



# Inventory Management Operations: Best Practices for Immunization Information Systems

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*The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the funding agency.*

# About MIROW

- The Modeling of Immunization Registry Operations Work Group (MIROW) was formed in 2005 by the American Immunization Registry Association (AIRA) in partnership with the National Center for Immunization and Respiratory Diseases (NCIRD) at the Centers for Disease Control and Prevention (CDC) to develop a best practices guidebook for immunization information systems (IIS).
- MIROW Goals
  - Promote operational consistency
  - Foster communication and collaboration
  - Increase credibility of IIS
- MIROW web page at the AIRA web site
  - <http://www.immregistries.org/pubs/mirow.html>
- MIROW web page at the CDC web site
  - <http://www.cdc.gov/vaccines/programs/iis/activities/mirow.htm>

# Topics Developed

- 2012-2013 (in-progress): Data Quality Assurance in IIS: Selected Aspects

## **2011-2012: IIS Inventory Management Operations**

- 2010-2011: IIS collaboration with Vaccines For Children program and Immunization programs of Grantees
- 2008-2009: Reminder/Recall in IIS
- 2007: Data Quality Assurance in IIS: Incoming Data
- 2006: Vaccination Level Deduplication in IIS
- 2005: Management of Moved or Gone Elsewhere (MOGE) Status and other Patient Designations in IIS

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- 2004-2005: (Pilot) IIS-VAERS Collaboration for Vaccine Adverse Events Reporting

# Why is Inventory Management Topic Important?

- Policies, regulations, and technical implementations related to ordering, distribution, and management of publicly-funded vaccines have evolved rapidly over the past few years. These changes led to requirements for better vaccine supply visibility and accountability.
- Grantees' immunization programs need to adapt to VFC program requirements to use National Drug Codes (NDC), lot numbers, and dose-level reporting for inventory management operations.
- Additional challenges for the IIS community are related to roll-out of the new VTrckS public vaccine ordering system, which will replace the existing VACMAN system.

# Benefits of managing vaccine inventory with IIS

- Adoption of best practice guidelines will:
  - Encourage use of IIS to support VFC and grantee immunization programs.
  - Provide standard consensus-based practices for inventory management through IIS that can be referenced as requirements when developing IIS applications (direct data entry) and EHR systems (for electronic transfer to IIS).
  - Reduce the reporting burden on provider organizations since their reporting to IIS will result in providing inventory data for a grantee immunization program and the VFC program.
  - Improve inventory data quality and accountability for the VFC and grantee immunization programs.
  - Ensure that inventory management practices are comparable across all grantees and all provider organizations. The guidelines will assist IIS in aligning practices through adherence to a set of common recommendations and guidelines.

# Methods

- The workgroup utilized modern business analysis and facilitation techniques
- 14 subject matter experts with diverse backgrounds
- Preliminary work, including collection and analysis of existing IIS materials
- Three and a half days facilitated meeting (September 2011, Atlanta, GA) to analyze existing practices and formulate consensus-based recommendations
- Post-meeting teleconferences to finalize recommended best practices

