Reminder/Recall in Immunization Information Systems

Recommendations of the American Immunization Registry Association (AIRA) Modeling of Immunization Registry Operations Work Group (MIROW)

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Reminder/Recall in Immunization Information Systems

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**Table of Contents**

- AIRA Modeling of Immunization Registry Operations Work Group’s roster ................. 6
- Acknowledgments ........................................................................................................... 8
- Executive Summary ......................................................................................................... 9
- **Chapter 1: Introduction** ............................................................................................. 12
  - About the MIROW Reminder/Recall Project ................................................................. 12
  - What this document is about ........................................................................................ 13
  - Benefits of Reminder/Recall ........................................................................................ 13
  - Value of MIROW Reminder/Recall recommendations ................................................. 15
  - Scope: Reminder/Recall in IIS ...................................................................................... 15
  - Implementation/Technology independence .................................................................... 16
  - Intended audience ......................................................................................................... 16
  - Intended use ................................................................................................................ 17
  - Work Group approach .................................................................................................. 17
- **Chapter 2: Reminder/Recall process** ........................................................................ 18
  - Reminder/Recall process in a nutshell ........................................................................... 18
  - Reminder/Recall process description ......................................................................... 20
- **Chapter 3: Process-related recommendations; Principles and Business Rules** .......... 26
  - Introduction ................................................................................................................ 26
  - Responsibility for Reminder/Recall .............................................................................. 27
  - Process triggers .......................................................................................................... 30
  - Reminder/Recall criteria .............................................................................................. 33
  - Resource limitations and other restrictions .................................................................. 36
    - A note regarding coordination of RR activities ............................................................. 37
  - Selection of the RR Notification method ...................................................................... 38
  - Content of the RR Notification ................................................................................... 41
  - Reaction to the RR Response ....................................................................................... 49
- **Chapter 4: Influences on various aspects of RR operations** ....................................... 55
  - RR functionality: General ........................................................................................... 55
  - RR Functionality: Algorithm ....................................................................................... 56
  - RR Functionality: Provider considerations ..................................................................... 57
  - RR Functionality: Language ........................................................................................ 57
  - IIS support of RR, including training ............................................................................ 58
  - Data quality ............................................................................................................... 58
  - Privacy and confidentiality ............................................................................................ 58
  - Evaluation of RR outcomes and responses ................................................................... 59
- **Chapter 5: Evaluation of Reminder/Recall Outcomes and Responses** ....................... 60
- **Chapter 6: Peer-reviewed literature references and literature-based recommendations** ...................................................................................................................................... 69
- **Chapter 7: RR worst practices: Approaches not to take and things definitely not to do** .......................................................................................................................................... 74
- **Chapter 8: Barriers to implementation** ...................................................................... 77
- **Conclusions** ............................................................................................................... 79
- **Selected references** .................................................................................................... 81
  - Previously developed guidelines .................................................................................. 81
  - Reference materials ..................................................................................................... 81
  - Materials from individual IIS ....................................................................................... 82
Reminder/Recall in Immunization Information Systems

Selected literature sources........................................................................................................................................ 82

Appendix A. Domain model................................................................................................................................... 84

Background.................................................................................................................................................................. 84
Domain model purpose and explanation.................................................................................................................. 84
How to read and interpret the domain diagram ....................................................................................................... 84
Description of the domain diagrams.......................................................................................................................... 85
  a) Vaccination Encounter – Vaccination Event – Vaccine.................................................................................. 85
  b) Patient – Provider – Immunization Home........................................................................................................... 86
  c) Public Health Entity - Jurisdiction – Population Group – Individual.............................................................. 86
  d) Reminder/Recall Notification............................................................................................................................. 86
  e) RR Responses and Outcomes............................................................................................................................. 88

Appendix B. Work Group approach .......................................................................................................................... 100

Process ....................................................................................................................................................................... 100
Methods and techniques............................................................................................................................................. 100
Resulting Products .................................................................................................................................................... 101

Illustrations

Figure 1. Reminder/Recall in context ............................................................................................................................. 14
Figure 2. Illustration of scope for the Reminder/Recall topic......................................................................................... 16
Figure 3. Reminder/Recall process at a glance............................................................................................................... 19
Figure 4. Reminder/Recall process diagram ................................................................................................................ 25
Figure 5. Example of the RR “criteria”: screen shot from the Kansas Immunization Registry................................. 34
Figure 6. Example of the RR “criteria”: screen shot from the CHILD Profile - Washington State Immunization Registry.................................................................................................................. 35
Figure 7. Example of RR Notification method selection: a screen shot from the CHILD Profile - Washington State Immunization Registry.................................................................................................................. 40
Figure 8. Postcard example from the Kansas Immunization Registry .............................................................................. 43
Figure 9. Postcard example from the CHILD Profile - Washington State Immunization Registry................................. 43
Figure 10. Postcard example from the Oklahoma IIS..................................................................................................... 44
Figure 11. Postcard example from the Oklahoma IIS..................................................................................................... 44
Figure 12. RR letter example from Scientific Technologies Corporation........................................................................... 45
Figure 13. Mail label example from the CHILD Profile - Washington State Immunization Registry................................. 45
Figure 14. List of Patients and associated vaccines due or past due: example from the CHILD Profile - Washington State Immunization Registry.................................................................................................................. 45
Figure 15. Example of a RR Notification card ............................................................................................................... 45
Figure 16. Example of Recall Notification for a geographic Jurisdiction from the Colorado IIS......................................... 47
Figure 17. Example of a RR Notification card from the Colorado IIS.............................................................................. 48
Figure 18. Illustration of person-to-person telephone-based RR...................................................................................... 54
Figure 19. Illustrative example - RR Outcomes evaluation (Colorado IIS)....................................................................... 62
Figure 20. New Jersey IIS screen shot of the Patient "outreach history", ....................................................................... 65
Figure 21. Screen shot demonstrating tracking of person-to-person telephone Recall Notifications (Colorado IIS)............................................................................................................................................................... 66
Figure 22-A1. Domain diagram: Patient – Provider and Jurisdiction – Individual (a fragment). 89
Reminder/Recall in Immunization Information Systems

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Reminder/Recall in Immunization Information Systems

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Reminder/Recall in Immunization Information Systems

Executive Summary

Background
The Modeling of Immunization Registry Operations Work Group (MIROW) was formed by the American Immunization Registry Association (AIRA) in partnership with Centers for Disease Control and Prevention / National Center for Immunization and Respiratory Diseases (CDC/NCIRD) to develop a Best Practices guidebook for immunization information systems (IIS). This document is one chapter of the guidebook. It provides consensus-based best practice recommendations for IISs on communicating to an Individual that (s)he is due now or on a future date (reminder) or past due (recall) for one or more recommended immunizations.

Benefits of Reminder/Recall
The primary benefit of Reminder/Recall (RR) is to improve the timeliness and completion of recommended immunizations to prevent disease.

Peer reviewed literature indicates that Reminder/Recall (RR) is effective
- For both childhood and adult immunizations;
- In all types of medical settings, including private practices, academic medical centers, and public health agency clinics; and
- For universally recommended vaccinations, such as routine childhood vaccinations as well as targeted vaccinations, such as influenza vaccine, with increases in immunization coverage rates tending to be 5 to 20 percentage points.

Secondary benefits of Reminder/Recall include improved IIS data quality, achieved by using responses to the Reminder/Recall notices to add or update information in the IIS, and strengthening relationships between IISs and Providers.

Highlights of Recommendations
The decision to initiate an RR process is based on policy and resource considerations and can be initiated by a variety of parties: a Provider for its Patients, a health plan for its enrollees, or a State or local public health entity for Individuals for whom it is responsible. Examples of principles (P) and business rules (BR) in this document that establish responsibility for Reminder/Recall include:
- The IIS or other State or local public health agency should be available to assume the responsibility (and cost) of conducting Reminder/Recall on behalf of other parties (e.g., Providers) – principle P203.
- If the Immunization Home is known, that Provider is primarily responsible for RR processes for routine immunizations – business rule BR201.
- If the Immunization Home is not known, State and local public health agencies are primarily responsible for the RR processes for routine immunizations – business rule BR202.

The RR process originator determines the goal for the particular RR process, e.g., to improve immunization coverage levels for a certain age group, or to notify Individuals (or responsible
Reminder/Recall in Immunization Information Systems

parties) that a booster vaccine is available after a vaccine shortage is resolved. Examples of principles and business rules that define when the RR process should be initiated include:

- The RR process should be initiated on a regular basis (e.g., weekly, monthly, annually) and as needed - principle P302.
- The RR process could be initiated based on: (a) Advisory Committee on Immunization Practices (ACIP) schedules; (b) Standard time frames for well-child visits; or (c) State-mandated requirements (e.g., school and child care entry requirements) – principle P301.
- A single Reminder Notification should be considered 2 to 4 weeks before the recommended due date/date range for each recommended vaccine/vaccination visit – business rule BR301.
- One reminder and up to 3 follow-up Recall Notifications for each recommended vaccine/vaccination visit should be considered for children 0-6 years of age – business rule BR305.

The RR process originator takes into account resource limitations and other potential restrictions when determining whether to initiate a RR process. Considerations include data completeness and accuracy, timeliness of reporting data to the IIS and baseline immunization rates. If resource limitations or other restrictions limit initiation of RR, then recommendations (expressed in principles and business rules) provide priorities for when to initiate RR. For example:

- Reminder/Recall must be in line with available resources. Accordingly, not every recommended vaccination will result in a Reminder/Recall Notification – principle P501.
- Priority should be given to Recall Notifications for children 0–24 months of age – principle P505.

The RR process originator determines who will be included in the RR, as well as the type and frequency of communication and the content of the notice. This document contains principles and business rules defining the criteria to use in selecting who will be included in the RR and for the RR Notification content. Examples of principles and business rules related to the method of the RR notice include:

- Effectiveness of the Reminder/Recall could be increased with combining various RR Notification methods – principle P602.
- Each Reminder/Recall process should employ the most cost-effective RR Notification method based on resources available – principle P604.
- The most cost-effective RR Notification methods to improve timeliness and completion of immunizations, ranked from the most to least cost effective are: telephone call (person-to-person), letter, postcard, autodialer, and home visit – business rule BR602.

After a RR Notification is issued (i.e., the postcard is sent or the autodialer dials), the IIS or other party collects the results. Examples of recommendations with respect to the responses to the RR Notification include:

- In the event there is no State guideline, there should be 3 (three) RR Notification attempts before the RR process can be ended – business rule BR801.
Reminder/Recall in Immunization Information Systems

- After an unsuccessful RR attempt, if the RR process is not ended, consider a different RR Notification method. For example, escalate from a post card to a telephone call – principle P802.
- After certain period of time and number of unsuccessful RR attempts the responsibility for a Patient should be transferred from a Provider level to a geographic Jurisdiction level – principle P803.

Examples of general recommendations (GR) for IIS RR-related functionality include:

- Each IIS should have functionality to track Patient active/inactive status at both the Provider and geographic Jurisdiction levels – general recommendation GR105.
- RR functionality (algorithm) should support newly introduced vaccines (including newly introduced combination vaccines) within 90 days of notification from ACIP or CDC, or as soon as possible – general recommendation GR202.
- Each IIS should have functionality:
  - To allow Providers to use RR for its Patients
  - To allow local and State public health agencies to perform RR on behalf of Providers for the Provider’s Patients
  - To allow local and State public health agencies to perform RR on a geographic Jurisdiction level – general recommendation GR104.
- RR functionality should include:
  - Algorithm for ACIP recommendation, and
  - Algorithm for State school entry requirements – general recommendation GR201.

Approaches for the evaluation of Reminder/Recall are detailed, including examples of quantitative measures for RR responses and outcomes. General recommendation GR103 states that RR functionality should record information necessary to track RR responses and outcomes to support evaluation efforts; examples of data elements that should be tracked for evaluation are included.

This guide, additionally to formulated principles, business rules, and general recommendations, documents Reminder/Recall with a process description (use-case model) and a process diagram, as well as contain selected peer-reviewed literature references and extensive IIS examples of various aspects of the RR process.

Conclusion

*The National Vaccine Advisory Committee (NVAC)* has included a recommendation to "Promote the adoption of a guidebook and best practices for IIS as started by the CDC/NIP and AIRA/MIROW workgroup to adopt consistent operational guidance and quality control procedures that ensure good data quality." This best practices guide is one example of addressing the NVAC recommendation in the area of Reminder/Recall operations. It will assist IISs in aligning RR practices through adherence to a set of common recommendations and guidelines.
Chapter 1: Introduction

About the MIROW Reminder/Recall Project

The Modeling of Immunization Registry Operations Work Group (MIROW) of the American Immunization Registry Association (AIRA) was formed to develop a topic-by-topic Best Practice guidebook for various aspects of immunization information systems (IIS) functionality. The MIROW Steering Committee conducted an assessment in April 2005, within the IIS community, to learn which functional components were problematic to deploy and could benefit from a collective guidance.

The first topic selected for analysis and development of best practice recommendations was the management of the “Moved or Gone Elsewhere” (MOGE) status of patients and other patient immunization designations. Recommendations were developed in 2005 and the final guidance chapter is available at the AIRA web site at http://www.immregistries.org/docs/MIROW_MOGE_Chapter_Final_122005_rev1.doc . Best practice recommendations were presented at the 40th National Immunization Conference (March 6–9, 2006, Atlanta, Georgia). Slides and the recorded presentation are available at http://cdc.confex.com/cdc/nic2006/techprogram/P10124.HTM.

The second topic selected for analysis and development of best practice recommendations was the vaccination level deduplication in IIS. Recommendations were developed in 2006 and the final guidance chapter is available at the AIRA web site at http://www.immregistries.org/pdf/AIRA_BP_guide_Vaccine_DeDup_120706.pdf . Best practice recommendations were presented at the 41st National Immunization Conference (March 5–8, 2007, Kansas City, Missouri). Slides and the recorded presentation are available at http://cdc.confex.com/cdc/nic2007/techprogram/P12532.HTM.

The third topic selected for analysis and development of best practice recommendations was data quality assurance in IIS (incoming data). Recommendations were developed in 2007 and the final guidance chapter is available at the AIRA web site at http://www.immregistries.org/pdf/AIRA_MIROW_Chap3_DQA_02112008.pdf .

The current report represents MIROW efforts to develop best practice recommendations for the fourth topic chosen, Reminder/Recall utilizing IIS. The development process consisted of a preliminary phase (web-based teleconferences, September–October 2008), face-to-face meeting (October 28–30, 2008, Tampa, Florida), and subsequent post-meeting work to finalize the recommendations.

The National Vaccine Advisory Committee (NVAC) has included a recommendation to "Promote the adoption of a guidebook and best practices for IIS as started by the CDC/NIP and AIRA/MIROW Work Group to adopt consistent operational guidance and quality control procedures that ensure good data quality." This guide is one example of addressing the NVAC recommendation through the development of best practices for reminder/recall procedures.
Reminder/Recall in Immunization Information Systems

What this document is about
This document provides consensus-based best practice recommendations for IIS on communicating to an individual that (s)he is due now or on a future date (reminder) or past due (recall) for one or more recommended immunizations (not to be confused with the Vaccine Recall).

In this document the term Reminder/Recall and its abbreviation RR are used interchangeably.

This document brings real world practical knowledge from experts who work daily with Reminder/Recall. It also draws upon the wealth of peer reviewed literature written on the subject of Reminder/Recall. Selected references of this literature are provided in Chapter 6. In developing the guidelines, the Work Group intended to maintain an appropriate mix of practical real world public health considerations and peer reviewed recommendations for the IIS community.

The following assumptions reflect the MIROW approach to the development of principles, business rules, and associated best practices presented in this document:

• The focus should be on those principles and business rules that have the greatest potential for providing value and use across all IISs.
• The principles and business rules represent an attempt to balance “ideal” possible practices with “pragmatic” considerations of what will be possible to implement in an IIS.
• Each IIS will “tweak” the implementation of business rules (and associated best practices) based on its resources, goals, needs and unique implementation concerns.
• The set of principles and business rules presented here is not exhaustive. Individual IISs may choose to implement additional rules based on its unique requirements and insights.
• The developed business rules and associated best practices will need to change and evolve over time as business requirements change.

Benefits of Reminder/Recall
The primary expected benefit of Reminder/Recall is to improve the timeliness and completion of recommended immunizations to prevent disease.

Peer reviewed literature (see Chapter 6) indicates that Reminder/Recall is effective

• For both childhood and adult immunizations;
• In all types of medical settings, including private practices, academic medical centers, and public health agency clinics; and
• For universally recommended vaccinations such as routine childhood vaccinations as well as targeted vaccinations such as influenza vaccine.

All types of Reminder/Recall systems were found to be effective, with increases in immunization coverage rates tending to be 5 to 20 percentage points. [4.3]

Reminder/Recall also provides an important secondary benefit of improved IIS data quality by using responses to the Reminder/Recall communications to add or update information in the IIS, including:

• Demographic (contact) information (address, phone number, email address)
Reminder/Recall in Immunization Information Systems

- Documentation of immunizations that were administered prior to the Reminder/Recall that had not been reported to the IIS
- Identification of individuals who are the “responsibility” of each Provider and geographic Jurisdiction and are therefore the correct individuals to include in future Reminder/Recall efforts and in the denominator for calculation of immunization coverage levels (i.e., update Patient status at both the Provider and geographic Jurisdiction levels)

Additional benefits of Reminder/Recall are strengthening relationships between IISs and Providers by:
- Providing an easy and low-cost method for Providers to perform Reminder/Recall.
- Reinforcing a medical (immunization) home through identification of individuals lost to follow up and bringing them back for immunizations as well as other care.
- Assisting Providers to improve clinical care through identification of erroneous immunization practices, such as giving a vaccine too early, violating minimum interval/age rules, etc.
- Saving labor and providing quality assurance benefits for Providers, if IIS performs a Reminder/Recall for Providers.

