A HOW-TO GUIDE

Conducting Centralized Reminder/Recall

Using an Immunization Information System

ACCORDS

ADULT AND CHILD CONSORTIUM FOR HEALTH OUTCOMES RESEARCH AND DELIVERY SCIENCE

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This guide will help you implement centralized immunization information system-based reminder/recall, also known as centralized IIS-based R/R.

- **Reminder/recall (R/R)** is the process of identifying and notifying people who are due soon for immunizations (reminder) or are already behind on an immunization (recall). Reminder/recall can include contacts made by mail, phone, text, email or other methods.
- **Immunization information systems (IIS)** are confidential, population-based, computerized databases that record all immunization doses administered by participating providers to persons residing within a given geopolitical area.
- **Centralized IIS-based R/R** is reminder/recall conducted by a principal entity using the IIS as a data source; it is sometimes done by a state/local health department or a health system. This approach delivers reminder or recall messages at a population or system-wide level.

This guide is primarily designed for people working in public health departments (state and local) or Immunization Information Systems – all of which may have the ability, interest, and resources to conduct centralized IIS-based R/R. However, we have included some information on page 8 for other groups that may be interested in conducting IIS-based R/R.

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Executive Summary

Reminder/recall (R/R) is a term that describes outreach to members of a target population to tell them vaccinations are due (reminders) or late (recall). R/R delivered by various methods, such as telephone, letter, or text message, increases the proportion of recipients who receive immunizations. In centralized R/R, a health department or health entity sends R/R to patients in a geographic area or throughout a health system. R/R can be conducted using data from an immunization information system (IIS), which is a confidential, population-based, computerized database that records all immunization doses administered by participating providers to persons residing within a given geopolitical area. This guide walks you through how to conduct centralized IIS-based R/R, an effective and cost-effective method for increasing immunization rates in children and adults.

The scope of your centralized IIS-based R/R will be determined based on the capabilities of your IIS, the needs in your community, regulatory or legal issues, and your resources (financial, staffing, etc.). The iterative processes of a centralized IIS-based R/R project can be divided into the following processes:

1 INITIATING

- Identify internal and external stakeholders.
- Locate funding to perform IIS-based R/R.
- Obtain approval to use IIS data to send out R/Rs.
- Understand regulatory issues.

2 PLANNING

- Review the budget and identify staff.
- Consider the population and immunizations to focus on.
- Determine the mode for R/R, timing, and frequency.
- Identify and communicate with key stakeholders.
- Understand the needs of the patient population.
- Develop the R/R materials.

3 EXECUTING

- Use the IIS to create a list of patients needing your vaccine of interest.
- Upload relevant data into systems for mailing, autodial, email, or other forms of R/R.
- Send out the R/R.

4 MONITORING AND CONTROLLING

- Manage recipient responses to R/R.
- Update patient records.
- Review and evaluate results.

5 CLOSING

- Identify lessons learned.
- Share your results with stakeholders.

6 SUSTAINABILITY

- Identify next steps.
- Set lessons learned into action.
- Use a Continuous Quality Improvement (CQI) process.

Background: Reminder/Recall Interventions Improve Vaccination Rates

Reminder/recall interventions are incredibly effective in increasing immunization rates. Reminder and recall notices may be tailored for individual patients and may include educational messages about the importance of vaccination. A 2018 Cochrane review summarized the findings of 75 studies that evaluated immunization-focused patient R/R interventions (both practice-based and centralized). The review found that R/R interventions, including autodialer calls, letters, postcards, text messages, or combinations of these, improve the proportion of participants who receive immunization.[1] Another systematic review and meta-analysis found that parental education and R/R interventions are effective in increasing childhood vaccination.[2]

Reminder/recall interventions can take two approaches. Traditionally, R/R has been implemented by individual medical practices to remind their current patients about needed immunizations. This approach is referred to as **practice-based R/R**. Practice-based R/R has been shown to increase immunization rates.[1] However, some literature suggests that less than 20% of providers conduct practice-based R/R for their patients[3] due to barriers such as lack of time and inadequate resources.[4-6] A newer approach is **centralized R/R**, or population-based R/R. In centralized R/R, a health department or health entity sends R/R to patients in a geographic area or throughout a health system.

