sustainability

Sustainability of Monitoring Data

"Quality is not an act. It is a habit."
- Aristotle

- Tracking known limitations of EHRs (internal data quality tracking document)

- Use of IIS Data for AFIX

- Enhancing tools and implementing the protocol
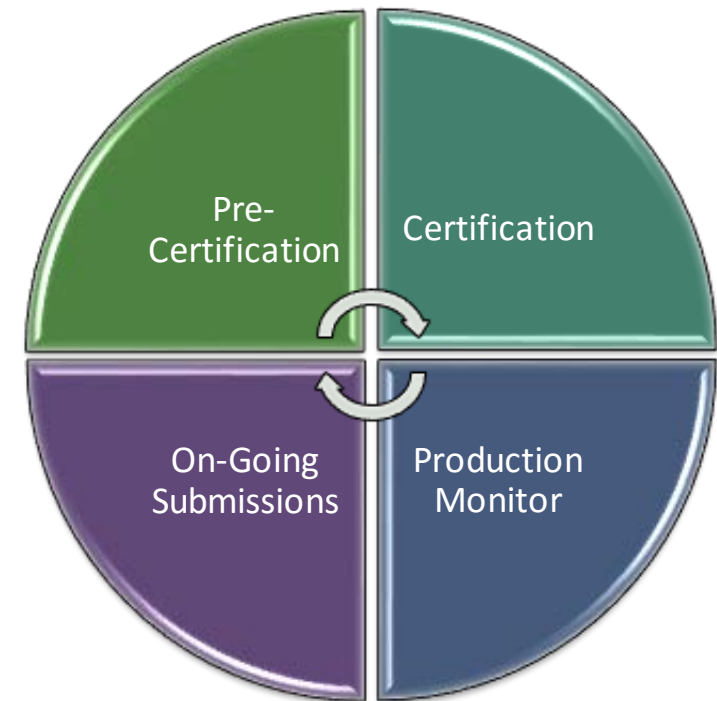
Questions?

"Alone we can do so little; together we can do so much."
-Helen Keller

www.contactmiis.info