Successful RR operations depend on a number of factors:
- Extent of reporting of client and immunization events to the IIS in a timely manner (see [1.3] in the “Selected References” section)
- Regular deduplication of client and vaccine information (see [1.2])
- Complete and accurate client (including contact information) and vaccine data (see [1.3])
- Consistent tracking of Patient active/inactive status (see [1.1])
- Accurate forecast of vaccinations that are due

Figure 1. Reminder/Recall in context
Value of MIROW Reminder/Recall recommendations
The National Vaccine Advisory Committee (NVAC) recommends that all IIS meet minimal functional standards. Functional Standard Number 10 (see http://www.immregistries.org/know/standards.phtml) states that all IISs should have the ability to “Automatically identify individuals due/late for immunization(s) to enable the production of reminder/recall notifications.” These MIROW Reminder/Recall recommendations and knowledge base will allow IIS and Providers to implement Reminder/Recall at both the Provider and geographic Jurisdiction levels in a consistent and efficient manner and meet NVAC functional standard Number 10.

Scope: Reminder/Recall in IIS
Primary focus of these recommendations (see Fig. 2 below) includes procedures, principles, and business rules for using an IIS to produce Reminders and Recalls that are
- Communicated to one or more individuals, of
- All ages (children, adolescents and adults), at both
- Provider and geographic Jurisdiction levels, for
- Routine and targeted Reminder/Recall

Secondary focus of these recommendations includes (see Fig. 2 below):
- Vaccine recall
- Patient active/inactive status management (see also decision tables in the MIROW Patient Status (MOGE) guideline document [1.1] )
- Immunization coverage assessment

ACIP recommendations and State school entry laws and regulations intersect with Reminder/Recall. While these interdependencies are recognized and referenced in this document where appropriate, the developed recommendations are independent from specifics of ACIP recommendations and individual State school entry requirements.
**Implementation/Technology independence**
Developed best practice recommendations are intended to be at the business/operational level and as a result, independent from particular IIS implementations and technology solutions. This reflects the industry-wide strategic approach to capture and maintain business knowledge, requirements, and policies/constraints independently of implementation architecture and technical solutions. As a result, developed best practice recommendations will be able to support the wide variety of IIS implementations strategies on different technological platforms.

**Intended audience**
This guide is designed to be read by programmatic, technical and operational personnel involved in creating or maintaining an IIS. The guide intends to bridge the gap between technical and
Reminder/Recall in Immunization Information Systems

program staff so they can have a mutual understanding of the issue of Reminder/Recall, and target actions to address these recommendations.

**Intended use**
This guide contains a set of recommended operational best practices (including a set of principles and business rules to follow) that are intended for use as a basis for requirements in IIS Reminder/Recall systems and operations. Additionally, this guide can be used by IIS for staff training, operational documentation, and communication purposes.

The implementation of Reminder/Recall systems will vary based on the vendors’ technology, application architecture, and specifics of a particular IIS. Also, resource constraints, or required changes to existing functionality, may result in *incremental adoption* of these guidelines.

The approach used and results presented are relevant for and can be utilized beyond immunization information systems, e.g., for developing and documenting best practices and operational requirements for domain-specific data validation applications in public health, health care, and other areas.

**Work Group approach**
This section contains a brief description of the methodology and process used by MIROW; see Appendix B for the expanded description of the work group approach.

The Work Group used business engineering and facilitation techniques to analyze IIS processes and develop recommendations. It utilized a pragmatic results-oriented approach that has been effective for modeling of IIS and cancer registration operations. Initial *preparatory off-line work* (assembling pertinent materials, producing preparatory notes, analysis of processes and development of preliminary drafts) was performed by a group of business analysts and subject matter experts (SMEs). During a subsequent *face-to-face facilitated modeling session* in Tampa, Florida (October 28-30, 2008) a full (large) work group of SMEs used preparatory materials as a framing/scoping resource and began development and formulation of consensus-based recommendations. The *post-session work* was aimed at finalizing the development of recommendations. The work group was divided into two small groups of SMEs, each addressing a set of remaining tasks during a series of teleconferences. Additional teleconferences were dedicated to progress reviews of small groups by the full group of SMEs. The work group used the following definition of a consensus among SMEs regarding the best practice recommendations developed, which did not reflect 100% agreement, but rather meant "I can live with that and support it."
Chapter 2: Reminder/Recall process

This chapter describes a Reminder/Recall process that utilizes an IIS. Reminder/Recall systems that use other data, such as an electronic medical record, or a Provider-based immunization registry that is independent from an IIS, are not included in this document, although many of the concepts and recommendations are applicable to any Reminder/Recall system. Definitions of Reminder and Recall, as well as definitions of other terms used in describing and discussing various aspects of the Reminder/Recall process are presented in Appendix A, “Domain model”.

Reminder/Recall process in a nutshell

The RR process is about communicating to an Individual/Patient, or a responsible party, that the Individual/Patient is due now or on a future date (reminder) or past due (recall) for one or more recommended immunizations. Reminder/Recall can be initiated by many different parties: a Provider for its Patients, a health plan for its enrollees, or a State or local public health entity for Individuals for whom it is responsible in all or part of its geographic Jurisdiction.

The decision to initiate an RR process is based on policy and resource considerations and a comparison of recommended immunizations versus the immunization information recorded in the IIS for an Individual. Communication with the Individual (or a responsible party) utilizes demographic information recorded in the IIS, such as address and telephone number.

The entity that initiates an RR process (referred to as the RR Originator in this document) determines the goal for the particular RR process, e.g., to improve immunization coverage levels for a particular age group, or to notify Individuals (or a responsible party) that a booster Vaccine is available after a Vaccine shortage is resolved. After setting the goals for the particular RR process the RR Originator determines specific parameters for the particular RR process, including: the Individuals who will be subject to the RR (referred to as the RR Recipients in this document), as well as the type and frequency of communication. The most common methods of RR communication include postcards, letters, and telephone calls (person-to-person or autodialers).

After the RR process is initiated, other entities may have responsibility for all or part of the RR activities. Coordination among all the entities who may initiate a RR process is important to use resources efficiently without unintended duplication of efforts and to ensure that the Individuals who are subject to the RR efforts are not confused.

The primary goals of the Reminder/Recall process are to improve timeliness and completion of recommended immunizations to prevent disease. The RR process also serves to improve the data quality in an IIS and can strengthen the relationship of Patients to a medical home and Immunization Home as defined in [1.1].

Reminder/Recall may use a direct or indirect notification scheme (see Fig. 3):

1. Direct notification is from the RR Originator (e.g., IIS or Provider) directly to the RR Recipient (Individual/Patient or a responsible party, e.g., parents or guardians).
Reminder/Recall in Immunization Information Systems

2. Indirect notification is from the RR Originator (e.g., IIS) to the RR Distributor (e.g., Provider, or school clinic), which in turn sends the notification to the RR Recipient (Patient or a responsible party, e.g., parents or guardians).

The following section provides a detailed step-by-step description of the Reminder/Recall process.

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**Figure 3.** Reminder/Recall process at a glance.
Reminder/Recall in Immunization Information Systems

Reminder/Recall process description

The following is a detailed step-by-step description of the Reminder/Recall process. Guiding principles and business rules are referenced at each step of the process, but are externalized from the process model. Such an approach allows separation of the process flow description (what is happening) from the statement of the policies and rules that guide decisions made at each step (why and how).

Principles and business rules for various topics related to the Reminder/Recall process are logically grouped into the sections of Chapter 3.

The process is flexible; it can accommodate a variety of Reminder/Recall strategies and approaches. For example, restrictions related to limited IIS resources can be accounted for upfront, during the criteria selection, or later in the process when a list of potential Reminder/Recall Recipients is produced, or in both places, as a multi-phase process, when results of initial considerations entered into a criteria are adjusted after the list of potential Reminder/Recall Recipients is produced.

Reminder/Recall operational scenarios are depicted on the process map (see Fig. 4).

The RR Originator (Provider or Jurisdiction) sets the goal(s) for the particular RR process based on policy and resource determinations. The RR Originator will determine whether the goal is to raise immunization coverage levels in all or a targeted part of the population for which it is responsible. After setting the goal(s) for the particular RR process, the RR Originator determines specific parameters for the particular RR process (RR protocol: RR Criteria, recurrence, etc.)

For readability, the term Patient in this process description may be used instead of the more appropriate term Individual/Patient.

The process starts based on (see Chapter 3, section “Process triggers”):

- **Schedule-based triggers**, for example, periodic identification of Individuals/Patients who are due or overdue for vaccinations (e.g., monthly, quarterly). This type of RR process could be for all Individuals/Patients or for Individuals/Patients in one or more specified age groups. This type of RR process is based on an overall policy decision to raise immunization coverage levels.
- **Situation-based triggers** that target particular segments of the population:
  - Specified priority groups as a result of an emergency situation.
  - Individuals/Patients who are overdue for one or more Vaccines as a result of a Vaccine shortage (both by Providers and Jurisdictions)
  - Individuals/Patients for whom a newly introduced Vaccine is recommended.
  - Individuals/Patients identified as a pocket of need (e.g., based on address, occupation, access to medical home, race and ethnicity, insurance coverage).
  - Individuals/Patients identified as a high risk population through the IIS or some other source such as an electronic medical record or registry other than the IIS (e.g. diabetics)
Step 1. RR Originator formulates Reminder/Recall criteria.

- Associated principles and business rules:
  *See Chapter 3, section “Reminder/Recall criteria”*

By assigning values to the criteria data items the RR Originator can create various sets of conditions (filters) to select Individuals/Patients for a list of potential candidates for the particular RR process. Such a selection determines the target group. The target group could be all the active Patients associated with a Provider, or it could be all the Individuals associated with a Jurisdiction (State or local health entity or school district), or all the Individuals residing in a specified geographic area (e.g., based on zip code or city boundaries). The type of RR—e.g., Provider-based recall or geographic Jurisdiction recall—guides the criteria selection.

- Typical data elements to consider are (see Chapter 3, section “Reminder/Recall criteria”):
  - Individual/Patient age (DOB)
  - Associations between a Provider and its Patients, such as medical home or Immunization Home
  - Patient active/inactive status at the Provider and geographic Jurisdiction level (see [1.1])
  - Immunization status with respect to one or more specified antigens
  - High risk status for a Patient or population
  - Address attributes: State, county, city, zip or public health entity area of responsibility
  - Association with a particular program (e.g., WIC – federal Women, Infants, and Children nutrition program, Medicaid, Fire Department)
  - Health plan (insurance) or payer source
  - Exemptions and contraindications for a Vaccine(s) (may be temporary or permanent)
  - Language preference
  - Occupation
  - Individual/Patient opt-out from RR process in whole or in part

Step 2 (optional). RR Originator defines additional conditions (filters) for the Reminder/Recall criteria.

- Associated principles and business rules:
  *See Chapter 3, section “Resource limitations and other restrictions”*

During this step additional conditions (filters) may be applied to limit the list of potential RR candidates. For example, the RR Originator may need to limit the list of potential RR candidates because of:
  - Resource-related considerations (e.g., the RR Originator has limited human and/or financial resources to devote to RR)
Reminder/Recall in Immunization Information Systems

- Coordination with other RR Originators to limit the number of RR Notifications sent to particular Individuals/Patients within a given time frame (see principle P502)

Resource limitations can be accounted for a) Upfront, when selecting RR criteria; b) After criteria is used to produce a list of RR recipients; c) In both places – when selecting criteria, upfront, and then adjusting afterwards. Step 2 describes a "practical" (as it done now) approach, which accounts for resource limitations at the start of the RR process. As a result, a smaller sub-group of target Patients will be produced. The alternative approach (see Step 4) follows a hierarchy of goals from a broader population perspective: the RR Originator first identifies all Patients eligible for RR and then considers the resources available to determine what part of the Patients eligible for RR will actually be recalled (similar to principle P401). These two approaches can be combined, with initial conditions (filters) implemented at Step 2 and the resulting list of potential RR candidates adjusted later, at Step 4.

**Step 3.** RR Originator produces list of potential RR candidates based on the Reminder/Recall criteria.

- Associated principles and business rules: See Chapter 4 “Influences on various aspects of RR operations”

**Step 4 (optional).** RR Originator reduces/revises the list of potential RR candidates based on resource limitations and other restrictions.

- Associated principles and business rules: See Chapter 3, sections “Resource limitations and other restrictions”

When resources are limited, choices include:
- Eliminate some of the potential RR candidates and proceed with the RR process.
- Eliminate all potential RR candidates, concluding this particular RR process.
- Return to the Step 1 and modify the original criteria

See discussion at Step 2 of various approaches to account for resource limitations and other restrictions.

**Step 5.** RR Originator selects the RR Notification method

- Associated principles and business rules: See Chapter 3, section “Selection of the RR Notification method”

This selection of the RR Notification method could be for:
- a) The whole list of RR candidates - with subsequent corrections for candidates that may not have a sufficient contact info (see Step 6), or
- b) Each Patient included in the list of RR candidates.
Currently the order of Steps 1 to 5 for the RR process varies among IISs. For example, in some IISs that are locked into a single RR Notification method (e.g., postcards) the selection of the RR Notification method is made at the very beginning of the RR process. However, a best practice is to first identify all Individuals/Patients who are eligible for RR, and then decide how to contact them (similar to principle P401).

**Step 6.** RR Originator changes the RR Notification method for specific Individuals/Patients based on availability of contact data, e.g., if Individual/Patient lacks address, but has a phone number recorded in the IIS.

- Associated principles and business rules:

  *See Chapter 3, section “Selection of the RR Notification method”*

As an alternative to Step 6, the RR Originator can set the criteria in Step 1 or Step 2 to exclude Individuals/Patients from the particular RR process based on insufficient contact information for the selected RR Notification method.

**Step 7A.** RR Originator conveys RR Notification to RR Recipients based on the list of RR candidates adjusted during Steps 4–6 (*direct RR Notification*).

**Step 7B.** As an alternative to Step 7A, RR Originator conveys the list of RR candidates adjusted during Steps 4–6 to RR Distributor (*indirect RR Notification*).

**Step 7B1.** RR Distributor conveys RR Notifications to RR Recipients.

RR Distributor can modify the set of Individuals/Patients and RR Notification method for all or some Individuals/Patients. Also, RR Distributor can exclude some Individuals/Patients.

**Step 8.** The RR Originator (and/or the IIS, and/or RR Distributor, if any) collects results of issued RR Notifications (RR Responses/RR Outcomes) from RR Recipients or other parties (e.g., Postal Service) and updates the RR Status Indicator (RR Log) with information related to the issuance of the RR Notifications (See Chapter 5, “Evaluation of Reminder/Recall Outcomes and Responses” for the discussion of RR Status Indicator and RR Log).

If there is no result (e.g., no response on the postcard sent), RR Originator should wait a certain period of time before proceeding to Step 9.

- Associated principles and business rules:

  *See Chapter 3, section “Reaction to a RR Response”, Chapter 5 “Evaluation of Reminder/Recall Outcomes and Responses”.*

See appendix A, Domain model, for definitions of RR Responses and RR Outcomes.

*See Table 8*, which cross-references RR results (Responses and Outcomes) and subsequent actions in the process.
**Step 9.** RR Originator (and/or the IIS, and/or RR Distributor, if any) updates Patient information in the IIS.

- Associated principles and business rules:
  
  *see Chapter 3, section “Reaction to the RR Response” and Appendix A, section RR Responses and Outcomes.*

The updated information may or may not be the result of the RR Notification.
Possible updates include:
- Administered immunizations.
- Historical immunizations – Immunizations that were administered prior to the date of the RR Notification, but had not been recorded in the IIS.
- Patient active/inactive status at the Provider and/or Jurisdiction level [1.1].
- Immunization Status for a Patient (based on information on administered and historical immunizations).
- Patient contact information: address, telephone number, etc.
- Patient opt-out from the IIS and/or all or part of the RR process.

*Certain RR Outcomes will result in the termination of the RR process with respect to an Individual/Patient. For example, if the RR Response is that the Patient’s forwarding address is no longer within the geographic Jurisdiction area, the RR Outcome would be to change the Patient Status to Inactive-MOGE for that Provider. The RR Originator would stop the RR process for that Patient (see Step 10B). For another Patient the forwarding address is still within the geographic Jurisdiction area and the RR Originator might send another RR Notification to the Patient (see Step 10A).*

**Step 10A.** RR Originator decides to continue RR activities for a Patient. Process continues from Step 6 (a decision on the RR Notification method has to be made).

**Step 10B.** As an alternative to Step 10A, RR Originator decides to stop RR activities for a Patient. **Process ends.**

- Associated principles and business rules:
  
  *See Chapter 3, section “Reaction to the RR Response”*

*See Table 8,* which cross-references RR results (Responses and Outcomes) and subsequent actions in the process.
Figure 4. Reminder/Recall process diagram
Chapter 3: Process-related recommendations; Principles and Business Rules

Introduction

This chapter contains process-related principles and business rules organized along the sections (categories) related to various phases of the RR process.

A **principle** reflects business guidelines, practices or norms that the work group recommends to follow. It is a high-level direction that guides the development of more specific business rules. **Business rules** represent specific requirements regarding how the business should operate based on the laws, policies, regulations, and chosen business/operational style.

- **Responsibility for Reminder/Recall**
  - Recommendations regarding the parties (individuals and organizations) who should be involved in the specific RR action (roles and responsibilities).