Immunization information systems (IIS) are confidential, population-based, computerized databases that record and consolidate all immunization doses administered by participating providers to persons residing or seeking care within a given geopolitical area. An IIS provides immunization history that can be used to determine needed vaccinations via algorithms designed to follow the Advisory Committee on Immunization Practice recommendations.[7]

Centralized IIS-based R/R

In centralized IIS-based R/R, a state or local health department can use patient data in the IIS to send out reminder or recall messages to people regardless of where they receive medical care.

Broadly speaking, centralized IIS-based R/R can be performed for patients in:

an entire geographic region, such as counties or ZIP codes

a group of practices or health system

an Accountable Care Organization

a health maintenance organization

Health departments (both state and local) are uniquely positioned to conduct centralized IIS-based R/R; they are organizations with access to immunization data via an IIS, and they may be motivated to increase immunization rates at a population level.

Studies show most providers and parents are in favor of centralized IIS-based R/R conducted by a health department.[8-10] Several studies have found that centralized IIS-based R/R is an effective and cost-effective method for increasing immunization rates in children, adolescents, and adults.[11-19]

Get Familiar with your IIS!

The rest of the guide assumes you are well acquainted with the capabilities of your IIS. If you are not sure, it is a good idea to talk with your IIS program manager to learn about the data elements collected. Consider the following issues:

Data in the IIS

- Does the IIS collect immunization information on all age groups - children and adults? This will help when considering your target population.
- What type of patient contact information is collected, e.g., email, cell phone, address? Is there one that is required or collected more frequently? Knowing this will help determine which mode of R/R is feasible.
- Are there data elements that are missing or infrequently populated? This may be a limiting factor in your R/R.
- How often is patient contact information updated in the IIS? You may need to make plans to update this information.
- What other data elements are you interested in, and does the IIS collect them? (For example, health conditions needed for risk-based immunization recommendations often aren't captured in the IIS.)

Before proceeding, review the completeness of your IIS data.

IIS Data Quality

- What type of vaccine providers upload immunization data to the IIS?
- Are providers required by law to upload immunization data to the IIS or is this voluntary? Does this change by age categories?
- What is the provider coverage/saturation?
- Does data quality vary by age, region, or type of vaccine provider?
- How are data uploaded into IIS—manually or electronically?

An assessment of the data quality allows you to feel confident that you are not contacting people in error, which can annoy people and waste precious resources. Review internal reports on data quality as recommended by IIS Functional Standards,[20] or use your annual Immunization Information System Annual Report (IISAR).[21] Electronic uploading and mandated reporting can help ensure data quality, but are by no means a requirement to doing R/R using IIS data. However, it may merit a more in-depth coverage assessment before putting resources into an IIS-based R/R. As a practical example, if your vaccine of interest is often administered at pharmacies, make sure pharmacies upload vaccine data to your IIS in your area.

Not a Health Department or an IIS? Not a Problem!

While this guide specifically focuses on centralized R/R conducted by state or local health departments or IIS, there are other entities that may benefit from partnering with their IIS to deliver centralized R/R. An IIS's centralized immunization data can be used to help increase immunization rates, for example, by regional Accountable Care Organizations (ACOs) that serve large geographic areas or by health insurance agencies that cover large populations cared for by different practices.

Some of the benefits organizations such as these can gain from using the information in their area's IIS include having:

- A patient's consolidated immunization record regardless of where he/she receives vaccinations.
- A built-in R/R function that can accurately identify patients in need of immunizations based on their age and other factors. For many IIS, this function is customized and updated with current algorithms designed to follow the Advisory Committee on Immunization Practices' vaccination recommendations.

If you are not part of a health department or IIS, check to see if you can easily access IIS data for your patients. The first step is to see if your agency can gain access to the IIS data and if that requires any paperwork or login and password. In some states, ACOs and insurers have the ability to both upload patient immunization records and obtain patient data from the IIS.