# Key Outcomes

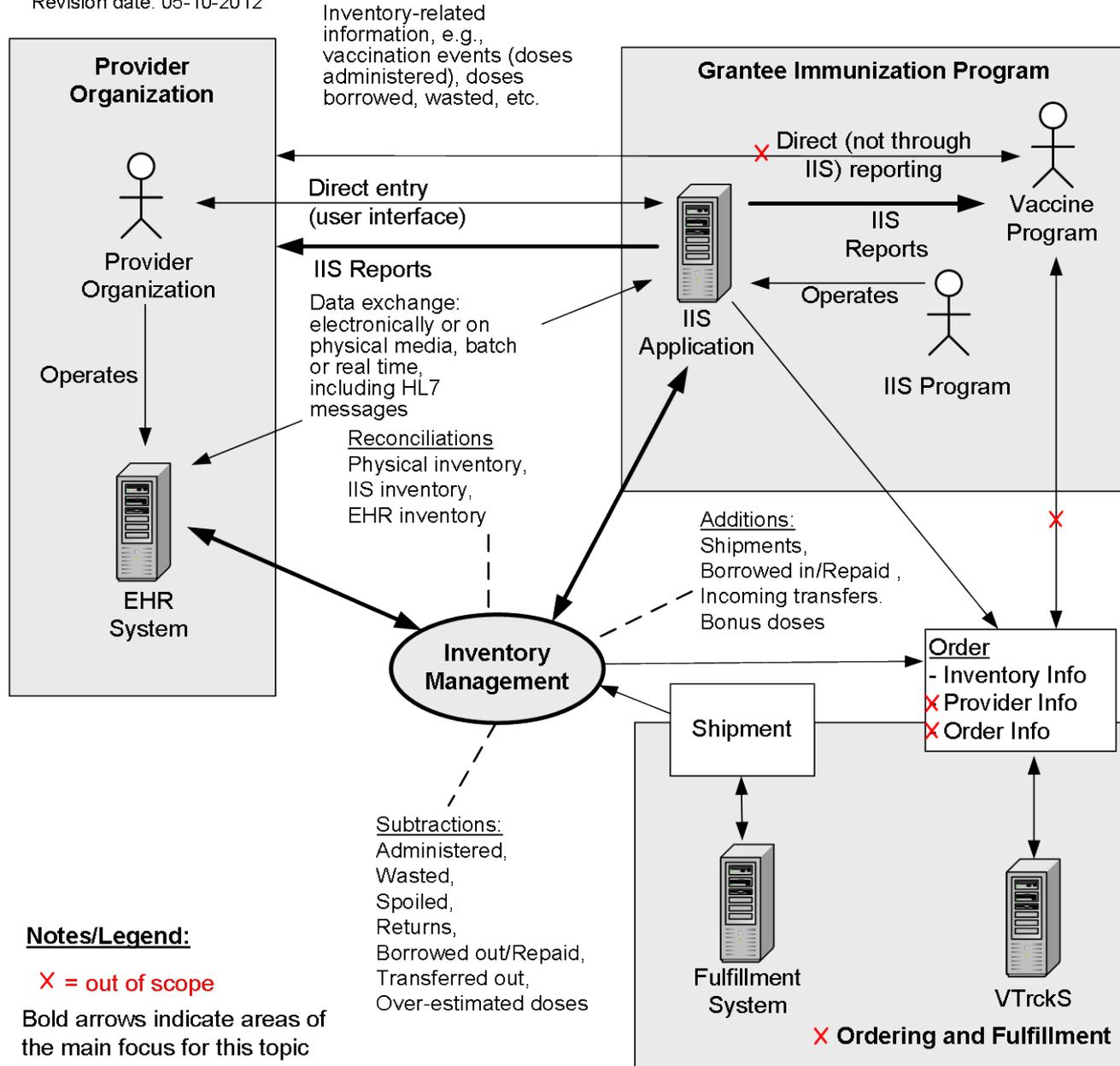
- Developed and reconfirmed key definitions for inventory management through IIS, such as inventory transaction, provider organization IDs, public/private inventory indicator, bonus dose, and over-estimated dose.
- Developed a state/event model that represents the particular state of a vaccine at the dose level and the major stages through which it goes. The model describes **11 states** and **20 events**.
- Formulated **8 principles** and **25 business rules** to guide inventory management operations (e.g., what information to record, how often to conduct inventory reconciliations, and how to handle borrowing).
- Formulated **23 general recommendations** for IIS functionality and operations related to inventory management.
- Described **20 key inventory management reports**, with a focus on accountability reports to support inventory management, accountability reports that support the ordering process, allocation reports, and reconciliation reports.
- Developed expanded considerations for implementing National Drug Codes (NDC) and handling borrowing between publicly-funded and privately-purchased vaccine stocks.

# Recommendations Overview:

- Topic scope (slide 12)
- Domain concepts and key terms (slide 13)
- State/Event model (slide 14)
- Dose level accountability (slide 15)
- NDC and Lot number (slide 16)
- Reconciliation (slide 17)
- Borrowing (slide 18)
- Inventory Data Quality (slide 19)
- IIS Reports (slide 20)