- **Process triggers**
  - When should RR be initiated?

- **Reminder/Recall Criteria**
  - Recommendations regarding whether a specific Individual should be included in or excluded from a specific list of RR candidates.

- **Resource limitations and other restrictions**
  - Conditions under which a RR process may or may not be executed due to resource limitations and other restrictions.
  - Resource limitations and other restrictions also influence RR triggers and criteria.
  - Resource limitations and other restrictions influence whether or not to send an RR Notification.

- **Selection of the RR Notification method**
  - Recommendations regarding the mode of communication for RR Notifications.

- **Content of the RR Notification**
  - Recommendations regarding the content (language, format, structure) of an RR Notification.

- **Reaction to the RR Response**
  - Recommendations regarding handling responses to an RR Notification.

Principles and business rules presented in this chapter have been deliberately numbered starting from 201 for the section “Responsibility for Reminder/Recall”, starting from 301 for the section “Process Triggers”, starting from 401 for the section “Reminder/Recall Criteria”, etc.
Responsibility for Reminder/Recall

A health care Provider is responsible for the immunization and RR process for his/her Patients. The public health authority (on local, State, or federal levels) is responsible for the immunization and RR process of the population as a whole within its Jurisdiction (or, more precisely, for Individuals that comprise that population). Assignment of an Individual/Patient active/inactive status allows for the establishment of a classification that can be used by parties responsible for immunization for the variety of public health and health care purposes, including Reminder/Recall activities. General recommendations and business rules for assigning status and responsibility for Individuals/Patients can be found in the MIROW document [1.1].

From the public health perspective, it is important to maintain immunization status and responsibility for a Patient/Individual in a hierarchical manner, so that a classification of immunization statuses and responsibility would be defined on each level of this hierarchy, e.g. at the Provider and the geographic Jurisdiction (city, county, and State) levels. Such a hierarchical structure of immunization statuses ensures that ultimately for every Individual there is a party responsible for his/her immunizations and for the RR process. For example, if no Provider in a city considers an Individual as a Patient, there would be no responsibility for the RR process for this Individual at the Provider level, but on the next level of hierarchy a local public health authority is responsible for the RR process for this Individual. The State public health agency has responsibility for all Individuals in its Jurisdiction.

A Patient can be active with many Providers, but only one Provider will be considered as the Immunization Home. A Patient’s Immunization Home can be determined by parent/guardian election, last immunization from a Provider, or assignment by a health plan [1.1].

Coordination among Providers, State and local public health agencies and other entities that have responsibility for immunization of Individuals (e.g., health plans) is vital to ensure that the IIS data are complete for each Individual and to ensure that the RR process is effective and efficient (see principles P201, P204, and P503).

This section provides general principles and business rules for both the responsibility for initiation of the RR process and performing the tasks and responsibilities throughout the RR process.
### Table 1. Responsibility for Reminder/Recall: principles and business rules

<table>
<thead>
<tr>
<th>#</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
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</thead>
<tbody>
<tr>
<td>P201</td>
<td>Define ownership principle&lt;br&gt;The “ownership” (the responsibility) for an Individual/Patient has to be clearly defined.</td>
<td>The ownership concept can be related to the assignment of a medical home or Immunization Home [1.1] for a Patient. This association should be used to determine the Patient population served by a particular Provider and/or Jurisdiction and establishes the initial Patient cohort for the particular RR process. See BR201–BR203</td>
</tr>
<tr>
<td>P202</td>
<td>Responsible party principle&lt;br&gt;Party responsible for the Individual/Patient should initiate the RR process.</td>
<td>See also P203 – Delegate responsibility principle. See BR201–BR203</td>
</tr>
<tr>
<td>P203</td>
<td>Delegate responsibility principle&lt;br&gt;IIS or other State or local public health agency should be available to assume the responsibility (and cost) of conducting Reminder/Recall on behalf of other parties (e.g., Providers).</td>
<td>As a matter of policy, in collaboration with Providers, local and State health departments should be able to assume responsibility (and cost) for generating and distributing RRs on behalf of a Provider. IIS should provide functionality that allows Providers to initiate and implement an RR process for the Provider’s Patients, and that also allows local and State public health agencies to initiate and implement an RR process on behalf of individual Providers or on a geographic Jurisdiction basis. Local and/or State public health agencies should partner with Providers to develop collaborative RR projects and processes that utilize the IIS. Centralization of RR operations would reduce the overall cost. Also, refer to the section “Selection of RR Notification method” where cost-effectiveness issues are discussed.</td>
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<td>#</td>
<td>Principle / Business Rule Statement</td>
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| P204| **Hierarchy of parties principle**  
A hierarchy of parties responsible for every Individual/Patient in the IIS should be established. | See beginning of this section and [1.1]  
See BR202 below.                                    |
| BR201| If the Immunization Home is known, that Provider is primarily responsible for RR processes for routine immunizations.       | See P201, P202                                               |
| BR202| If the Immunization Home is not known, a geographic Jurisdiction (e.g., State or local public health agency) is primarily responsible for RR processes for routine immunizations. | See P201, P202, P204                                               |
| BR203| For disease outbreaks, the State and local health departments are responsible for RR processes.                                | See P201, P202                                               |
**Process triggers**

This section addresses the triggers that initiate an RR process. The overall scheme of the RR process (Chapter 2) calls for:
- First, to find out what RR Notifications are needed.
- After that, to consider what RR Notifications can be issued based on various restrictions and limitations (e.g., available resources).

This section describes the first part of this scheme - when to consider sending RR Notifications to RR Recipients. The RR process could be initiated multiple times before and after each recommend vaccination. The section “Resource limitations and other restrictions” describes the second part of this scheme - considerations that restrict issuing RR Notifications based on resources available, desire to limit disturbance of Patients, timeliness of reporting to IIS, baseline immunization coverages, and other circumstances.

**Table 2. Process triggers: principles and business rules**

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<thead>
<tr>
<th>#</th>
<th>Principle/Business Rule Statement</th>
<th>Remarks / Links</th>
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<tbody>
<tr>
<td>P301</td>
<td>RR process initiation principle</td>
<td>Recall Notifications must be based on individual vaccine history in association with applicable requirements or schedules.</td>
</tr>
<tr>
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<td>RR process can be initiated based on/for:</td>
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<tr>
<td></td>
<td>• Current ACIP schedules (e.g., DTaP at 2, 4, 6, 15-18 months of age; MMR at 12 months; Td every 10 yrs)</td>
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<tr>
<td></td>
<td>• Standard well child visit timeframes (2, 4, 6, 12, 15, 18 and 24 months of age; reminders only)</td>
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<td></td>
<td>• State-mandated requirements (e.g., school and child care entry requirements)</td>
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</tr>
<tr>
<td>P302</td>
<td>RR periodicity principle</td>
<td>There is not sufficient evidence on effectiveness to recommend an optimal frequency for initiation of the RR process.</td>
</tr>
<tr>
<td></td>
<td>The RR process should be initiated on a regular basis (e.g., weekly, monthly, annually) and as needed (based on “well accepted requirements” such as ACIP schedule, standard well child visits, State mandated requirements, etc.)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>The frequency of RR process initiation depends on age of cohort, goal(s) for the particular RR process, available resources, and size/nature of the target population.</td>
</tr>
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<td></td>
<td></td>
<td>RR frequency can vary depending on the RR Notification method (see sections “Selection of the RR Notification method” and “Reaction to the RR Response” in this chapter).</td>
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<tr>
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<td>Principle/Business Rule Statement</td>
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</table>
| P303 | **Single RR Notification principle**  
  If more than one vaccination is due or overdue at the time of RR, all vaccinations should be accommodated in a single RR Notification.                                                                                     | An RR process should not include a separate RR Notification for each vaccine group for which an Individual/Patient needs doses for (due or overdue).  
  This approach avoids triggering multiple RR Notifications to the same Individual/Patient on the same day.  
  See also section “Content of the RR Notification” in this chapter.  
  See also P502 – Limited disturbance principle.                                                                                                             |
| P304 | **Recall principle**  
  Recall should be considered after the recommended period for vaccination has expired.                                                                                                                                  | If immunization is recommended for a Patient 2 months of age, the recall for this immunization could be initiated at 3 months of age.  
  For a dose of vaccine recommended for a Patient 15–18 months of age, the recall could be initiated at 19 months of age.  
  The RR Originator should consider the timeliness of reporting and recording data in the IIS in determining when to initiate an RR process. For example, if a Provider reports data to the IIS monthly, a RR process for recall of immunizations due at 2 months of age could be initiated at 4 months of age to account for the delay of up to one month in reporting data.  
  When a catch-up schedule is used (minimum intervals instead of the normally recommended ages), a certain time after the minimum interval should be allowed before a recall notice is sent. |
| BR301 | A single Reminder Notification should be considered 2 to 4 weeks before the recommended due date/date range for each recommended vaccine/vaccination visit.                                                                 | RR Originator should decide is this 2–4 weeks before the first possible date in a date range or before the last date in a date range.  
  If the minimum interval between doses requires Vaccine to be administered after the age for which it is normally scheduled (catch-up schedule) then Reminder Notifications for a catch-up vaccine should either specify that the vaccine is due as soon after the <Due Date> as possible, or not be sent prior to the first date the Individual is eligible to receive the Vaccine. |
### Reminder/Recall in Immunization Information Systems

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</table>
| BR305 | One reminder and up to 3 follow-up Recall Notifications for each recommended vaccine/vaccination visit should be considered for children 0-6 years of age.                                                                                   | See P301, P302. Examples are:  
- Reminder to start a schedule on time - at 2 months.  
- Reminder at the beginning of the child’s second year.  
- Recall: after 7 months of age, then after 19 months of age.  
See the section “Resource limitations and other restrictions” for various restrictions: resources, disturbance to the Patient, timeliness of reporting, baseline immunization coverage level of target population, etc. |
| BR306 | One reminder and up to 3 follow-up Recall Notifications for each recommended vaccine/vaccination visit should be considered for children 7-18 years of age.                                                                                           | See P301, P302.                                                                                                                                                                                                  |
| BR307 | For adults a single reminder for routine vaccinations recommended by ACIP should be considered.                                                                                                                                     | See P301, P302. Examples are:  
- Annually for influenza vaccination (50 years of age and older)  
- Once for a zoster vaccination (at 60 years of age)  
- Once for a pneumococcal vaccination (at 65 years of age)  
- Once for a Td vaccination (every 10 years)                                                                     |
| BR308 | A single Recall Notification should be considered when routine doses or subsequent doses in a multi-dose series are overdue for adults.                                                                                                      | See P301, P302.                                                                                                                                                                                                  |
Reminder/Recall criteria

The RR Originator will determine the criteria (filters) to be used to identify the list of RR candidates. This section describes the principles and business rules related to the RR criteria.

Table 3. Reminder/Recall criteria: principles and business rules

<table>
<thead>
<tr>
<th>#</th>
<th>Principle/Business Rule Statement</th>
<th>Remarks / Links</th>
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<tbody>
<tr>
<td>P401</td>
<td>Identify all Individuals eligible for RR principle</td>
<td>From a general Public Health perspective, it is more prudent to first find Patients who are due for RR, and only after that decide how to contact them (i.e., select an RR Notification method).</td>
</tr>
<tr>
<td></td>
<td>The RR process should begin by identifying all Individuals/Patients who are eligible for the particular RR process before determination of the RR Notification method.</td>
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<td></td>
<td>Provider-based Reminder/Recall should be based on the established associations between a Provider and Patients, such as Medical Home or Immunization Home for a Patient [1.1].</td>
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<td></td>
<td>Patient active/inactive status at the Provider and geographic level should be considered for Patients’ inclusion in a RR campaign. Patients with any status other than “active” for a particular Provider or geographic area should be excluded from the RR campaign.</td>
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<tr>
<td></td>
<td>Criteria for inclusion /exclusion of Individuals to/from Reminder/Recall should include (but not be limited to):</td>
<td>Patients with temporary contraindications should be reconsidered for inclusion in subsequent RR campaign(s).</td>
</tr>
<tr>
<td></td>
<td>• Individual’s age (DOB)</td>
<td>In the case of outbreaks, RR Notifications may be considered for all Individuals with non-medical exemptions.</td>
</tr>
<tr>
<td></td>
<td>• Established associations between a Provider and Patients, such as medical home or Immunization Home for a Patient.</td>
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</tr>
<tr>
<td></td>
<td>• Patient active/inactive status at the Provider and geographic Jurisdiction level</td>
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<td></td>
<td>• One or more specified Vaccines</td>
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<td>• Dose number within vaccine series (Vaccine Family/Group)</td>
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<td>• High risk status for a Patient</td>
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<td></td>
<td>• Various address attributes: State, county, city, zip code or health district/region</td>
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<td></td>
<td>• Program/association (e.g., WIC, Medicaid, fire department)</td>
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<td></td>
<td>• Specified health plan (insurance) or payer source</td>
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<td>• Permanent and temporary exemptions and contraindications for a Vaccine(s)</td>
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<td>• Language preference</td>
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<td>• Occupation</td>
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<tr>
<td></td>
<td>• Opt-out from RR in whole or in part</td>
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<td></td>
<td>• Routine versus emergency RR</td>
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</tbody>
</table>
Figure 5. Example of the RR “criteria”: screen shot from the Kansas Immunization Registry
Figure 6. Example of the RR “criteria”: screen shot from the CHILD Profile - Washington State Immunization Registry
Resource limitations and other restrictions

This section describes considerations that restrict issuing RR Notifications based on resources available, desire to limit disturbance to Patients and avoid duplication of RR efforts, timeliness of reporting to IIS, baseline immunization coverage, and other circumstances.

Table 4. Resource limitations and other restrictions: principles and business rules

<table>
<thead>
<tr>
<th>#</th>
<th>Principle /Business Rule Statement</th>
<th>Remarks / Links</th>
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<tbody>
<tr>
<td>P501</td>
<td>Limited resources principle: Reminder/Recall must be in line with available resources. Accordingly, not every recommended vaccination will result in a Reminder/Recall Notification.</td>
<td>Resource-related considerations refer to the fact that IISs have limited human and financial resources to devote to RR. Examples of resource limitation: - Personnel to validate and correct the contact and immunization information, make phone calls, and/or keep up with RR responses; - Personnel to train and re-train Providers - Mailing costs and postal fees, etc.</td>
</tr>
<tr>
<td>P502</td>
<td>Limit disturbance principle: For a given set of Vaccines, RR Notifications should be issued only once during a given period of time.</td>
<td>Coordination of efforts among all the parties with responsibility for immunizations is important to avoid duplication of efforts – see P503. For example, Individuals/Patients might be excluded from the RR process if they have already been issued a RR Notification within the past 30 days for a postcard or letter method (see P301, BR801, BR803). See also P303 - Single RR Notification principle.</td>
</tr>
<tr>
<td>P503</td>
<td>Coordinate to avoid duplication principle The RR process must be coordinated to eliminate duplication of RR by various RR Originators.</td>
<td>For example, the RR functionality would include a flag for Patients to whom an RR Notification was issued. IIS should record number of RR Notification attempts for each Patient, the date, type, and RR Originator. This information should be accessible to IIS users.</td>
</tr>
<tr>
<td>P504</td>
<td>Supremacy of Recall over Reminder principle: If resources are limited, Recall is more important than a Reminder.</td>
<td>See related business rules BR501, BR502, BR503 below. Exception: in public health emergency situations available resources might be focused on emergency-related reminders.</td>
</tr>
<tr>
<td>P505</td>
<td>Priority for children 0–24 months of age principle Priority should be given to Recall Notifications for children 0–24 months of age.</td>
<td>Since infants are at most risk for serious disease if they are not vaccinated the IIS may choose to target infants who do not have any record of immunization by a certain age, e.g., by 3 months of age. Vaccine series completion rates for different age groups</td>
</tr>
</tbody>
</table>
## Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>#</th>
<th>Principle /Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>should be taken into consideration when prioritizing use of limited resources (e.g., series completion by 19 months of age is 90%; but series completion is 60% at 4 months of age).</td>
<td>See BR501–BR503 below.</td>
</tr>
<tr>
<td>P506</td>
<td>Timeliness principle&lt;br&gt;Timeliness of data recorded in the IIS should be taken in consideration for issuing/delaying RR Notifications.</td>
<td>For example, if a Provider reports data to the IIS monthly, a RR process for recall of immunizations due at 2 months could be initiated at 4 months to account for the delay of up to one month in reporting data.</td>
</tr>
<tr>
<td>P507</td>
<td>Baseline immunization coverage level principle&lt;br&gt;Baseline immunization coverage level should be taken in consideration for issuing/delaying RR Notifications.</td>
<td>For example, if the “on-time” baseline immunization coverage level is low, a Reminder plus one or more Recall Notifications may be cost-effective. If the baseline “on-time” immunization coverage level is high, Reminders may not be as cost effective as one or more Recall Notifications.</td>
</tr>
<tr>
<td>BR501</td>
<td>In the event that we can do only one Recall for children 0–24 months of age it should be between 19 and 21 months.</td>
<td>Based on principles P501, P504, P505</td>
</tr>
<tr>
<td>BR502</td>
<td>In the event that we can do two Recalls for children 0–24 months of age it should be at 19–21 months and 7 months.</td>
<td>Based on principles P501, P504, P505</td>
</tr>
<tr>
<td>BR503</td>
<td>In the event that we can do three Recalls for children 0–24 months of age it should be at 19–21 months, 7 months and 3 months.</td>
<td>Based on principles P501, P504, P505</td>
</tr>
</tbody>
</table>

### A note regarding coordination of RR activities

It is necessary to coordinate RR activities with all other parties that have some responsibility for the target population (e.g., State and local public health agencies, health plans, and all Providers who have provided immunization services to the target population). Coordination includes understanding the immunization schedule followed by all the Providers that have some responsibility for the target population. Providers immunization delivery practices vary: Some administer immunizations at the beginning of a recommended age range and some administer immunizations at the end of a recommended age range. Some have standing orders for the first Hep B in the birth hospital and some administer the first Hep B at the first office visit. Some administer all vaccines that can be administered at one time simultaneously and some administer them in multiple visits. Some Providers do not administer all recommended vaccines. A functionality-related recommendation is to allow each Provider to customize these parameters for Provider based Recall. For geographic Jurisdiction Recall, there must be some consensus.
Selection of the RR Notification method

After determining the criteria and production of the list of RR candidates, the RR Originator selects the RR Notification method. This section deals with how to choose the RR Notification method.