To get a better sense about the data elements that your IIS collects, look through the Immunization Information System Annual Report (IISAR),[21] a required annual report to the Centers for Disease Control and Prevention (CDC), and reach out to your IIS staff to see if a partnership for a centralized R/R initiative would be a worthwhile project. You may find that this partnership could end up being mutually beneficial! The next section, *How Do You Implement Centralized IIS-Based R/R?*, will be useful once you get access to your IIS.

How Do You Implement Centralized IIS-Based R/R?

Before starting a Centralized IIS-based R/R, you must first have a few things:

1. The IIS needs the capability to identify eligible patients in need of immunizations, ideally at the population-level (county, state or ZIP code);
2. you need approval from the organization; and
3. you need staff resources and funding to do the work.

Recently, interviews with several IIS that have sustained centralized R/R efforts revealed the importance of getting buy-in and support from the top. Leadership could include a program manager within the IIS, an immunization branch section chief, or even the chief medical officer of the health department. Communicating with key people and getting them on board with your centralized R/R project should be step one. Several pieces of information could aid these discussions, including reviewing the research on the effectiveness of centralized R/R, cost information, or even cost-benefit analyses. It may be wise to propose a limited-scale pilot project to test feasibility and determine reactions from constituents. We will discuss other elements related to the scale and evaluation of centralized R/R projects later on.

Funding poses a challenge to many IIS-based centralized R/R initiatives, but there are several avenues that could be explored. Centralized IIS-based R/R efforts may have multiple funding streams, including federal dollars from the Centers for Disease Control and Prevention (through their cooperative agreement or other grants), partnerships with researchers doing centralized R/R research, state or local funding, and partnerships with private entities, including vaccine manufacturers and cancer prevention organizations. Additional points on budget and funding can be found on page 14.

The scope of your centralized IIS-based R/R will be determined based on the capabilities of your IIS, the needs in your community, regulatory or legal issues, and your resources (financial, staffing, etc.). Below we walk you through how to start a centralized IIS-based R/R project that has never been implemented before in your setting. Please note that a new project like this is often iterative in nature. You may try it one way, then tweak it and try it again slightly differently until you get it right for your agency.

Thinking of your centralized IIS-based R/R project as an iterative process is helpful. Following the model described by project management professionals,[22] a process is a series of iterative activities, not always sequential, designed to produce a desired result. The work of the project can be divided into several, sometimes overlapping, processes:

1. **Initiating:** processes to define a new project or a new phase of a project—usually includes obtaining authorization to start.
2. **Planning:** processes to define the scope of the project, refine the objectives, and define the course of action.
3. **Executing:** processes performed to complete the work defined in the plan to satisfy the project requirements.
4. **Monitoring:** processes to track, review, and evaluate the progress and performance of the project; this includes identifying areas that need changes and initiating those changes.
5. **Closing:** processes performed to formally complete or close the project.

Process for Implementing a Centralized IIS-based R/R Project

1

- Identify the problem you want to address
- Locate funding to perform IIS-based R/R
- Obtain approval to use IIS data to send out R/Rs
- Understand regulatory issues

2

- Review the budget
- Consider the population and immunizations that will be the focus
- Determine mode for R/R, timing, and frequency
- Communicate with key stakeholders
- Understand needs of patient population
- Develop R/R materials

3

- Use the IIS to create a list of eligible patients (R/R report)
- Upload R/R report for mailing, autodial, email or other form
- Send out R/Rs

4

- Manage patient responses to centralized R/R
- Update records in IIS or tracking document
- Review results

5

- Identify lessons learned
- Communicate with stakeholders
- Close out project

1 Initiating

Before you embark on the centralized IIS-based R/R project, you will need to initiate the project. During this process you are authorized to start the work. Perhaps you received a grant to perform centralized IIS-based R/R or were encouraged to implement it from leadership at your health department. Either way, this is the first step to starting the project. Below are the activities and questions to consider as part of this initiation process.