# Topic scope in context of immunization operations

Revision date: 05-10-2012



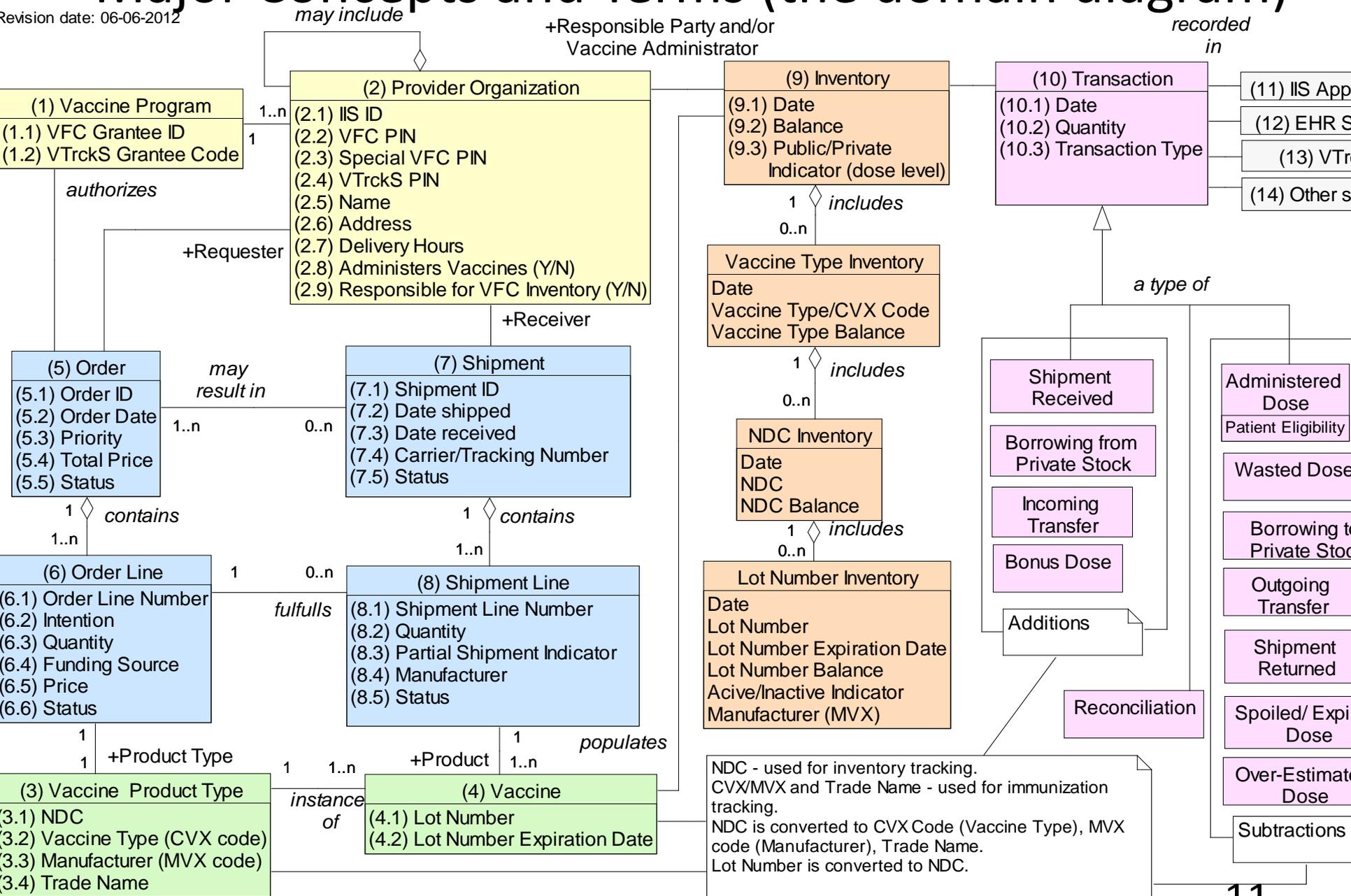
**Notes/Legend:**

**X = out of scope**

**Bold arrows indicate areas of the main focus for this topic**

# Major Concepts and Terms (the domain diagram)

Revision date: 06-06-2012



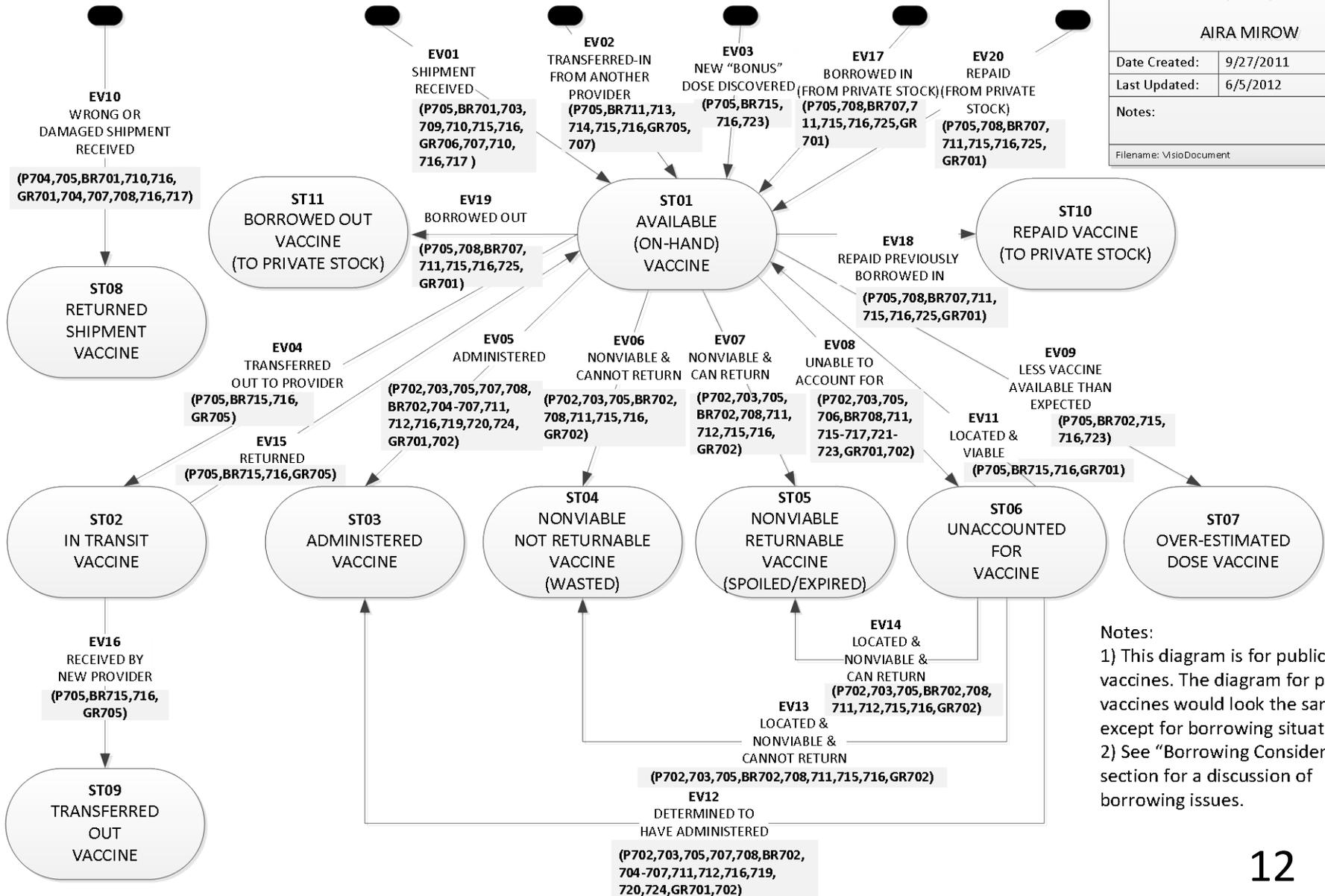
# State/Event Diagram for a Vaccine Dose

## Inventory Management

Event (State) Model

AIRA MIROW

Date Created:	9/27/2011
Last Updated:	6/5/2012
Notes:	
Filename:	Visio Document



Notes:  
 1) This diagram is for public vaccines. The diagram for private vaccines would look the same except for borrowing situations.  
 2) See "Borrowing Considerations" section for a discussion of borrowing issues.

# Recommendations Highlights:

## Dose Level Accountability

- Dose-lot number accountability principle: Every vaccine dose should be accounted for with the associated lot number information (P702).
  - According to the state/event model, the following vaccine dose states (types/categories) should be measured (further sub-categories may be implemented locally): available (on-hand), in-transit (transferring), administered, wasted (nonviable, not returnable), expired/spoiled (nonviable, returnable), unaccounted for, over-estimated, returned shipment, transferred out, repaid (previously borrowed), and borrowed out.
- IIS inventory management functionality should support accountability at the dose/lot number level, but aggregate reporters (Provider Organizations) will have to be accommodated during the phase-in of accountability at the dose/lot number level for all Provider Organizations (GR702).