**Table 5.** Selection of the RR Notification method: principles and business rules

<table>
<thead>
<tr>
<th>BR #</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
</table>
| P601 | A variety of RR Notification methods principle  
IIS should have more than one RR Notification method. | Availability of multiple RR Notification methods allows more flexible and cost-effective approach to RR. |
| P602 | Combine RR Notification methods principle.  
Effectiveness of Reminder/Recall can be increased by combining various RR Notification methods. | Based on [4.7], a letter followed by a telephone message was significantly more effective than either a letter alone or a telephone message alone. A telephone message followed by a letter was more effective than either alone, although the differences were not statistically significant.  
See P802 (RR escalation principle) in the section “Reaction to the RR Response”. |
| P603 | Consider data quality principle  
RR Notification method should take into consideration the available contact information (data quality issue). | Example: To use phone as an RR Notification method, the IIS must have current phone numbers recorded.  
See GR601 in chapter 4. |
| P604 | Cost-effectiveness principle  
Reminder/Recall should employ the most cost-effective RR Notification method based on resources available. | The most cost-effective method of RR Notification is a method that brings the highest return in terms of timeliness and completion of immunizations per dollar spent.  
Cost effectiveness of methods will change as technology progresses  
See BR602 |
### Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>BR #</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>P605</td>
<td><strong>Supremacy of Provider communication principle</strong>&lt;br&gt; A communication from a Provider is more effective for the Provider’s Patients than a communication from IIS or other RR Originator.</td>
<td>For example, a telephone call may be followed by a second phone call the following day, but two postcards should be separated by several weeks. IIS might use modern electronic methods to communicate with adolescents.</td>
</tr>
<tr>
<td>P606</td>
<td><strong>Impact of selecting RR Notification method principle</strong>&lt;br&gt; The RR Notification method impacts the frequency of RR and target population.</td>
<td>Based on Cochrane Review [4.2]&lt;br&gt;&lt;br&gt;Email, text and other electronic messages are new/emerging RR Notification methods and are therefore not ranked. Utilization of these and other new/emerging methods will increase in the future.</td>
</tr>
<tr>
<td>BR601</td>
<td>The most effective RR Notification method to improve timeliness and completion of immunizations, ranked from the most effective to the least effective::&lt;br&gt; - Home visit&lt;br&gt; - Person to person phone&lt;br&gt;  o Phone call by Provider&lt;br&gt;  o Phone call by local or State public health authority&lt;br&gt; - Letter&lt;br&gt; - Postcard&lt;br&gt;  o Specific card from Provider&lt;br&gt;  o Generic card from Provider&lt;br&gt;  o Specific card from IIS&lt;br&gt;  o Generic card from IIS&lt;br&gt; - Autodialer</td>
<td>Assumptions for RR Notification method cost-effectiveness:</td>
</tr>
<tr>
<td>BR602</td>
<td>The most cost-effective RR Notification method to improve timeliness and completion of immunizations, ranked from the most to least cost effective:&lt;br&gt; - Telephone call (person-to-person)&lt;br&gt; - Letter&lt;br&gt; - Postcard&lt;br&gt; - Autodialer&lt;br&gt; - Home visit</td>
<td>This ranking is based on the opinion of subject matter experts (SMEs).&lt;br&gt;&lt;br&gt;The cost and effectiveness should be evaluated by the IIS to determine what RR method is the most cost-effective given their population, budget, and other circumstances.&lt;br&gt;&lt;br&gt;There is insufficient experience with email and text messages to be able to rank the cost-effectiveness of those RR Notification methods. Assumptions for RR Notification method cost-effectiveness:</td>
</tr>
</tbody>
</table>
## Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>BR #</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Reporting functionality is in place that allows the IIS to produce a list of RR candidates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. All systems supporting RR are in place (i.e., no development cost, e.g., for autodialers)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Contact information is available for selected method, e.g., 100% of telephone numbers for</td>
<td></td>
</tr>
<tr>
<td></td>
<td>autodialing are available and they are current (data quality)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Targeted audience is Individual or responsible party</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Content of the RR Notification is appropriate for the targeted audience: i.e., language, level of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>literacy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See P604</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See also Fig.18. Illustration of person-to-person telephone-based RR</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 7.** Example of RR Notification method selection: a screen shot from the CHILD Profile - Washington State Immunization Registry


**Content of the RR Notification**

This section discusses what information has to be put into the RR Notification.

**Table 6. Content of the RR Notification: principles and business rules**

<table>
<thead>
<tr>
<th>#</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
</table>
| P701 | Comply with HIPAA interpretation principle  
The RR Notification content must comply with the RR Originator’s interpretation of HIPAA requirements. | For example, the RR Originator may require that information concerning specific immunization must be in a letter and not on a postcard |
| P702 | Dependency on data quality principle  
The specificity of the RR Notification should reflect the quality of data recorded in the IIS. | For example, the RR Notification could read: “Your child is missing the 4th DTaP” vs. “Your child may be overdue for an immunization”. |
| P703 | Best message for the audience principle  
Social marketing techniques and research should be used to determine best messages for the target audience. | See also general recommendations GR402 and GR403 in chapter 4. |
| BR701 | The minimum set of data items for the RR Notification when the RR Notification is going to an Individual:  
1) Individual’s name  
2) “You/your child is due/overdue for one or more vaccinations”  
3) “Please, contact your health care provider". |                                                                                                                                          |
| BR702 | The minimum set of data items for the RR Notification when the RR Notification is going to a Provider:  
1) Patient name  
2) Sufficient information for the Provider to identify the Patient (e.g., the Provider’s unique identifier, Patient date of birth, Patient medical record number, etc)  
3) Immunizations that the Patient is due/overdue to receive |                                                                                                                                          |
<p>| BR703 | The RR Notification should include a statement that encourages the RR Recipient to provide documentation of immunizations that are not recorded in the IIS. | See illustrations below for examples. |</p>
<table>
<thead>
<tr>
<th>BR704</th>
<th>The RR Notification should state if a Patient is due (Reminder) or overdue (Recall) for immunization(s), as well as whom it is from (Provider or IIS).</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR705</td>
<td>The RR Notification (letter or card) should contain sufficient postage to obtain forwarding addresses from the post office.</td>
</tr>
<tr>
<td>BR706</td>
<td>The RR Notification (letter or card) should contain the return address of the party responsible for collecting results (RR Originator or the IIS).</td>
</tr>
</tbody>
</table>
Reminder/Recall in Immunization Information Systems

NOTICE OF IMMUNIZATION DUE

Dear Parent:

According to our records, your child may need one or more immunizations to be fully protected against disease. If you have already obtained additional immunizations from another source, please let us know so we can update our records. If you have not, we urge you to contact us as soon as possible. If you have any questions, please feel free to call us.

SU NINO DEBE SER VACUNADO

Estimados Padres:

Según nuestros archivos, su nino(a) necesita una o mas vacunas para estar protegido completamente contra las siguientes enfermedades. Si usted ha obtenido estas vacunas en otra parte le pedimos que nos lo haga saber, para poner su archivo al corriente. Si su nino no las ha recibido todavia, es muy urgente que llame nuestra oficina o venga lo mas pronto posible. Lame nuestra oficina si usted tiene alguna pregunta.

IMM-215

Figure 8. Postcard example from the Kansas Immunization Registry

Give them Shots
1221 E. Logan
Cheney, WA 99004
(509)459-0500

RETURN SERVICE REQUESTED

Dear Parent or Guardian:

Our records indicate that your child may be due for one or more immunizations.

Please contact the clinic to discuss scheduling an appointment for getting your child vaccinated. (If your child has been vaccinated by another provider, or is no longer a patient of this clinic, please advise so that we may update our records.)

We look forward to hearing from you soon.

To the Parent/Guardian of:

Joe Doe
1234 Main Street
Deming, WA 98244

Figure 9. Postcard example from the CHILD Profile - Washington State Immunization Registry
Our records show it’s time for your child’s next immunization.
- These shots are needed to prevent serious diseases.
- Shots should be given at 2 months, 4 months, 6 months, and 12 months of age.
- To find out when and where you can get these shots, call your primary care provider or your local health clinic.

**Save lives.**
**Immunize.**

Figure 10. Postcard example from the Oklahoma IIS

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Figure 11. Postcard example from the Oklahoma IIS
Reminder/Recall in Immunization Information Systems

Figure 12. RR letter example from Scientific Technologies Corporation

![Letter Example]

Figure 13. Mail label example from the CHILD Profile - Washington State Immunization Registry

![Mail Label Example]

Figure 14. List of Patients and associated vaccines due or past due: example from the CHILD Profile - Washington State Immunization Registry

![Patient Recall Phone List]

Chapter 3: Process-related recommendations;
Principles and Business Rules
Reminder/Recall in Immunization Information Systems

[To Parent/Guardian of: ________ (On front of tri-fold or envelope)]

*YOUR CHILD NEEDS SHOTS*

The doctors and public health offices in your county are working together with the State Immunization Program to help children get the shots they need. Our records show that your child needs the shot(s) with a check mark in front:

- Hepatitis B
- Hib (influenza type B)
- IPV (polio)
- Prevnar (pneumonia)
- Varicella (chicken pox)
- MMR (measles/mumps/rubella)
- Dtap (diphtheria/tetanus/pertussis)

If your child already has these shots, make sure your doctor or public health clinic knows about them by calling or bringing the record in. If your child needs shots, please make an appointment to receive them. If you don’t have a place to go you can call ______ to find a public clinic near you.

Please note: If a shot is against your personal or religious beliefs you must sign an exemption. If your child cannot receive a shot for medical reasons, a doctor must sign a medical exemption. You can get an exemption form from your doctor or public health office.

Figure 15. Example of a RR Notification card
Dear Parent/Guardian

The private and public health offices listed below and on the back of this notice are working together to improve childhood immunizations in the [geographic jurisdiction]. Our records show that your child is past due for immunizations (shots).

Please call your doctor or public health office to get your child’s immunizations (shots). If you have already made an appointment to get your child’s immunizations (shots) you do not need to call again.

If you believe that your child has already received all immunizations, please call your doctor or public health office to update your records.

If you do not want to continue to receive notices about your child’s immunizations please call your public health office, listed below, to remove your name from the recall list.

You have the right to refuse any or all immunizations on the grounds of medical, religious [or personal belief] considerations pursuant to [statutory cite].

List of names, addresses and telephone numbers of public health offices in the geographic jurisdiction.

List of names, addresses and phone numbers of all private providers in the geographic jurisdiction: [Note: There were 12 private providers in this geographic jurisdiction that performed this recall.]

Figure 16. Example of Recall Notification for a geographic Jurisdiction from the Colorado IIS
Instructions to the Health Care Provider: Fold this card in half (fold this top part down) with the information below on the inside. Seal with a sticker, staple, or piece of tape. Mail using first class postage, return address requested. Remember: Make sure that your notice of privacy practice allows you to send recall notices.

Our records show that __________________________ needs to receive the following immunizations:

- DTaP  
- Hib  
- Prevnar

- Hepatitis A  
- MMR  
- Td

- Hepatitis B  
- Polio  
- Varicella

Your child can receive these shots at:

If your child has already received any of these immunizations, please call__________ to update your records.

If you do not want to continue to receive notices about your child’s immunizations, please call________________ so you may be removed from recall notification.

You have the right to refuse any or all immunizations on the grounds of medical, religious[, or personal belief] considerations pursuant to [statutory cite].

Figure 17. Example of a RR Notification card from the Colorado IIS
Reaction to the RR Response

After an RR Notification is issued (e.g., the postcard sent or the autodialer dials the telephone number) the RR Originator or other party collects the results. This section deals with responsibilities of the RR Originator and IIS with respect to the responses to the RR Notification.

Table 7. Reaction to the RR Response: principles and business rules

<table>
<thead>
<tr>
<th>#</th>
<th>Principle / Business Rule Statement</th>
<th>Remarks / Links</th>
</tr>
</thead>
<tbody>
<tr>
<td>P801</td>
<td><strong>Track RR results principle:</strong> RR results (responses and outcomes) must be systematically tracked.</td>
<td>Systematic tracking means that the RR Status Indicator (not just text-based RR Log) should be used to monitor the status of RR Notifications (See the Chapter 5 “Evaluation of Reminder/Recall outcomes and responses”). See also general recommendation GR103.</td>
</tr>
<tr>
<td>P802</td>
<td><strong>RR escalation principle:</strong> After an unsuccessful RR attempt, if the RR process is not ended, consider a different RR Notification method. For example, escalation from a post card to a telephone call.</td>
<td>A letter followed by a telephone message was significantly better than either a letter alone or a telephone message alone in one study [4.7]. A telephone message followed by a letter, also was more effective than either alone, although the differences were not statistically significant. [4.7] See the domain model section for a definition of “unsuccessful attempt”. See Chapter, 3 section “Selection of the RR Notification method”. The number of RR attempts is associated with changes in Patient status. The rules regarding changes in Patient’s status prescribe that a certain number of RR attempts to be made; in some cases, RR Notification methods can be prescribed as well. See MIROW MOGE document [1.1].</td>
</tr>
<tr>
<td>P803</td>
<td><strong>Elevation of responsibility principle:</strong> After a certain period of time and a number of unsuccessful RR attempts the responsibility for a Patient should be transferred from a Provider level to a geographic Jurisdiction level.</td>
<td>See BR802 below for a specific BR.</td>
</tr>
<tr>
<td>#</td>
<td>Principle / Business Rule Statement</td>
<td>Remarks / Links</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>P804</td>
<td>Repeated Notification principle: Providing multiple RR Notifications is more effective than a single RR Notification.</td>
<td>Based on the literature sources, e.g., [4.2]</td>
</tr>
<tr>
<td>BR801</td>
<td>In the event there is no State guideline, there should be 3 (three) RR Notification attempts before the RR process is ended.</td>
<td>See also BR802</td>
</tr>
<tr>
<td></td>
<td>The number of attempts might differ for different RR methods, e.g., for the post card 3, for the phone call 2, and for the home visit 1. Note that the RR Notification method can be changed after the first or second unsuccessful attempt (P802). IIS should allow for a maximum number of RR attempts. Once the maximum number of RR attempts has been reached, these Patients should be excluded from future RR campaigns [1.1]. Refer to Table 8 (item I) and P802 for handling the unsuccessful RR attempts.</td>
<td></td>
</tr>
<tr>
<td>BR802</td>
<td>In the event there is no State guideline, after 90 days and three (3) unsuccessful attempts Patient active/inactive status should be set to “Inactive” at the Provider level and remain “active” at the geographic Jurisdiction level.</td>
<td>See P803 – for a generic alternative. See also BR801 Note: Responsibility for a Patient is elevated to a geographic Jurisdiction level. See the domain model section for a definition of the unsuccessful attempt.</td>
</tr>
<tr>
<td>BR803</td>
<td>The time between recall attempts should be 14-30 days for letters and postcards.</td>
<td>For telephone calls and autodialers this time can be much shorter, e.g., one day.</td>
</tr>
</tbody>
</table>
## Reminder/Recall in Immunization Information Systems

### Table 8. Cross-references for RR results and subsequent actions

<table>
<thead>
<tr>
<th>#</th>
<th>RR results</th>
<th>Actions</th>
</tr>
</thead>
</table>
| I) | Contact information has been changed, new contact information is not available.  
   1a) Postcard returned with no forwarding address  
   1b) The telephone number has been changed or disconnected, no forwarding number is provided. | a) Proceed with additional RR Notification using a different method, e.g., telephone or email instead of the postcard. OR  
   b) Update Patient active/inactive status. Process ends. |
|   | Notes:  
   • Item (a) assumes that multiple RR attempts are going to be made and the current RR attempt is not the last one.  
   • For item (b) the RR attempt is the last one |
| II) | Contact information has been changed, new contact information is available and it is outside of the geographic Jurisdiction.  
   IIa) Postcard returned with the forwarding address outside of the Jurisdiction  
   IIb) The telephone number has been changed or disconnected, the new number is provided. | For postcard or other address-based RR - Update Patient active/inactive status. Process ends.  
   For telephone-based RR – make another RR attempt using the new telephone number. |
| III) | Contact information has been changed, new contact information is available and it is within the geographic Jurisdiction.  
   IIIa) Postcard returned with the forwarding address within the Jurisdiction  
   IIIb) The telephone number has been changed or disconnected, the new number is provided. | a) Update Patient contact information: address, telephone number, etc. AND  
   b) Proceed with additional RR Notification using the updated contact information; same or different RR Notification method can be used. |
| IV) | No response  
   IVa) Postcard has not been returned and there is no response from the RR Recipient.  
   IVb) Nobody answers the telephone, no answering machine or line is busy. | For the first RR attempt: Proceed with additional RR Notification using the same or different method, e.g., telephone or email instead of the postcard.  
   For a second or third RR attempt (after certain period of time): Update Patient active/inactive status. Process ends. |
### Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>#</th>
<th>RR results</th>
<th>Actions</th>
</tr>
</thead>
</table>
| V) | RR Recipient, RR Originator, Provider or a third party provides some immunization information that was not previously recorded in the IIS (immunization recommended in the RR Notification)  
This is a desirable outcome of the RR process. | This may or may not lead to a change in the Immunization Status for a Patient. If Immunization Status is changed to “complete” then process ends. If Immunization Status does not change to “complete” then make another RR attempt.  
Update Patient active/inactive status if necessary. |
| VI | Patient gets recommended immunization and it is entered into the IIS (administered immunization recommended in the RR Notification).  
This is the most desirable outcome of the RR process. | This may or may not lead to a change in the Immunization Status for a Patient. If Immunization Status is changed to “complete” then process ends. If Immunization Status does not change to “complete” then make another RR attempt.  
Update Patient active/inactive status if necessary. |
| VII | Request to remove the Patient from all future RR Notifications is received.  
This can happen simultaneously with all other results.  
This is the least desirable outcome of the RR process. | Update the Opt-out RR indicator. Process ends. |