Initiation Questions and Activities

- Understand who is funding the project and what they want out of it.
- Review the requirements of the centralized IIS-based R/R project (if any).
- Identify key internal and external stakeholders.
- Research and understand regulatory issues:
  - Does your IIS have authority to contact patients?
  - Does the management at your organization have any legal concerns about conducting R/R?
  - Are you familiar with the Telephone Consumer Protection Act, particularly if you may be doing autodial or text?
  - Can your R/R algorithm exclude patients who do not wish to be contacted?

It is important to identify your stakeholders ahead of sending out a centralized R/R campaign. Stakeholders may include both internal (leadership within your agency) and external groups (local health departments, provider groups such as the American Academy of Family Physicians (AAFP) and American Academy of Pediatricians (AAP), parent organizations). Identify who these people and groups are early in the process. You will need to get buy-in from these stakeholders early on, starting with leadership at your IIS or health department.

Another important early step is to determine if there are any legal or regulatory roadblocks before beginning the project. Because of privacy concerns surrounding personal medical information, it is important to find out if your health department (or other organization) has the authority to contact patients about needed immunizations. Talk to leadership and the legal team at your IIS, health department and/or other health entity to ensure there are no issues.

If you are thinking about sending R/R via autodial or text messages, you may also need to look into the Telephone Consumer Protection Act (47 U.S.C. § 227). This law restricts telephone solicitations (i.e., telemarketing) and the use of automated telephone equipment. How your health department or IIS interprets that law may affect your ability to send autodial or text reminders. You may also need to get approval on the wording of your reminder messages from your legal department (more on developing messages later).

2 Planning

Once you have the approval to start the centralized IIS-based R/R project, you are ready to begin the planning process. This is the most time-intensive part with many things to consider, including those summarized below. Some of these may have been considered before you got authorization to begin.

Planning Activities to Consider

Consider your population or immunizations of focus.

- Can you perform R/R at the geographic or population level?
- What age groups will you focus on?

  6–20 months | 19–35 months | 11–12 years | Adults (see special cases on page 13)

- What vaccines will you focus on?
  - Childhood series
  - Adolescent series (HPV, TDaP, meningococcal vaccines)
  - Flu vaccine
  - Adult vaccines (pneumococcal, zoster)

Consider factors affecting budget.

- How will you send reminders, e.g., text, autodial, mail?
- Determine frequency and timing of R/R messages.
- How many notifications will you send; e.g., one, two, three per person?
- What is the timing of reminders; e.g., seasonally for flu, one time per year?
- What can you afford to do?
- Who will do the work?

Communicate with stakeholders.

Understand your patient population.

- Have you considered health literacy?
- Do you need translation services?
- Have you ensured your messages are culturally appropriate?

Develop R/R materials.

- Create a script that can be used for autodial, text and/or postcards
- Think through any visual components needed on postcards.

Consider your Population or Immunizations of Focus

If you can choose any population or immunization to be the focus of centralized IIS-based recall, you may want to consider targeting certain ages, geographic areas, or vaccines. One way to assess the needs is to review state or local data from your IIS. Other data sources to check include the National Immunization Survey and school immunization data at the county level. These may help you prioritize.

Use both the available data and public opinion to help prioritize. Is there concern from local parent groups about preschool-aged vaccinations? Is there money being given by federal funders to increase HPV vaccination rates? Making sure your proposed project aligns with what the community wants and available funding is always a good idea in making the program more sustainable and acceptable. Also, you may want to think about how you will evaluate the results of your project early during the planning phase to make sure you are capturing the outcomes important to stakeholders (more on evaluation on page 28).

Special Considerations for the Adult Population

While sometimes overshadowed by childhood vaccines, vaccine-preventable diseases like influenza, pneumococcus, and tetanus affect adult populations too. Because of this, a Cochrane review of evidence recommends R/R for adult vaccines to increase their uptake in the adult population.[1] Below are some unique considerations to think about when considering R/R for adults.

- Adult immunizations might not be entered in the IIS as frequently as childhood vaccines. Some IIS might not be authorized to collect adult immunizations.
- You may need to work with other health care entities to populate or upload adult information into IIS before you start a centralized IIS-based R/R, especially if your IIS has not been a lifespan IIS for long.
- Adult contact information might not be as accurate as child/parental information, since contact information might be updated only when shots are given, which might not be as frequently as for children.
- Consider pulling in patient contact information from other sources (practices or health entities) to get better information.
- Unlike children, not all adult vaccines are covered by major insurance groups, presenting a cost barrier for patients.