# Recommendations Highlights: NDC and Lot Number

- NDC supremacy principle: Vaccine inventory management should be based on the National Drug Code (NDC) (P701).
- The NDC received from VTrckS (in the shipment file) should be used for receiving, reporting, and tracking inventory (BR701).
  - In cases where the shipment file has not been received and the vaccine is packaged in a larger container, *the NDC on the outside packaging (e.g., box) should be used.*
- IIS should make NDC known to Provider Organization prior to arrival of a direct vaccine shipment (BR703).
- Lot number for every vaccine dose utilized by a Provider Organization must be matched/mapped to NDC for a specific inventory entry and the appropriate transaction should be created to adjust the inventory appropriately (BR702).

# Recommendations Highlights: Reconciliation

- Provider Organizations should reconcile their physical inventories to the IIS at a frequency appropriate to the size and complexity of their practice or clinical setup (P706).
- Reconciliation frequency: Provider organizations should reconcile their entire physical inventory to the IIS at least once a month; large, complex provider organizations may consider reconciling more frequently (e.g., weekly) to minimize the risk of inventory errors (BR723).
- Provider Organizations must reconcile their entire physical inventory to the IIS inventory immediately prior to ordering (BR722).
- Physical inventory count for reconciliation purposes should always be done on a day boundary ( i.e., at the end of a business day or prior to the next business day) (BR721).

# Recommendations Highlights: Borrowing

- Borrowing between private and public vaccine stocks at a Provider Organization should be done according with the VFC program guidelines and Grantee Vaccine Program policies.
- IIS should have functionality in place to assist
  - The Grantee Vaccine Program with monitoring of Vaccine borrowing between the public and private stocks, and
  - Provider Organizations to meet reporting and accountability requirements for Vaccine borrowing and replacement.

Such functionality also would be helpful for monitoring and analyzing Provider Organization's borrowing practices.

- Borrowing and replacement of borrowed vaccine doses between public and private stocks should be tracked at the dose level (BR707). When a multi-dose vial is involved, borrowing should be done at the single-dose level (BR725).

## Recommendations Highlights: Inventory Data Quality

- Manual data entry should be minimized and manual entry of inventory data that is already known should be avoided (GR710).
- Data quality assurance metrics (as determined by CDC and grantee immunization programs) should be utilized to measure and track data quality from any shipping entity, including a centralized distributor (currently McKesson) – e.g., entering lot numbers and other data items. These metrics should be used to improve data quality from any shipping entity (GR717).
- QA process should be in place to assure that information that has been provided as compiled by non-IIS systems is accurate (GR714)
  - This should be a collaborative effort between IIS Program, the Provider Organizations community, and the IIS and EHR vendor community.
- IIS should follow MIROW Data Quality Assurance in Immunization Information Systems: Incoming Data guidelines (GR709).

# Recommendations Highlights: IIS Reports

- IIS application should have reports available to support detailed analysis by the grantee program of a provider organization practices (GR719). For example (Chapter 6):
  - No inventory vaccine report (1.1).
  - Pending inventory/transfers (1.2).
  - Vaccine loss (1.5) - specifically for review of waste.
  - Borrowed/replaced report (2.1).
- The Guide (chapter 6) contains recommendations for reports in the following areas:
  - Accountability reports to support inventory management (for purposes other than ordering and reconciliation, reports 1.1 – 1.6).
  - Reconciliation reports (reports 2.1 – 2.4).
  - Accountability reports that support the ordering process (3.1 – 3.6).
  - Allocation reports (i.e., to allocate vaccines during shortages and to issue a recall based on lot numbers, reports 4.1 – 4.4).

# Conclusions

- Workgroup developed guidelines and recommendations to use IIS as a base for handling inventory management activities
- Recommendations are at the business/operational level, independent from specific implementations and technology solutions
- Consistent use and implementation of these recommendations will help to improve IIS practices. Developed guidelines will assist IIS in aligning practices through adherence to a set of common recommendations and guidelines.
- Guidelines address NVAC recommendations to develop a guidebook and best practices for IISs to promote IIS data quality

# Acknowledgments

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- Technical Editors at CDC



# Questions?

Copies of the MIROW recommendations documents as well as abridged mini-guides can be found at:

- AIRA web site

<http://www.immregistries.org/pubs/mirow.html>

- CDC web site

<http://www.cdc.gov/vaccines/programs/iis/activities/mirow.html>

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