**Note:** A concept of “immediate Provider’s area” – as a part of a “geographic Jurisdiction area” - might be helpful for some IIS that collect data for Individuals/Patients from more than one State. This concept has not been developed in this document, as well as in the earlier MIROW MOGE document [1.1].
Table 9. Impact of the outcome of the RR Notification process on the assignment of Patient/Individual statuses (excerpt from the MOGE document [1.1], p. 27)

<table>
<thead>
<tr>
<th>Outcome of the RR Notification process, postcard:</th>
<th>Provider level</th>
<th>Geographic Jurisdiction level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Returned with no forwarding address</td>
<td>Inactive- MOGE: BR13</td>
<td>Inactive – Lost to follow-up: BR14</td>
</tr>
<tr>
<td>Returned with the forwarding address outside of the geographic Jurisdiction</td>
<td>Inactive- MOGE: BR13 – if new address is out of the immediate area, or</td>
<td>Inactive- MOGE: BR27</td>
</tr>
<tr>
<td></td>
<td>Active: BR13 – if new address remains within the immediate area, e.g. Patient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lives in NJ, but uses Provider in NY.</td>
<td></td>
</tr>
<tr>
<td>Returned with the forwarding address within the geographic Jurisdiction</td>
<td>Inactive-MOGE: BR13 – if new address is out of the immediate area, or</td>
<td>Active: BR24, BR25</td>
</tr>
<tr>
<td></td>
<td>Active - if new address remains within the immediate area.</td>
<td></td>
</tr>
<tr>
<td>Not returned and there is no response from the Patient</td>
<td>Inactive – Lost to follow-up: BR14</td>
<td>Inactive – Lost to follow-up: BR14</td>
</tr>
</tbody>
</table>
Unable to Contact

We were not able to contact 13% of those we attempted to contact.

Reasons for non-contact were:
- Disconnected 43%
- Unauthorized Voicemail 15%
- No Answer 4%
- Non Authorized Answer 3%
- Hang Up 1%
- Other 34%

Contact is not dependent on time of the day the call is made

<table>
<thead>
<tr>
<th>Time of Call</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>9am-noon</td>
<td>11%</td>
</tr>
<tr>
<td>Noon-3pm</td>
<td>11%</td>
</tr>
<tr>
<td>3-5pm</td>
<td>13%</td>
</tr>
<tr>
<td>5-7pm</td>
<td>13%</td>
</tr>
</tbody>
</table>

n = 6,333 call attempts were made to 1,807 families

Figure 18. Illustration of person-to-person telephone-based RR
Chapter 4: Influences on various aspects of RR operations

This section deals with topics that impact overall operations of IISs, as those topics relate to RR activities. The topics covered are:

- IIS RR functionality
  - General
  - Forecasting algorithm
  - Provider Considerations
  - IIS support, including training
- Data quality
- Privacy and confidentiality
- Evaluation of Reminder/Recall outcomes and responses

Table 10. General recommendations (GR) for IIS functionality and various aspects of RR operations

<table>
<thead>
<tr>
<th>#</th>
<th>Statement</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>RR functionality: General</strong></td>
<td></td>
</tr>
<tr>
<td>GR101</td>
<td>RR functionality should be automated to the extent possible.</td>
<td>For example, a list of candidate RR Recipients for a second RR Notification attempt can be automatically generated.</td>
</tr>
<tr>
<td>GR102</td>
<td>RR functionality should be able to identify and notify susceptible individuals during disease outbreaks or individuals in other targeted populations.</td>
<td>For example, a Hepatitis A outbreak or kindergarten registration</td>
</tr>
</tbody>
</table>
| GR103| RR functionality should record information necessary to track RR Responses and Outcomes. | For example:  
  - Bad address and bad telephone number flags  
  - Number of attempts  
  - Opt out of RR  
  - Date of an RR Notification and vaccines included in the RR Notification  
  See Evaluation topic, Chapter 5  
  See principle P801 |
| GR104| Each IIS should have functionality:                                       |                                                                        |
|      |   - To allow Providers to use RR for its Patients                         |                                                                        |
|      |   - To allow local and State public health agencies to perform RR on behalf of |                                                                        |
### Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>#</th>
<th>Statement</th>
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<tbody>
<tr>
<td></td>
<td>Providers for the Provider’s Patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• To allow local and State public health agencies to perform RR on a geographic Jurisdiction level</td>
<td></td>
</tr>
<tr>
<td>GR105</td>
<td>Each IIS should have functionality to track Patient active/inactive status at both the Provider and geographic Jurisdiction level.</td>
<td>See MIROW MOGE document [1.1]</td>
</tr>
</tbody>
</table>

#### RR Functionality: Algorithm

Algorithm includes: a) assessment of a vaccine history, and b) making recommendations of what vaccinations Patient needs and when (s)he needs them (forecasting).

<p>| GR201 | RR functionality should include:                                           |                                                                         |
|       | • Algorithm for ACIP recommendation, and                                   |                                                                         |
|       | • Algorithm for State school entry requirements                           |                                                                         |
| GR202 | RR functionality (algorithm) should support newly introduced vaccines (including newly introduced combination vaccines) within 90 days of notification from ACIP or CDC, or as soon as possible. |                                                                         |
| GR203 | Population catch-up: When new vaccines or new doses of a vaccine are recommended by ACIP, some of the population is older than the routine recommended age at the time of the recommendation. For example, children currently 17 years old did not have 2nd dose Varicella recommended when they were 4–6 years old) These people may be considered for Reminder/Recall or omitted from these efforts, as deemed appropriate. Special Reminder/Recall initiatives may be undertaken to “catch-up” populations that were beyond the recommended age when new recommendations were made. |                                                                         |
| GR204 | RR functionality (algorithm) should support vaccine recommendations dealing with deferrals due to shortages, as appropriate, within 30 days of notification from ACIP or CDC, or as soon as possible. |                                                                         |</p>
<table>
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<tr>
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</thead>
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<tr>
<td>GR205</td>
<td>IIS should test all aspects of the RR-related functionality regularly and in response to any system change.</td>
<td>Periodic testing ensures correct RR Notifications</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>RR Functionality: Provider considerations</strong></td>
<td></td>
</tr>
<tr>
<td>GR301</td>
<td>All RR interfaces should be user friendly.</td>
<td></td>
</tr>
<tr>
<td>GR302</td>
<td>The IIS should provide RR functionality that enables Providers to execute RR cost effectively.</td>
<td></td>
</tr>
<tr>
<td>GR303</td>
<td>RR functionality should include a wizard to walk users through the RR process.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>RR Functionality: Language</strong></td>
<td></td>
</tr>
<tr>
<td>GR401</td>
<td>IIS functionality should record language preference at the Individual/Patient level.</td>
<td>Refer to National Standards on Culturally and Linguistically Appropriate Services (CLAS) under Title VI of the Civil Rights Act: <a href="http://www.omhrc.gov/templates/browse.aspx?lvl=2&amp;lvlID=15">http://www.omhrc.gov/templates/browse.aspx?lvl=2&amp;lvlID=15</a></td>
</tr>
<tr>
<td>GR402</td>
<td>RR Notifications should be produced in the language preferred by the Individual/Patient.</td>
<td>Specific for translations, an organization is more likely to be assessed as compliant with federal requirements if it meets the Safe Harbor guidelines - (A) All vital documents are translated for each LEP (limited English proficient) group of 5% or 1,000 (whichever is less) of the eligible population OR (B) If there are fewer than 50 persons in the language group that reached the 5% in (A), a federal funding recipient can instead provide written notice in the primary language of the right to receive oral interpretation of those written materials, free of charge.</td>
</tr>
<tr>
<td>GR403</td>
<td>Language preference for RR Notifications should be available once a certain % of the target population language threshold is reached. (i.e., <em>translate the RR Notification once language threshold has been established</em>)</td>
<td>Specific for translations, an organization is more likely to be assessed as compliant with federal requirements if it meets the Safe Harbor guidelines - (A) All vital documents are translated for each LEP (limited English proficient) group of 5% or 1,000 (whichever is less) of the eligible population OR (B) If there are fewer than 50 persons in the language group that reached the 5% in (A), a federal funding recipient can instead provide written notice in the primary language of the right to receive oral interpretation of those written materials, free of charge.</td>
</tr>
</tbody>
</table>
### IIS support of RR, including training

<table>
<thead>
<tr>
<th>#</th>
<th>Statement</th>
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</tr>
</thead>
<tbody>
<tr>
<td>GR501</td>
<td>IISs should provide multiple means for training and re-training in the use of RR functionality.</td>
<td>For example, self paced on-line tutorial, CD, Webcasts, person-to-person (regional and local) and Help Desk</td>
</tr>
<tr>
<td>GR502</td>
<td>IIS should provide support to Providers to integrate RR into immunization delivery at the practice level</td>
<td>For example, analysis of flow of work at the practice</td>
</tr>
<tr>
<td>GR503</td>
<td>Use of RR should be integrated with all training and education opportunities for Providers</td>
<td>For example, Vaccines for Children and AFIX</td>
</tr>
<tr>
<td>GR504</td>
<td>IIS should produce materials demonstrating the value of RR at both the Provider and geographic Jurisdiction level</td>
<td>See the Evaluation, Chapter 5.</td>
</tr>
</tbody>
</table>

### Data quality

<table>
<thead>
<tr>
<th>#</th>
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<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR601</td>
<td>Data quality affects the selection of the RR Notification method (letter, phone call, etc).</td>
<td>See P603 in Chapter 3, section “Selection of the RR Notification method”</td>
</tr>
<tr>
<td>GR602</td>
<td>IIS should establish business rules regarding who what, when, where, and how to validate and standardize contact and immunization information from any source</td>
<td></td>
</tr>
<tr>
<td>GR603</td>
<td>IIS should follow MIROW Data quality guidelines.</td>
<td>See [1.3]</td>
</tr>
<tr>
<td>GR604</td>
<td>IIS should have de-duplication procedures at the Individual level to reduce duplicate or erroneous RR Notifications.</td>
<td></td>
</tr>
<tr>
<td>GR605</td>
<td>IIS should follow guidelines for vaccine level de-duplication to reduce duplicate or erroneous RR Notifications</td>
<td>See [1.2]</td>
</tr>
</tbody>
</table>

### Privacy and confidentiality

<table>
<thead>
<tr>
<th>#</th>
<th>Statement</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR701</td>
<td>RR Notifications must comply with local, State and federal privacy and confidentiality laws and regulations</td>
<td>Considerations include State laws governing IIS operations, State privacy laws and regulations and federal laws and regulations, including HIPAA.</td>
</tr>
<tr>
<td>#</td>
<td>Statement</td>
<td>Comment</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>HIPAA interpretations will vary and each RR Originator must make its own</td>
<td>determination that the RR Notification complies with HIPAA and other applicable laws and regulations.</td>
</tr>
<tr>
<td></td>
<td>RR Notification complies with HIPAA and other applicable laws and regulations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Evaluation of RR outcomes and responses (see chapter 5)</td>
<td></td>
</tr>
<tr>
<td>GR801</td>
<td>The IIS should collect data necessary for a basic outcome evaluation for each RR process:</td>
<td>Basic aggregate immunization rate is “percentage of the target population that has received all immunizations recommended by ACIP for the age of the Individual in the target population, using the end of any age range and grace periods”.</td>
</tr>
<tr>
<td></td>
<td>• Number and percentage of Individuals in the target population who received the recommended target vaccine(s) before RR Notification (baseline immunization rate), with date of calculation</td>
<td>The goals for the RR process may specify modifications and/or other definitions for immunization rate(s).</td>
</tr>
<tr>
<td></td>
<td>• Number and percentage of Individuals in the target population who received the recommended target vaccine(s) one or more times within a certain amount of days after the RR Notification, as well as date(s) of calculation(s)</td>
<td></td>
</tr>
<tr>
<td>GR802</td>
<td>The IIS should automatically produce documentation of a basic outcome evaluation for each RR process</td>
<td></td>
</tr>
<tr>
<td>GR803</td>
<td>The IIS should have functionality (algorithm) for calculating immunization rate before and after the RR Notification.</td>
<td>For the targeted RR population and for the targeted vaccine(s). See BR801 and Chapter 5</td>
</tr>
<tr>
<td>GR804</td>
<td>The RR Status Indicator should exist to support tracking of the every RR Notification issued.</td>
<td>See the section “RR Log and RR Status Indicator” in the Chapter 5. See also P801.</td>
</tr>
</tbody>
</table>
Chapter 5: Evaluation of Reminder/Recall Outcomes and Responses

Evaluation of RR Outcomes and Responses is important to show the value of Reminder/Recall to Providers, funders and policy makers and to make the most efficient use of resources. RR Responses are results of a RR Notification that characterize the communication process. RR Outcomes are results of a RR Notification that characterize Patient status or Immunization status. See Appendix A, domain model, for a discussion of RR results in terms of Responses and Outcomes, as well as for a discussion of Patient active/inactive status and Immunization status for a Patient.

Evaluation of RR Outcomes
Measures of RR Outcomes that could be considered in an evaluation include:

- Number and percentage of Individuals in the target (and control) population who received the recommended target vaccine(s) before RR Notification (baseline immunization rate), with date of calculation
- Number and percentage of Individuals in the target (and control) population who received the recommended target vaccine(s) one or more times within a certain amount of days after the RR Notification, as well as date(s) of calculation(s)
- Number and percentage of Individuals with immunizations added to the IIS after the RR Notification
  - Number and percentage of Individuals with historical immunizations added to the IIS after the RR Notification. Historical immunizations can be defined as immunizations reported to the IIS after the RR Notification, with administration dates prior to the RR Notification.
  - Number and percentage of Individuals with Vaccinations administered after the RR Notification. Administered Vaccinations can be defined as doses reported after the RR with administration dates after the RR Notification.
- Number and percentage of Individuals who should have been excluded from the RR process as a result of quality improvement processes (deduplication, exceptions, other)

Evaluation of RR Responses
Measurement and evaluation of Responses to RR Notifications vary based on the type of RR Notification. Measures of Responses to RR Notifications that could be considered in an evaluation include:

- For telephone/autodialer RR Notifications (not all of these items can be measured by an autodialer)
  - Number of telephone calls not made, e.g., one or more number is missing
  - Among all phone calls made
    - Number and percentage of calls not answered
    - Number and percentage of phone numbers changed/disconnected/wrong
    - Number and percentage unreachable due to busy signal
    - Number and percentage of messages left on answering machines
    - Number and percentage of unauthorized answering machine (wrong name)
    - Number and percentage of calls answered by unauthorized person
Reminder/Recall in Immunization Information Systems

- Number of total attempts and time of day of attempts
- Number and percentage hang ups
- Other
- Number and percentage of calls answered by parent/adult. Of those, the number and percentage who:
  1. agree to make appointment
  2. cannot get access to care
  3. refuse immunizations, etc.
  4. appointment already scheduled
  5. child no longer lives in home
  6. parent concerned with vaccine safety

- For Postcard/letter RR Notifications
  - For RR Notifications not sent the number and percentage of card/letters not sent in each of the following groups:
    - No address/incomplete address
    - Change in Patient Status
    - Duplicate record
    - RR Originator choice (e.g., does not have vaccine, does not administer that immunization)
  - For RR Notifications sent the number and percentage:
    - returned with unknown address
    - where address was updated
    - responded /not responded
Figure 19. Illustrative example - RR Outcomes evaluation (Colorado IIS)
Table 11. Illustrative example – a relatively simple way of measuring the impact of RR (Oklahoma)

<table>
<thead>
<tr>
<th>DATE</th>
<th>RECALL TOTAL Postcards</th>
<th>BAD ADDRESS</th>
<th>Number of records updated within:</th>
<th>Total % of records updated within 5 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>WEEK 1</td>
<td>WEEK 2</td>
</tr>
<tr>
<td>April 2005</td>
<td>11193</td>
<td></td>
<td>717</td>
<td>572</td>
</tr>
<tr>
<td>May 2005</td>
<td>11922</td>
<td></td>
<td>532</td>
<td>531</td>
</tr>
<tr>
<td>June 2005</td>
<td>5076</td>
<td></td>
<td>423</td>
<td>365</td>
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<tr>
<td>July 2005</td>
<td>11836</td>
<td></td>
<td>819</td>
<td>688</td>
</tr>
<tr>
<td>August 2005</td>
<td>11922</td>
<td></td>
<td>837</td>
<td>534</td>
</tr>
<tr>
<td>September 2005</td>
<td>11898</td>
<td></td>
<td>897</td>
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<tr>
<td>October 2005</td>
<td>12904</td>
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<td>1057</td>
<td>772</td>
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<tr>
<td>November 2005</td>
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<td>929</td>
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<td>December 2005</td>
<td>14930</td>
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<td>647</td>
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<td>939</td>
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<td>911</td>
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<tr>
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<td>May 2007</td>
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<td>June 2007</td>
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<td>1014</td>
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<td>July 2007</td>
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<td>861</td>
<td>730</td>
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<tr>
<td>August 2007</td>
<td>12606</td>
<td></td>
<td>688</td>
<td>690</td>
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</table>
Reminder/Recall in Immunization Information Systems

**RR Log and RR Status Indicator**
To collect information on RR Responses and Outcomes each IIS should keep information related to the RR at the RR level. Information should be kept automatically to the extent possible. A *RR Log* that contains unstructured text-based information does not always provide sufficient support for the automatic tracking of RR Notifications and, therefore, can’t be used as a basis for business logic automation.