Consider Factors Affecting Budget

One major consideration that will affect your budget is how you will send out the reminders. Options include text messages, autodialed telephone calls, and mail. Mailed notices will be the most expensive, and while you might think you can do it in house, using a print and mail service may be more economical and more feasible. Vendors are available to handle text and autodial services, or systems can be purchased to do this in house. Typically, automated communications (like autodial, text, or email) will be cheaper per contact than mail. Text and autodial companies typically charge less than 10¢ per contact, with the cost decreasing with the more people called. Make sure to talk with you IIS leadership and/or your legal department about which method of reminders will work best for your IIS or state. Each jurisdiction may have different interpretations of regulations, and these will guide decision making too. Consider the pros and cons of each approach below.

Types of R/R: Pros and Cons

Mode	Pros	Cons
Mail 	Bulk mail or nonprofit postage rates may apply, lowering costs. A physical reminder that people can "hold in hand." Fewer legal issues. Easy to customize and provide more information and detail. Easier to brand (e.g., logo of partnering physician's office).	Expensive ($1–$3 per contact). Time-consuming to put together. Can be labeled as "junk" and thrown away. Potential unauthorized disclosure of protected health information if received by someone other than patient (note HIPAA limitations for postcards vs. letters).
Autodial 	Inexpensive (<10¢ per contact). Some companies offer customizations. Can send out a lot of phone calls quickly. Can leave a message in voicemail that can be listened to again.	May be difficult to find vendor that offers level of customizations desired. People might not like autodial. Easy to ignore or forget. Potential legal issues via Telephone Consumer Protection Act (TCPA), based on local interpretation.
Text 	Inexpensive (<10¢ per contact). Can be customizable. More lasting than autodial. People are used to getting text messages.	140-character limit. May be difficult to find vendor that offers customizations desired. Potential legal issues (TCPA). Cell phone numbers might not be routinely collected in the IIS.
Email 	Inexpensive. Customizable. May be done without vendor. More lasting than autodial.	Many IIS do not have "email address" field, or it is not well maintained. Some people do not use email. Messages can go to junk folder.

Another thing to consider is if you have existing staff to conduct and manage the centralized IIS-based R/R. In our previous work, personnel time accounted for a fair portion of the total cost of centralized R/R. Staff time for centralized R/R is spent on creating the materials, running the initial report, updating the call and/or mailing lists, and managing phone calls that you may receive from patients after R/R has been sent. Using existing staff could make your out-of-pocket expenses considerably lower. Studies have shown comparable effectiveness between autodial and mail reminders.[16,18]

Lastly, consider the scope of your project. Costs per person tend to go down the more people you send reminders to, especially when choosing text or autodial approaches instead of mail. You can still save money with mailings by checking with the Post Office to see if you are eligible for a nonprofit rate. You can also use metered postage and/or send postcards instead of letters. The table below lists the costs associated with R/R as found through a number of controlled trials.

Cost Estimates from Previous Centralized R/R Trials

R/R method	Cost*	Number	Ages	Vaccines
2 autodial + 2 mail R/R[16]	$3.16 per child $28,620 total	9,049 children	19–35 months	Childhood Vaccination Platform (DTaP, polio, MMR, Hib, hepatitis B, varicella, and pneumococcal conjugate vaccines)
3 mailed R/R notices[13]	$3.15 per child $40,367 total	12,832 children	19–35 months	Childhood Vaccination Platform (DTaP, polio, MMR, Hib, hepatitis B, varicella, and pneumococcal conjugate vaccines)
2 autodial + 1 mail R/R[23]	$0.78 per adolescent $5,647 total	7,240 adolescents	adolescents	HPV, meningitis, Tdap vaccines
3 autodial R/R (unpublished)	$0.22 per child $3,629 total	16,425 children	6 months–18 years	influenza vaccine
2 autodial + 1 mail R/R[19]	$0.86 per adult $15,438 total	17,951 adults	19+ years	Influenza, Tdap, or pneumococcal vaccines