A multivariable *RR Status Indicator* that contains structured information (e.g., information organized and stored in database tables) can better support systematic tracking of RR Notifications, as well as automation of tracking and reporting. Implementation of RR Status Indicators can help to collect and logically organize responses, outcomes, and other data that characterize the RR process, as well as to coordinate RR efforts among multiple parties (potential RR Originators) to prevent duplication of RR Notifications issued to the same Patient. As noted in general recommendation GR804, an RR Status Indicator should exist for every RR Notification issued. The RR Status Indicator should be maintained by the IIS and can be populated by all parties participating in the RR process.

Information recorded in an RR log, or preferably in the RR Status Indicator, could include:

- RR Notification not sent (no address in IIS, or incomplete address)
- RR Notification sent and date (time of day if phone)
- No response after x number of days/attempts (e.g., phone does not answer, phone busy, no answering machine)
- Phone number does not exist (changed), letter returned
- Message received (Message left on answering machine, person answered)
- and so on …
Figure 20. New Jersey IIS screen shot of the Patient "outreach history", demonstrating an "auto" entry as the result of a Reminder letter that was generated from the system for this Patient and also the "manual" recording of a telephone reminder and the outcome of that contact.
**Figure 21.** Screen shot demonstrating tracking of person-to-person telephone Recall Notifications (Colorado IIS).
**Reminder/Recall in Immunization Information Systems**

**General considerations**
For any evaluation, including an evaluation of an RR process, the goals must be specific and measurable. The target population (and any control group) must be specifically defined. Criteria that can be used to define the target population for the RR process are discussed in the chapter 3, section “Reminder/Recall Criteria”.

Comparison of the results in the target population to a control group increases the validity and value of an evaluation. A control group can be the target population at an historical point in time prior to the RR process being evaluated or a different population at the same point in time as the RR process being evaluated. In either case, it is important to show that the target population and the control group are comparable. Examples of attributes that should be comparable between the target population and the control group are: 1) Demographic and socioeconomic status (e.g., age, income, and poverty level), 2) Baseline immunization rate for targeted vaccine(s), 3) Insurance coverage (Medicaid, private, uninsured), 4) Access to immunization services, and 5) Other interventions and environmental effects on immunization practices during time of the RR. For geographic Recall the following should also be comparable between the target population and the control group: Percentage of participation (regular reporting) by Providers in the Jurisdiction (public, private) and the percentage of the population with 2+ immunization records in the IIS. A randomized assignment to the RR process and to a control group also increases the validity of the evaluation. The randomization can be at various levels: by individual, by practice, or by some other grouping (e.g., residents of a county).

Another general issue related to evaluation is the optimal amount of time elapsed between the intervention (the RR Notification) and the measurement of the effect of the intervention (the RR Outcome). The baseline outcome measure should be measured as close as practicably possible at or prior to the time of the RR Notification. The optimal amount of time to wait after an RR Notification to measure an RR Outcome should take into consideration the following:

- **Age of the target population**: For younger children, immunizations are recommended within short intervals of each other and appointments are easier to make.
- **Timeliness** of reporting to IIS- evaluation should allow time for immunizations to be added to the IIS
- **Method of RR Notification**: Phone calls should have quicker outcome than postcards
- **Type of Vaccine**
- **Type of intervention**

Responses and Outcomes can be measured after each RR attempt or after all RR attempts are completed. Outcomes can be measured once or several times after the completion of all RR attempts.

Many factors enter into determining the appropriate denominator for RR evaluation. It may be appropriate to include the total number in the target population (and control population) in the denominator, or it may be appropriate to adjust the denominator to include only those with an
Active Patient status, and/or only those who have two or more immunizations recorded in the IIS, and/or only those who received the RR Notification.

Evaluation of the cost of an RR process is also outside the scope of this document (refer to principle P203 and the section “Selection of RR Notification method” where some of the cost and cost-effectiveness issues are discussed). Evaluation of the cost of a RR process requires collection and analysis of variables that are external to the RR process, including amount of time spent on each RR activity by all personnel (programmers, IIS staff and managers, nurses, mid-level providers, medical assistants, physicians, office staff) and the cost of RR materials (postcards, letters, postage).
Chapter 6: Peer-reviewed literature references and literature-based recommendations

This chapter includes a limited overview of the selected peer-reviewed sources on the topic of Reminder/Recall in IIS. Please, refer to the “Selected References” section in this document for the peer-reviewed sources discussed here and for other materials.


- 17 intervention arms evaluated provider reminder/recall used alone and 12 intervention arms evaluated multicomponent interventions that included provider reminder/recall. Typical (median) improvements in vaccine coverage were 17 percentage points and 14 percentage points, respectively.
- Client reminder/recall interventions are strongly recommended on the basis of strong scientific evidence that they improve vaccination coverage.
- Provider reminders that vaccinations are due or late (recalls) improve coverage with universally recommended vaccines for adults, adolescents, and children; across a range of intervention characteristics, including reminder or recall and varying delivery methods (e.g., computerized or simple reminders, checklist, or flowcharts); in diverse settings and populations; at different levels of scale (individual practice-based or community-wide); and whether used alone or as part of a multi-component intervention.


- This review found that reminding people to have vaccinations increased the number of people vaccinated, whether the people were due or overdue for vaccinations.
- The increases were observed in both children and adults for all types of vaccines, but not among urban adolescents in one study.
- Reminding people over the telephone, sending a letter or postcard, or speaking to them in person increased vaccinations. Reminding people over the telephone was more effective than postcard or letter reminders, but reminders over the telephone may be expensive compared with alternative approaches. Autodialers have smaller but positive effects.
- Letter reminders were somewhat more effective than postcard reminders, among mailed reminders.
- Providing numerous reminders was more effective than single reminders.
- Reminders also worked whether it was from a private doctor’s office, a medical center, or a public health department clinic.
- Practitioners today can tailor their own billing systems to function as reminder and recall systems for simple procedures, such as selecting all Patients over 65 years of age for reminders about influenza or pneumococcal vaccination.
- A critical issue involves the complexity of “rules” required for a reminder or recall system.
Reminder/Recall in Immunization Information Systems

- The simplest scenario involves elderly adults, because no special immunization algorithm is needed and eligible patients can be selected by birth dates.
- A slightly more complex scenario involves “flagging” patients with chronic problems, such as asthma or heart disease that would require influenza or pneumococcal (for adults) vaccination.
- More sophisticated algorithms are required to track prior immunization status, particularly for the complicated pediatric immunization schedule. A very promising route involves practitioners linking with computerized immunization registries that are being developed throughout the U.S. (CDCP1998; NVAC 1999; USDHHS2000). These registries already contain the necessary algorithms to assess up-to-date status of children, and could be modified to deliver patient reminders.

- There are additional benefits to the patient and practice, beyond improving immunization rates.
  - Studies have shown that patients who are behind with immunizations are also behind in other measures of preventive care, (Fairbrother 1996; Rodewald 1995) and that reminder or recall systems targeting immunizations can also have “spillover effects” to improve other aspects of preventive care,(Rodewald 1999) if they are used within primary care practices.
  - Second, in fee-for-service settings, patient reminder and recall systems can increase revenues by increasing visits.


- The findings from this systematic review of the literature support the general recommendation that all primary care practitioners should consider patient reminder/recall systems to improve immunization coverage levels of their practices.
- We found that reminder/ recall was effective for both children and adults; in all types of medical settings, including private practices, academic medical centers, and public health department clinics; and for universally recommended vaccinations such as routine childhood vaccinations as well as targeted vaccinations such as influenza vaccine.
- In addition, all types of patient reminder/recall systems were found to be effective, with increases in immunization rates tending to be 5 to 20 percentage points.
- In general, the degree of improvement in immunization rates due to reminder/recall was not associated with baseline immunization levels.
- Telephone reminders were most effective, while there were no major differences in effectiveness among different types of mailed reminders.
- The few studies that evaluated patient reminder/recall combined with physician prompts found results that were similar or slightly better than that of studies using only patient reminder/recall.
- More intensive reminder/ recall systems, such as those using multiple reminders, appeared to be more effective than single reminders. Single reminders were less costly but also less effective.
- In studies that evaluated costs, patient reminder systems required a nontrivial expense but led to spillover benefits by increasing preventive visits or receipt of other preventive services.
Reminder/Recall in Immunization Information Systems


- Conclusions.—Letter and telephone recall for PCV7 vaccine did not significantly increase the rate of PCV7 immunization in an inner-city teaching hospital serving a disadvantaged population. The effectiveness of recall appears to have been limited by the inability to reach many subjects by mail and telephone.

From [4.5]: Implementation of Universal Influenza Immunization Recommendations for Healthy Young Children: Results of a Randomized, Controlled Trial With Registry-Based Recall. Pediatrics 2005;115;146–154.

- Registry-based reminder/recall was an effective intervention in this effort, particularly in shifting the immunization to earlier times during an unexpectedly early influenza epidemic, in comparison with nonrecalled children, especially among 1- to 2-year-old children.
- The intervention group received up to 3 reminder/recall letters, generated by the immunization registry.
- In a nonepidemic year, recall might have appeared more efficacious.
- Reminder/Recall was important to the success of the practices, especially in shifting the timing of vaccination to the period before the early epidemic developed.
- Note: Practices that achieved highest immunization rates were also proactive in planning immunization clinics to handle extra volume of immunizations required.

From [4.6]: Identification and Recall of Children With Chronic Medical Conditions for Influenza Vaccination. Pediatrics 2004;113(January);e26–e33.

- Reminder/Recall significantly increased influenza immunization in children with HRCs (high-risk conditions; asthma/reactive airways disease accounted for 87% of all HRCs) with a vaccination rate of 42% in those recalled, compared with 25% in control subjects. Recalled subjects were more likely to have an office visit (68% vs. 60%) and less likely to have a missed opportunity to immunize (28% vs. 37%) compared with control subjects.
  - Reminder/Recall significantly improved immunization rates for children with HRCs in each study practice, including in a practice that had a relatively high influenza immunization rate in control subjects.
- Registry-driven reminder/recall significantly increased influenza immunization in targeted children.
- The intervention group received a staged letter and postcard recall. During the second week of October 2002, all intervention subjects received a letter strongly encouraging influenza vaccination for their child, with a telephone number provided to schedule an appointment. Four weeks later, another reminder was mailed to those who had not yet been vaccinated, as determined by reviewing their influenza immunization status in the registry. Four weeks after the second reminder, a postcard was sent to all unimmunized intervention subjects.
Reminder/Recall in Immunization Information Systems

- Patient reminder/recall interventions have proved effective in multiple settings for children who were not up to date with routine immunizations, but have been less well explored for children who need influenza immunization.
- Registries can track influenza immunization rates in recalled children and can increase the efficiency of the reminder/recall by restricting subsequent mailings only to those patients who are not immunized after the initial recall letter.

From [4.7]: Effectiveness and Cost-effectiveness of Letters, Automated Telephone Messages, or Both for Underimmunized Children in a Health Maintenance Organization.
- For underimmunized 20-month-olds in this HMO setting, letters followed by automated telephone messages were more effective and cost-effective than either message alone.
- Compared with letters alone, automated telephone messages alone were equally effective and more cost-effective.
- The cost-effectiveness of automated telephone messages and letters may vary widely depending on the setting, and choices among strategies should be tailored to the populations being served.


Summary of Benefits from Summary and Recommendations Regarding Reminder/Recall Systems
Evidence supports that provider-focused reminder systems are more effective in increasing patients’ immunization compliance than patient-focused reminder systems.
- Reminders targeted at both groups simultaneously appear to be the most efficacious.
- Computer-generated postcard/letter reminders appear to be more cost-effective than telephone reminders in increasing compliance rates.
- Reminder systems are most effective in increasing immunization rates when provider continuity exists.


Summary Of Benefits Noted In Literature Search
- “Mailed reminders are of undoubted value in the promotion of influenza “
- However, “by themselves, clearly insufficient to produce satisfactory vaccination levels.”
- “They should be viewed as but one potential element in an overall strategy...”

Improving Influenza Vaccination Rates in Children With Asthma: PEDIATRICS Vol. 90, December 1997
- “We conclude that this simple, inexpensive computerized letter reminder system is useful . . . and it increased influenza vaccinations fourfold in the present setting.”

Chapter 6: Peer-reviewed literature references and literature-based recommendations
However, “inasmuch as only 27% of parents responded to letter reminders, more powerful interventions are needed to increase influenza vaccinations further for children with asthma.”

- “The postcard reminder significantly improved overall immunization rate.”
- “Both telephone and postcard reminders have been shown to be effective. The choice of phone or postcard notification should be based on available staff, budgetary constraints, and volunteer help...”

Comparison of three methods of recalling patients for influenza vaccination:  CMAJ, VOL. 135, NOVEMBER 1, 1986
- “Personal reminders by the physician and telephone reminders by the nurse were more efficacious than reminders by letter.”
- “On the basis of our results, we propose a combined approach: a reminder by the physician, followed by a reminder by letter or telephone for those who do not see the doctor.”
- “However, if a single approach is required, a telephone reminder by the nurse represents an effective alternative to commonly used mailed reminder.”

Computer-Generated Mailed Reminders for Influenza Immunization:  Journal of General Internal Medicine, Volume 7, 1992
“These results suggest that type and content of reminders, practice setting, and patient population are important factors in the success of reminders.”

A Randomized Trial of Computerized Reminders for Blood Pressure Screening in Primary Care:  Medical Care, Vol. 27, No.3
- “Both the physician and letter reminders significantly improved screening rates achieved.”
Reminder/Recall in Immunization Information Systems

Chapter 7: RR worst practices: Approaches not to take and things definitely not to do

Background and assumptions
The purpose of this section is not to merely describe practices that are opposite to the best practices developed in other chapters of this document; rather, it is to create a short reference list to help IIS practitioners avoid most the common pitfalls of the RR operations. The worst practices materials presented here have been developed in response to suggestions received during the presentation of MIROW recommendations at the AIRA ad-hoc meeting at the 42nd National Immunization Conference (Atlanta, Georgia, March 2008). The worst practices are aligned with mission-critical IIS goals and functional areas as they described at http://www.cdc.gov/vaccines/programs/iis/what-iis.htm

Program support
IIS help immunization programs identify populations at high risk for vaccine-preventable diseases and target interventions and resources efficiently.

- Sending un-coordinated notifications from multiple RR Originators to the same Patient
- Using the IIS RR functionality incorrectly, e.g., not printing our labels from the system, but rather writing it down from the screen – new errors can be introduced.
- Spending most of the IIS resources on resource-consuming RR Notification methods, such as home visits, without consideration of less resource-consuming methods.
- Sending RR Notifications to Patients who were mistakenly identified as high-risk Patients.
- Sending RR Notifications to the same address after an undeliverable notice from USPS has been received.

Consolidated records
IIS combine immunization information from different sources into a single record and provide official immunization records for school, day care, and camp entry requirements.

- Sending RR Notifications without deduplicating data (on Patients and associated vaccinations) in IIS. Result of this would be multiple notifications sent to the same Patient. If records have been consolidated, the child would have been up-to-date.

Privacy and confidentiality
IIS must protect the privacy of all users, including children, families, and providers. According to standards set by CDC, all IIS must have a written privacy policy that clearly defines the following:

- **Notification** - parents must be notified of the existence of the IIS, what information will be contained in it, and how the information will be used.
  - Sending RR Notifications to Patients/parents who were not notified of a) that their info will be included into the IIS and b) that this information will be used for the RR
  - Not clearly identifying the party issuing RR Notification
- **Choice** - Parents must be allowed to choose whether to participate in the IIS.
  - Sending RR Notifications to Patients/parents who opted out of IIS or just of the RR Notifications. Home visit would be especially bad in this situation.
Reminder/Recall in Immunization Information Systems

- **Use of IIS information** - IIS information must only be used for its intended purpose and not be used in a punitive manner.
  - Leaving threatening messages (i.e., reports to Child Protective Services)
  - Leaving messages that imply urgency
  - Sending out RR Notifications for deceased individuals (within the retention period)
  - Sending out RR Notifications for individuals who have exempted from one or more vaccines and/or the RR process

- **Access to and Disclosure of IIS information** - Policies must clearly define who has access to IIS information, what constitutes a breach of confidentiality, and what the associated penalties are.
  - RR Notification sent to a party who has no right to receive Patient’s information
  - RR Notification violates HIPAA interpretation

- **Data Retention** - the period of time that IIS information will be kept.
  - Send out RR Notices for deceased individuals.

**Clinical decision support**
IIS help providers and parents determine when immunizations are due and help ensure that children get only the vaccinations they need.

- Not using the RR Notification algorithm, but rather “manually” interpreting IIS data to create notifications
- Not to conduct periodic quality assurance of the RR algorithm. Results in unjustified RR Notifications and lots of complaints from Providers and IIS program.
- Issuing RR Notifications that lead to unnecessary immunizations
- Send out RR Notifications for HPV for boys

**Timely immunization**
IIS remind families when an immunization is due or has been missed.

- Not utilizing RR functionality.

**Data exchange**
IIS are capable of exchanging immunization information with immunization healthcare providers. Data exchange between IIS and other information systems helps ensure timely immunizations, consolidation of records, and allows immunization providers to work more efficiently.

- Issuing RR Notifications for Patients with incomplete or incorrect record as a result of the timing of the data exchange from the Provider. Sending out RR Notifications right before IIS uploads data from a Provider (e.g., once a month)
- Data not complete enough or incorrect

**Relations with Providers**

- No process at the Provider level to handle calls for appointments
- Having insufficient resources to accommodate responses from RR efforts
Reminder/Recall in Immunization Information Systems

- RR Notification sent out for a vaccine that is not available at the Provider office
- No process in place to update records in IIS based on RR Notification process – at both the Provider’s office and at the IIS
- RR Notifications sent without sufficient input and buy in from Providers
  - “Stealing Patients”
Chapter 8: Barriers to implementation

This chapter describes barriers to implementation of the IIS Reminder/Recall functionality, as well as some possible ways (shown in an Italic font) to address these barriers based on MIROW best practice recommendations for this and other topics.

Barriers relate to four major categories:
1. Data quality of the IIS.
2. Cost and complexity of building the RR functionality.
3. RR functionality is not user friendly/useful/flexible, etc.
4. Limitations/issues on the Provider side (financial, time, education).

1. **Data quality of the IIS:** IIS are reluctant to build/use RR functionality because often quality of data is not good enough for that purpose. The following are data quality issues that directly affect accuracy of RR process:
   - Incomplete immunization history capture in the IIS.
   - Record duplication, which can result in erroneous assessment of Immunization status, and sending more than one RR Notification to the same Individual.
   - Incomplete/inaccurate capture of contact information in the IIS.

   To address incomplete immunization history and contact information IIS should work toward timely and complete reporting by all immunization providers, including all core data elements (see Functional Standard # 1 at [http://www.cdc.gov/vaccines/programs/iis/stds/min-funct-std-2001.htm](http://www.cdc.gov/vaccines/programs/iis/stds/min-funct-std-2001.htm) and the NVAC approved core data elements at [http://www.hhs.gov/nvpo/nvac/NVACIISReport20070911.doc](http://www.hhs.gov/nvpo/nvac/NVACIISReport20070911.doc)).
   To address barriers related to data quality issues, reference general recommendations GR601–GR605 (Chapter 4) and principle P603 (Chapter 3). Also, refer to the MIROW documents on the data quality assurance [1.3] and vaccination level deduplication [1.2] topics, as well as *The Unique Records Portfolio: A guide to resolving duplicate records in health information systems*, published by the Task Force for Child Survival (available at [http://www.phii.org/resources/doc/Portfolio%20ORDER%20FORM.pdf](http://www.phii.org/resources/doc/Portfolio%20ORDER%20FORM.pdf)).

2. **Cost and complexity of building/doing RR**
   - Building RR functionality is costly (time, money, resources, staff).
     - *The recommendations in this document can serve to provide common standards for development of RR functionality and reduce time spent in developing requirements.*
     - RR functionality is complicated, the more flexible it is the more complicated it is.
       - *To address this barrier see general recommendation GR303 (Chapter 4).*
   - Not sufficient guidance on what type of RR is most effective, and what intervals, delivery modes and number of RRs are maximally effective
     - *To address this barrier see business rules BR601, BR602, and BR801, as well as other principles and business rules in the section “Selection of the RR Notification Method” and “Reaction to the RR Response” sections in Chapter 3.*
   - Doing recalls through the IIS is a big operation.
The recommendations in this document can serve to provide common standards for development of RR functionality and reduce time spent in developing requirements.

- No funding for collaborative projects with Providers other entities.

3. Functionality of the RR or IIS has limitations
   - Unable to use RR targeting specific vaccines or dose numbers.
     - To address this barrier see BR401 in the section “RR Criteria” (Chapter 3.)
   - RR is not adaptable to changes in vaccine environment (new vaccines, shortages, schedule recommendation changes).
     - To address this barrier see general recommendation GR202 - GR204 (Chapter 4).
   - RR is not able to capture responses, follow-ups, outcomes.
     - To address this barrier refer to the chapter 5 “Evaluation of RR Outcomes and Responses”.
   - IIS does not have the capability to capture Immunization Home.
     - To address this barrier refer to the MIROW document on Patient active/inactive status [1.1].
   - Inadequate capture of Patient active/inactive status (e.g., MOGE), contraindications, exemptions, opt-outs in the IIS.
     - To address this barrier see general recommendation GR105 (Chapter 4). Also, refer to the MIROW document on Patient active/inactive status [1.1].
   - RR messages are not maximally effective, the best they could be.
     - To address this barrier see section “Content of the RR Notification” (Chapter 3).
   - RR messages are not culturally sensitive.
     - To address this barrier see general recommendations GR401-GR403 (Chapter 4).

4. Providers do not use IIS RR functionality because they
   - lack time/resources
   - lack training (IISs do not have time/resources to train)
   - have their own appointment/reminder schedules
   - lack trust in the data
   - dislike RR functionality (not flexible/does not meet their needs)
   - don’t follow the ACIP schedule

To address barriers linked to Provider-related issues, reference general recommendations GR104, GR301-GR303, GR501-GR504, as well as other general recommendations in Chapter 4 and principle P203 in Chapter 3. Also see references listed under item #1 "Data Quality of the IIS” above to address data quality and Provider trust in the data.
Reminder/Recall in Immunization Information Systems

Conclusions

These guidelines provide a knowledge base for the IIS on the Reminder/Recall topic. Consistent use and implementation of these guidelines will help to improve Reminder/Recall practices in immunization information systems. These guidelines are intended to support a consistent alignment of the Reminder/Recall processes in IIS.

The following summary is a brief description of the key outcomes and accomplishments of the MIROW work group:

- Developed and re-confirmed key definitions for the Reminder/Recall operations, such as RR Originator, RR Distributor, RR Recipient, RR Notification, RR Notification method and others (captured in the domain model).
- Developed a typical Reminder/Recall process in a form of a process description (use-case model) and a process diagram. The process is intended to be flexible; it can accommodate a variety of Reminder/Recall strategies and approaches. For example, restrictions related to limited IIS resources can be accounted for upfront, during the criteria selection, or later in the process when a list of potential Reminder/Recall Recipients is produced, or in both places, as a multi-phase process, when results of initial considerations entered into a criteria are adjusted after the list of potential Reminder/Recall Recipients is produced.
- Formulated 29 process–related principles and 23 process-related business rules.
- Formulated 30 general recommendations for the IIS Reminder/Recall operations, including recommendations for IIS functionality.
- Described approaches for the evaluation of Reminder/Recall responses and outcomes, including examples of quantitative measures for RR responses and outcomes.
- Composed a set of peer-reviewed literature references and literature-based recommendations.
- Developed recommendations on the Reminder/Recall worst practices - approaches not to take and things definitely not to do.
- Described barriers to implementation of developed best Reminder/Recall practices, organized along four major categories: Data quality of the IIS, Cost and complexity of building the RR functionality, RR functionality is not user friendly/useful/flexible, Limitations/ issues on the Provider side (financial, time, education).

These best practice recommendations bring real world practical expertise from experts who work daily with Reminder/Recall. The recommendations also draw upon the wealth of peer reviewed literature that has been written on the subject of Reminder/Recall. The Work Group intended to maintain an appropriate mix of practical real world public health considerations and peer reviewed recommendations for the IIS community.

The recommendations are intended to be at the business/operational level and, as a result, independent from particular IIS implementations and technology solutions. Accordingly, the recommendations will be able to support the wide variety of IIS implementations strategies on different technological platforms.
Reminder/Recall in Immunization Information Systems

The approach and results presented are relevant for and can be used beyond immunization information systems—for developing and documenting best practices and operational requirements for applications in public health, healthcare, and other areas.

The National Vaccine Advisory Committee (NVAC) has included a recommendation to "Promote the adoption of a guidebook and best practices for IIS as started by the CDC/NIP and AIRA/MIROW workgroup to adopt consistent operational guidance and quality control procedures that ensure good data quality." This guide is one example of addressing this recommendation in the Reminder/Recall area.
Reminder/Recall in Immunization Information Systems

Selected references

Previously developed guidelines


http://www.immregistries.org/docs/IISVAERS_Collaboration_final_VASRECWG_042005.doc

Reference materials

2.1) 2001 Minimum Functional Standards for Immunization Registries.  


http://www.cdc.gov/vaccines/pubs/pinkbook/default.htm

2.4) AIRA Data Definitions Workgroup materials.  
http://www.immregistries.org/docs/IIS_Data_Codebook_072808.xls

Reminder/Recall in Immunization Information Systems

Materials from individual IIS

3.1) Preparatory materials (APPENDICES) for the Reminder/Recall topic.


Selected literature sources


http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD003941/frame.html

http://jama.ama-assn.org/cgi/reprint/284/14/1820?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext= Szilagyi&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT


http://pediatrics.aappublications.org/cgi/reprint/115/1/146

http://pediatrics.aappublications.org/cgi/reprint/113/1/e26

Selected references
4.7) Lieu TA, Capra AM, MakolDagger J, Black SB, Shinefield HR, and for the Immunization Message Study Group. Effectiveness of letters, automated telephone messages, or both for underimmunized children in a health maintenance organization. *Pediatrics* April 1998;101:e3
http://www.pediatrics.org/cgi/content/full/101/4/e3
Reminder/Recall in Immunization Information Systems

Appendix A. Domain model

Background
In developing the domain model presented in this section, the MIROW defined a set of terms and definitions identifying concepts and data elements relevant for the Reminder/Recall topic. The resulting set of terms and definitions, captured in the domain model, provides a vocabulary for consensus-based best practice recommendations formulated by the group. The MIROW took as a starting point existing models constructed for topics of Patient immunization status (MOGE), vaccination level deduplication, and data quality assurance [1.1 – 1.3]. These models were harmonized, modified, and partially simplified to fit needs of the Reminder/Recall topic. The resulting domain model was developed during the preliminary phase of this project, in a series of web-based teleconferences among MIROW experts, and was finalized during the face-to-face meeting.

Domain model purpose and explanation
A domain is an area of knowledge or activity characterized by a set of concepts and terminology understood by the business practitioners in the area.

A domain model captures a business vocabulary—terms and definitions. It ensures that all terminology and concepts that will appear in the process description, principles and business rules are known and understood by the domain practitioners (agreed-upon definitions and meaning).

A domain model includes:
- A domain diagram(s) that shows major business entities, their relationships and responsibilities (Fig. 22-A1 - Fig. 27-A6).
- A table of entities and attributes that provides the full descriptive details of the components represented on the diagram (Table 13-A2).
- A description of the domain diagram (presented below).

Unlike a data model diagram that depicts storage of information, or a workflow/process diagram that depicts the sequence of steps in a process, a domain diagram is a high-level static representation of the main “things” (entities) involved in the immunization process, including a description of how these “things” (entities) are related. It is important to note that the domain diagram is not a technical specification. Instead, the domain diagram provides the foundation for other modeling diagrams and materials.

How to read and interpret the domain diagram (see Fig.22-A1)
- Relationships between entities are visualized by connecting lines.
- Names associated with these lines describe the type of the relationship between entities. Example: a relationship between Population Group and Jurisdiction is shown as a connecting line with the word (label) “belongs to”. Such a relationship should be read as “Population Group belongs to Jurisdiction”.
- The general convention for interpretation of relationships between entities is to construct such a description by reading clockwise, starting from the first entity name (Population...
Reminder/Recall in Immunization Information Systems

Group), then relationship name—belongs to (note, that the name is shown left from the line, supporting a clockwise reading), then the second entity name (Jurisdiction).

If we need to read the same description in the opposite direction, from Jurisdiction to Population Group, we would have to place a second name—“includes”—right from the line. In this case, using the clockwise reading rule, a description would be “Jurisdiction includes Population Group.” In most cases just one name for a relationship is employed (like “belongs to” in the example just considered) assuming that it should be sufficient for a proper interpretation of a relationship in both directions.

Description of the domain diagrams

The entities and their characteristics (attributes) presented on domain diagrams (Fig. 22-A1 – Fig. 27-A6) describe a limited fragment of the overall immunization domain related to the IIS Reminder/Recall topic. Entities (and attributes) presented on these diagrams are described in Table 13-A2. Also, a domain model developed for the MIROW Data Quality Assurance topic [1.3] provides details for the Vaccination Event and Vaccination entities.

The domain model intended to cover entities involved in two main Reminder/Recall scenarios:

1) IIS or some third party utilizing IIS (e.g., Provider) sends the RR Notification directly to an Individual/Patient or to a responsible party responsible (e.g., parent/guardian).
2) IIS or some third party utilizing IIS (e.g., local Public Health Entity) sends the RR Notification through a distributor - some Organization (e.g., School, Provider) that distributes it to an Individual/Patient or to a responsible party (e.g., parent/guardian).

Two main terms for this topic – Reminder and Recall – are defined by the group in the following way:

- **Immunization Reminder** is a notification process used to communicate that an Individual is due for one or more recommended immunizations now or on a future date.
- **Immunization Recall** is a notification process used to communicate that an Individual is past due for one or more recommended immunizations (note: not to be confused with a Vaccine Recall).

a) **Vaccination Encounter – Vaccination Event – Vaccine** (Fig. 22-A1 and domain model in [1.3])

*Patient* is getting vaccinated as a result of the **Vaccination Event** (Fig. 22-A1). More than one Vaccination Event can happen during the Vaccination Encounter (office visit). In other words, Patient can receive several Vaccine shots during a single office visit; each shot would be represented by a dedicated vaccination event. Accordingly, the relationship between Vaccination Event and Vaccination Encounter on a more detailed diagram (see [1.3]) is labeled with “1” for the Vaccination Encounter and “1…n” (meaning one or many) for the Vaccination Event.

**Vaccine** refers to a product that produces an immune response in a Patient and is administered during the Vaccination Event. It is described by a set of characteristics (attributes), such as ([1.3]) Vaccine type, CVX code, CPT code, trade name, lot number, etc. A single Vaccine can be related to multiple *Families/Groups*. Vaccine that belongs to multiple Vaccine Families/Groups is referred to as a "combo" Vaccine. A single Family/Group can be related to multiple *Antigens*, such as tetanus, diphtheria, pertussis.
b) Patient – Provider – Immunization Home (Fig. 22-A1)

A Provider is an Organization that administers immunization to a Patient. Patient is a “type of” Individual. Every Patient is an Individual, but not every Individual is a Patient.

Individual may be recognized as a Patient of a Provider not only when given an immunization by a Provider, but also when the Patient is assigned by a health plan, or a Provider identifies the Individual as a Patient, or Patient’s birth is reported by a Provider, or other medical information identifies the Individual as a Patient.

A Patient may have a relationship with more than one Provider, but only one Provider may be designated their Immunization Home[1.1]. An act of vaccination "activates" the Patient for a Provider, but it does not automatically designate or change the Immunization Home for a Patient. A Patient’s Immunization Home can be determined by parent/guardian election, or last immunization from a Provider, or assignment by a health plan.

A Provider is accountable for its Patients, thus establishing Provider level accountability. More than one Provider may be accountable for a Patient.

c) Public Health Entity - Jurisdiction – Population Group – Individual (Fig. 22-A1)

A Public Health Entity is accountable for a Jurisdiction, and, therefore, for the Population Group / Cohort that is associated with the Jurisdiction, which contains a collection of Individuals. Through a Jurisdiction level accountability, a Public Health Entity is responsible for an Individual.

d) Reminder/Recall Notification (Fig. 27-A6 and Fig. 24-A3)

A Reminder/Recall Notification is issued accordance with a Reminder/Recall Protocol and associated Criteria for a Recommended Vaccination for an Individual/Patient by a Reminder/Recall Originator, e.g., IIS, Provider, health plan, State or local Public Health Agency, etc (see Fig.24-A3 for the types of Reminder/Recall Originator).

A RR Notification can be issued to one or more Reminder/Recall Distributor(s) – an intermediate party that delivers RR Notifications to RR Recipients. Based on the cross-reference Table 12-A1 below, the most common Originator – Distributor pair is IIS – Provider.

The RR Notification always related to one or more Patients/Individuals. The RR Notification can be related or not related to a particular Provider.

Structurally, the RR Notification is a list (a set of data elements from the IIS): a list of one or more recommended immunizations for a single Patient/Individual or for multiple Patients/Individuals. HIPAA interpretations may restrict the information that the RR Notification includes.
Table 12-A1. Cross-reference table of possible pairs of RR Originators and RR Distributors

<table>
<thead>
<tr>
<th>RR Distributors</th>
<th>RR Originators</th>
<th>IIS Program</th>
<th>Provider</th>
<th>Local Public Health Agency</th>
<th>Health Plan</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provider</td>
<td></td>
<td>X</td>
<td>0</td>
<td>X</td>
<td>X</td>
<td>0</td>
</tr>
<tr>
<td>Local Public Health Agency</td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Health Plan</td>
<td></td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>School</td>
<td></td>
<td>X</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

A Recommended Vaccination takes into a consideration a Recommended Immunization Schedule (e.g., ACIP recommendations or State school entry requirements), the Individual/Patient Immunization History, Immunization Exemptions, and Immunization Contraindications.