* *Total includes personnel time and supplies. Descriptions of how costs were estimated can be found in each article. Note: the costs noted here were true as of the time of the published articles.*

Think about how many reminders you will want to send to each individual. This can be by person or by dose of vaccine needed. What you decide will depend on your budget and a few other factors. Typically, it is recommended that between one and three notices per person may be best. If you decide to do more than one notice per person, you may need to consider how to track who is getting reminders each round. Think about the spacing between each reminder. Allowing three to four weeks in between rounds will allow you to remove bad addresses and remove individuals who may become up to date.

Set your timeline. You may wish to avoid holidays or busy times for practices, since your R/R will generate calls to immunization providers such as doctor's offices, which may be overbooked. For example, respiratory season is often very busy, typically beginning in December and lasting through February. Sometimes the back-to-school time (August) is also busier than usual because of needed physicals. Obviously if you are focusing on influenza vaccination, that will need to be timed based on when the vaccine is available (often September or October) with a need to conduct R/R before influenza season begins. However, be mindful of competing demands at doctors' offices.

Finally, realize that your message might not be the only one going out to people in your area. Assess your community to determine if other vaccine reminder efforts, such as those from pharmacies or health insurance plans, are going out at a similar time so you avoid confusion and duplication of efforts. Other, non-vaccine related outreach efforts should also be taken into consideration. Election season, for example, is a time when people may receive lots of unsolicited phone calls, so an autodial R/R program may end up getting overlooked.

Unique Vaccines: HPV and Influenza (Seasonal and Pandemic)

Human Papillomavirus (HPV) and influenza vaccination rates remain sub-optimal according to Healthy People goals. Centralized IIS-based R/R has the potential to improve vaccination rates for both; however, special considerations are needed to ensure optimal effectiveness.

HPV

Consider focusing on certain populations if resources are limited.

Focus on those who have already initiated and need reminding for completion.

Patients who have already started the series are accepting of the vaccine; a reminder about completing may help more than efforts to increase initiation rates.

Focus on younger adolescents (11–12 years).

The vaccine is more effective if given at a younger age, before adolescents are exposed to HPV. IIS contact info may be better for younger adolescents.

Consider including educational messages.

Framing HPV vaccine as a cancer prevention strategy may be more effective than as a STI-prevention measure. Including dosing and vaccine safety information may help.

If sending R/R for follow-up doses, decide if you will be sending:

Reminders: alerts the patient when they are eligible but not yet overdue for the next dose

Recalls: alerts the patient when the follow-up dose is overdue

Both reminder and recalls

- For the two-dose series, reminders could begin at six months after the first dose; whereas, recalls could begin 12 months after the first dose.
- Reminders may help get adolescents fully protected before they are overdue.
- Reminders may confuse people who were planning to complete the series later, based on their provider's recommendations, and/or may cause the patient to incur out-of-pocket co-pay costs with an additional visit.

Be aware of recommendations or R/R efforts being done in the area.

Clinics may have different recommendation strategies and viewpoints about HPV in particular; it is good to make them aware of your outreach and get their input.

SEASONAL INFLUENZA

Flu is the only vaccine that is recommended for everyone annually; therefore, it is resource-intensive to implement C-R/R for the entire population.

If resources are an issue, consider focusing reminders in certain age groups:

- **6–12 months of age:** Young children visit clinics more frequently and might get vaccinated without R/R, but they are also most at risk of serious flu-related complications.
- **3 years of age and up:** Children age >3 years are seen only annually for well-visits, leaving fewer opportunities to vaccinate, so R/R might be helpful.
- **Adolescents:** Adolescents have lower vaccination rates than younger children and seek health care less regularly, making this group a potential target for C-R/R.

Consider including educational messages.

Positively worded messages that include information about effectiveness, location, and timing may help. Children under 9 years old may need two doses, which families might not be aware of. A reminder for this may be helpful.

Consider staggering reminders in waves (e.g., across days of the week or months).