Elements that the RR Originator considers in an RR Criteria are the Individual/Patient active/inactive, a.k.a. Patient status [1.1] and the Individual/Patient Immunization Status. Patient active/inactive status conveys information with respect to the relationship of an Individual/Patient to a Jurisdiction/Provider. Immunization status for an Individual/Patient conveys information on “current” or “not current” (“complete” or “not complete”) or “up-to-date” and “not-up-to date and eligible” with respect to one or more Recommended Vaccinations.

A Reminder/Recall Notification can be sent to more than one Party (Organization or Individual – see Fig. 26-A5). For example, a Reminder/Recall Notification can be sent to an Individual/Patient, a guardian (responsible party), a school, and a Provider. Also, if there is insufficient coordination, multiple parties can issue Reminder/Recall Notifications to the same Individual during the same time period, resulting in an inefficient duplication of RR efforts.

There are two types of Reminder/Recall:
- Provider-based recall, for Patients of a particular Provider
- Geographic recall, for Individuals with an address recorded in the IIS that is located within a Jurisdiction
e) RR Responses and Outcomes  (Fig. 27-A6)
There are two types of RR Notification results: RR response and RR outcome. An RR result may be received/originated from an **Entity/Party** which is different from the original RR Recipient, e.g., from the Post Office.

**RR Response** is a result of the RR Notification that characterizes the communication process. Response examples are:
- Post card returned with or without the forwarding address.
- No reaction on the post card sent after the certain waiting period.
- Telephone line is busy, disconnected, or phone number has been changed.
- Request received from an Individual/Patient to be excluded from some or all future RR Notifications.

Analysis and evaluation of RR Responses can help to improve the RR process.

**RR Outcome** is a result of the RR Notification that characterizes Individual/Patient immunizations and/or Individual/Patient active/inactive status or Individual/Patient immunization status.

Outcome examples are:
- Individual/Patient received immunization recommended in the RR Notification (administered).
- Individual/Patient, Provider or other entity reported immunization recommended in the RR Notification to the IIS (historical).
- Patient status changed from “Active” to “Inactive – MOGE” at the Provider and/or Jurisdiction level
- Immunization Status for a Patient changed to “current/up-to-date” (based on information on administered and historical immunizations)

Analysis and evaluation of RR Outcomes can help to justify the RR process.

Some RR Responses can lead to certain RR Outcomes. For example, after a specified number (and type) of RR Notification attempts the Patient status can be changed to Inactive-Lost to Follow-up. Also, it is possible to have an RR Response that would not result in an Outcome. For example, the IIS can receive a request from the Individual/Patient to be excluded from the RR process in the future.

**Successful RR attempt** either provides sufficient new or revised contact information to continue the RR process or results in a change in the Patient status or Patient immunization status. For example, if a postcard is returned with a forwarding address, and the forwarding address is within the Jurisdiction, then the RR Notification can be repeated using the newly obtained address.

**Unsuccessful RR attempt** is when no additional information is gained, and no Outcome is achieved. For example, there is no response to a RR Notification (after a waiting period) and additional RR attempts must be made in order to assign an Inactive status.
Note: see Table 13-A2 for the description of entities presented on this diagram

Figure 22-A1. Domain diagram: Patient – Provider and Jurisdiction – Individual (a fragment)
Reminder/Recall in Immunization Information Systems

Minimum set of data items for an RR Notification (card or letter) sent to an Individual/Patient:
1) Individual/Patient name
2) Generic message: "Our records show that you/your child is due/overdue for one or more vaccinations."
3) Generic message: "Please contact your health care provider."

Additional data items can be defined. Some data items might not be allowed by HIPAA.

Minimum set of data items for the RR Notification - when it is going to a Provider
1) Patient's name
2) Patient's unique identifier (DOB, patient's ID, etc)

Additional data items can be defined. Some data items might not be allowed by HIPAA.

RR Notification is a list (a set of data elements from the IIS): a list of one or more recommended Immunizations for an Individual/Patient or for a group of Individuals/Patients.

HIPAA requirements might reduce amount of information that the RR Notification contains.

Figure 23-A2. Reminder/Recall Notification – domain diagram (a fragment)
Reminder/Recall in Immunization Information Systems

Revision date: 12-01-08

Note: This is not all-inclusive list of possible RR Originators. Any party with authorized access to an IIS and authority to issue a RR Notification can be an RR Originator.

**Figure 24-A3.** Reminder/Recall Originator – domain diagram (a fragment)

Revision date: 12-01-08

Note: This is not all-inclusive list of possible RR Distributors.

**Figure 25-A4.** Reminder/Recall Distributor – domain diagram (a fragment)
Participants of the Reminder/Recall Process

Entity/Party

Organization

Individual

Patient

Patient's Authorized Representative

Parent/Guardian

Entity/Party

Address

Mail Address
Telephone Number
Fax Number
Email Address

Organization

Individual

Health / Public Health Organization

Patient-related Organization

Provider-related Organization

Other Organizations

IIS Program

State Agency

Local Health Agency

School

University

Childcare Center

Provider

Independent Practice Association

US Postal Service

Note: This is not all-inclusive list of RR process participants.

Figure 26-A5. Participants of the Reminder/Recall process – domain diagram (a fragment)
Reminder/Recall in Immunization Information Systems

Revision date: 02-03-09

Figure 27-A6. Domain diagram for Reminder/Recall– Main entities

Note: see Table 14-A2 for the description of entities presented on this diagram
Table 13-A2. Entities and attributes (terms and definitions) for Fig.22-A1 – Fig.27-A6

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>Contact information for Individual, Patient, Parent/Guardian, Provider, etc.</td>
<td>Every Entity/Party (Organization or Patient) has an address, often – multiple addresses. Address includes mail address, telephone, email address, etc.</td>
</tr>
<tr>
<td>Entity/Party</td>
<td>An individual or organization of interest (e.g., Patient, Clinic).</td>
<td>e.g., Foster Care (when a guardian of a Patient)</td>
</tr>
<tr>
<td>Immunization Exemption</td>
<td>Non-medical reasons that exclude a Patient from vaccinations.</td>
<td>All States allow a medical exemption and some States allow philosophical and/or religious exemptions. See <a href="http://www.immunize.org/exemptions/">http://www.immunize.org/exemptions/</a></td>
</tr>
<tr>
<td>Immunization History</td>
<td>A collection of vaccination events records for an Individual/ Patient.</td>
<td></td>
</tr>
<tr>
<td>Immunization Home</td>
<td>An Immunization Home is the practice (Provider) where the Patient receives immunization services. A Patient can be active with many Providers, but only one Provider will be considered as the Immunization Home.</td>
<td>See [1.1, p.29]</td>
</tr>
<tr>
<td>Immunization Information System (IIS)</td>
<td>Immunization Information Systems or Immunization Registries are confidential, computerized information systems that collect vaccination data within a geographic area.</td>
<td>See <a href="http://www.cdc.gov/vaccines/programs/iis/what-iis.htm">http://www.cdc.gov/vaccines/programs/iis/what-iis.htm</a> IIS Program vs. IIS Data Source – see Fig.24-A3</td>
</tr>
<tr>
<td>Individual</td>
<td>A person. Population is comprised from Individuals. A Patient is “a type of” (sub-group) Individual.</td>
<td></td>
</tr>
</tbody>
</table>
## Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>Jurisdiction</td>
<td>The geographic Jurisdiction could be a State, a metropolitan area (New York City, Chicago, etc.), a county within a State, or some other subdivision of a larger Jurisdiction.</td>
<td>A Jurisdiction might encompass the entire country, as is the case with nationwide Jurisdictions such as the Jurisdictions of the Veterans Administration (“non-geographic Jurisdiction”).</td>
</tr>
<tr>
<td>Organization</td>
<td>A type of Entity/Party, such as clinic, foster home, etc.</td>
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</tr>
<tr>
<td>Parent/Guardian</td>
<td>A type of responsible party for an Individual/Patient.</td>
<td><strong>Patient active/inactive status</strong>, a.k.a. Patient status [1.1], conveys information with respect to the relationship of an Individual/Patient to a Jurisdiction/Provider. <strong>Immunization status</strong> for an Individual/Patient that conveys information on “current” or “not current” or “up-to-date” and “not-up-to-date and eligible” with respect to one or more Recommended Vaccinations</td>
</tr>
<tr>
<td>Patient</td>
<td>An Individual who is associated with a Provider.</td>
<td></td>
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<tr>
<td>Population Group / Cohort</td>
<td>Part of the population (individuals) within a Jurisdiction.</td>
<td></td>
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<tr>
<td>Provider</td>
<td>An Organization that administers immunizations. A Provider Organization is a collection of related clinicians that are treated as an entity that administer immunizations. It may include a number of different clinical offices/sites and physician groups.</td>
<td>Provider’s organization &quot;owns&quot; the immunization.</td>
</tr>
<tr>
<td>Public Health Entity</td>
<td>A governmental agency with public health oversight or management responsibilities over a particular public health Jurisdiction and associated Population (Individuals).</td>
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<td>Name</td>
<td>Description</td>
<td>Remarks</td>
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</tr>
<tr>
<td>Reminder/Recall Protocol</td>
<td>A set of rules and procedures that guides the Reminder/Recall operations.</td>
<td>Based on the following considerations:</td>
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<td>• Individual/Patient age (DOB)</td>
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<td>• Immunization status with respect to one or more Vaccine Family/Group (Vaccine type / CVX code)</td>
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<td>• Dose number within vaccine series (Vaccine Family/Group)</td>
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<td>• Associations between a Provider and its Patients, such as medical home or Immunization Home</td>
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<td>• Active/Inactive status at the Provider and geographic level</td>
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<td>• High risk status for a Patient or population</td>
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<td></td>
<td>• Address attributes: State, county, city, zip or public health entity area of responsibility</td>
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<td>• Association with a particular program (e.g., WIC, Medicaid, Fire Department)</td>
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<td>• Health plan (insurance) or payer source</td>
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<td></td>
<td>• Exemptions and contraindications for a vaccine(s) (may be temporary or permanent)</td>
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<td>• Language preference</td>
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<td></td>
<td>• Occupation</td>
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<td></td>
<td></td>
<td>• Opt-out from RR process in whole or in part</td>
</tr>
<tr>
<td>R/R Criteria (attribute of R/R Protocol)</td>
<td>A set of conditions (filters) used to produce the list of RR candidates.</td>
<td></td>
</tr>
<tr>
<td>R/R Frequency (attribute of R/R Protocol)</td>
<td>Frequency of R/R Notifications – single or multiple.</td>
<td>• Single (RR Notification issued only once)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Multiple (RR Notification for same Immunization Events issued multiple times)</td>
</tr>
</tbody>
</table>
### Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| R/R Notification Count (attribute of R/R Protocol) | Count | Used to:  
• Modify Individual/Patient active/inactive status, e.g., MOGE  
• Exclude Individuals/Patients from future RR Notifications, e.g., stop after 3 RR Notifications |
| R/R Recurrence (attribute of R/R Protocol) | | • Periodic (time-based), e.g., monthly  
• Event-driven, e.g., upon resolution of Vaccine shortage |
| Recommended Vaccination | An immunization that is due or past due for an Individual/Patient for a Vaccine per a Recommended Immunization schedule. | |
| Recommended Immunization Schedule | Recommendations or requirements concerning when a Vaccination is due or past due. | Recommended Immunization Schedules include:  
• ACIP recommendations  
• State school entry requirements  
Recommended Immunization Schedules take into account immunization history of the Individual and minimum intervals.  
See [http://www.cdc.gov/vaccines/recs/schedules/child-schedule.htm](http://www.cdc.gov/vaccines/recs/schedules/child-schedule.htm) |
| Reminder/Recall Distributor | Organization (e.g., school, Provider) that receives the RR Notification from RR Originator and distributes it to an Individual/Patient or to a responsible party (e.g., parent/guardian). | |
## Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reminder/Recall Notification</td>
<td>A communication sent to an Entity/Party (e.g., Individual, Patient, parent/guardian, foster home) for one or more Recommended Immunization(s) per a Reminder/Recall Protocol.</td>
<td>e.g., Telephone call, postcard (mail label), letter (mail label), email message, home visit. A RR Notification is a list (a set of data elements from the IIS): a list of one or more Recommended vaccinations for an Individual or for a group of Individuals.</td>
</tr>
<tr>
<td>Reminder/Recall Originator</td>
<td>Entity/Party to which the Reminder/Recall Notification is addressed (e.g., Individual, Patient, parent/guardian, Provider)</td>
<td>e.g., IIS, Provider, Health Plan, State or local Public Health Agency, Medicaid Agency.</td>
</tr>
<tr>
<td>Reminder/Recall Recipient</td>
<td>Entity/Party to which the Reminder/Recall Notification is addressed (e.g., Patient, Parent/Guardian, Provider)</td>
<td></td>
</tr>
<tr>
<td>RR Response</td>
<td>RR Response is a result of the RR Notification that characterizes the communication process.</td>
<td>An RR Response is not necessarily from the R/R Recipient. It can be from the US Postal Service, a family member, a landlord, another Provider, school, etc. A fact of no response in a given period can be used for certain actions (e.g., issue another R/R Notification)</td>
</tr>
<tr>
<td>RR Outcome</td>
<td>RR Outcome is a result of the RR Notification that characterizes Individual/Patient immunizations and/or Individual/Patient status or Individual/Patient immunization status.</td>
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<tr>
<td>Responsible Party</td>
<td>Entity/Party responsible for an Individual/Patient</td>
<td>Examples are: Parent/Guardian, foster home</td>
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</tbody>
</table>
## Reminder/Recall in Immunization Information Systems

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>School</td>
<td>Entity/Party, one of the possible RR Recipients</td>
<td></td>
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<tr>
<td>Vaccination Encounter</td>
<td>Interaction between a Provider and Patient resulting in one or more vaccination events.</td>
<td>Example: An office visit, at school, at work or in the grocery store</td>
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<tr>
<td>Vaccination Event</td>
<td>Administration of one Vaccine to a Patient.</td>
<td>Several Vaccination Events can happen within one Vaccination Encounter.</td>
</tr>
<tr>
<td>Vaccine</td>
<td>A product that produces an immune response in a Patient.</td>
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Appendix B. Work Group approach

Process
The process used for a development of best practices is presented on the Figure 28-B1. This process includes six steps described below. Responsibilities of parties involved in the best practices development effort are described in Table 14-B1.

Step 1. Topic selection is performed by the Steering Committee.

Step 2. Selection of subject matter experts (SMEs) is performed by the Steering Committee based on recommendations from the public health community.

Step 3. Preliminary work is performed by a small group of business analysts and subject matter experts (SMEs). This work includes gathering and analyzing current practices for the selected topic. A goal is to develop materials that will serve as a basis for a productive face-to-face meeting. Common products of this step include development of a domain model and related glossary of common terms and definitions. Also, major areas of the collaborative work are defined during this step, including modeling instruments and templates used to elicit and capture information during the face-to-face session.

Step 4. The face-to-face session is a culmination of best practice development efforts. It involves a multidisciplinary team of experts, business analysts, facilitators, observers, administrative staff, and sponsors (see Figure 29-B2). During the modeling session experts, acting in a focused, structured, and facilitated environment, analyze existing "as-is" practices, brainstorm solutions, and reach consensus regarding recommended best practices captured in the form of a "to-be" model.

Step 5. The post-meeting phase is designated to finalize recommendations developed during the face-to-face sessions. The major modes of collaboration during this phase are teleconferences and e-mails. The duration of this step varies from a few weeks to a few months depending on the amount and significance of remaining issues. Editors and external reviewers are involved in the creation of a resulting best practices recommendations document.

Step 6. During the implementation phase, a survey instrument is used to conduct targeted evaluation of IIS operations improvements resulting from utilization of the developed best practices and, later, targeted efforts are initiated to promote and encourage compliance as standards of excellence. Feedback from implementation efforts is analyzed, and best practice guidance recommendations are updated accordingly.

Methods and techniques
- Business modeling techniques are employed to analyze IIS processes and to develop the best practice recommendations.
- Facilitation and web-based teleconferencing techniques are used during the face-to-face meeting session and conference call meetings.
- Standard Unified Modeling Language (UML) notation is the notation of choice for this project. Subject matter experts do not need to have prior knowledge of this form of
Reminder/Recall in Immunization Information Systems

notation. It is intuitive and easily interpreted by either technical or non-technical professionals. Necessary explanations of the UML notation will be provided during the face-to-face modeling sessions.

- The definition of a consensus among subject matter experts regarding developed best practice recommendations does not reflect an absolute 100% agreement, but rather it means “I can live with that and support it.”

- Best Practice Recommendations. Definition: A best practice is "a superior method or innovative approach that consistently exceeds the standard level of performance as determined by expert review, evidence of significant improvement vs. the standard approach, consistently superior results, or agreement of multiple sources."


Simply speaking, a best practice for IIS is the agreed-upon "most superior way" to perform a particular routine operation(s).

Resulting Products

Results of the analysis and the incremental, consensus-based recommendations development process are captured in the following business modeling artifacts:

- Textual descriptions of restrictions, rules, and operational policies (business rules modeling).
- Diagrams of the processes and process-related collaborations among parties (UML activity diagrams).
- Diagrams of entities involved in the processes and their relationships (UML domain diagrams).
- Other products in tabular and textual formats, as well as supporting sketches and illustrations.
Figure 28-B1. The process of developing best practice recommendations
Table 14-B1. Process steps and participants responsibilities

<table>
<thead>
<tr>
<th>Step</th>
<th>Select the topic</th>
<th>Assemble experts</th>
<th>Preliminary work</th>
<th>Face-to-face meeting</th>
<th>Post-meeting work</th>
<th>Implementation</th>
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Figure 29-B2. Facilitated modeling session