This may reduce capacity burdens on individual clinics from an influx of phone calls following R/R messages and vaccination appointments needed.

Consider timing of reminders (e.g., which month to start).

Correspond with vaccine supply delivery (optimally for both Vaccines for Children and commercial) and ideally prior to flu outbreaks (assess state and CDC data).

Be aware that IIS-based vaccination rates for flu may be an underestimation.

- IIS flu vaccine reporting may be lower than other vaccines due to vaccines given at non-reporting sites.
- Sites may have trouble reporting to an IIS related to multiple vaccine types with new and multiple codes.
- Sites in states where reporting to the IIS is not mandatory may have lower reporting.

Be aware of other outreach efforts in the community, focus on gaps.

Many groups (pharmacies, practices) could be doing flu outreach efforts, including R/R. Try not to replicate efforts!

PANDEMIC INFLUENZA

Be prepared. Keep contact information as up to date as possible.

During a pandemic, IIS can efficiently create lists of patients (especially children) with contact information.

Remind people of necessary doses.

Pandemic flu may require two or more doses, even for healthy individuals.

Provide information about where to get flu vaccines.

Generic and tailored messages could include vaccination locations or where to access a schedule of locations in their area. In a pandemic, new locations may be set up.

Communicate with Stakeholders

At a minimum, it is a good idea to make sure local providers are aware of your centralized IIS-based R/R efforts. You may want to get provider input on the project before you start. This could be done by providing information during existing monthly IIS-user groups, contacting local chapters of the AAP/AAFP or other provider organizations, or sending through email listservs. Allowing providers to weigh in beforehand might prevent issues down the road. Communication is important once you start the R/R, as it can be confusing to both patients and providers if someone gets a reminder and no one in the doctor's office is aware of where it is coming from. The main way to avoid confusion and reduce duplication is to communicate with providers from the outset by letting them know of your intended efforts, including which age groups and vaccines you are targeting. Additionally, you can also choose to partner with providers by inserting the practice name into the reminder message, sometimes called provider endorsement. We detail how this can be done in the box to the left.

Here are a few suggestions for communicating with practices:

- Send out communication (letter or email) directly to the practices as a courtesy to make sure providers and front desk staff are aware of the centralized IIS-based R/R. You may also consider publishing on your website a schedule of all R/R efforts that will be going on throughout the year and making sure stakeholders and practices have access. It is important to communicate the frequency, timing, populations, and vaccines targeted.
- Consider how practices might handle potential demand from centralized IIS-based R/R. It is important to communicate that sending R/R messages typically does not increase demand for the vaccines to a point where practices can't accommodate them.
- Your IIS may have regulations or statutes permitting the contact of patients for health purposes. If not, you may need to have specific permission from providers to contact their patients on their behalf. Talk with IIS leadership and legal staff to see what you are able to do on your own (see page 23 for more details).

Partner with Physicians!

Past studies have found that including the practice's name on the R/R is important[16] and most providers and patients prefer it.[8-10]

Linking the patient to the practice can be done using your IIS. If your IIS has a "default provider" field —a field that assigns a provider to a patient based on vaccination records—you can include the practice's information to make it look like a more collaborative approach. If your IIS does not have this type of field or you do not trust its accuracy, an alternative is to use the practice where the patient last received an immunization. Having a known practice name gives more familiarity to the patient, who will recognize the practice, and gives patients the next step of action: calling their practice to schedule a visit. If you are doing this, it is essential that you contact the practices and get their prior approval!

Understand your Patient Population

Consider your patient population. Based on whom you will be reaching, materials may need to be translated into different languages. Work with a translator within your organization or seek outside help to translate documents.

Consider aspects of health literacy when planning your R/R. Health literacy is the extent to which a patient understands health information.[24] Issues of literacy apply to oral information, print information, and numeric information. Fourteen percent of adults have limited health literacy,[25] so it is important to keep this in mind when developing patient materials.

When thinking about your patient population, it is important to assess the readability of the messages you are sending out (see box on readability). Making sure your message is both readable and understandable to your target population can improve the effectiveness of R/R.[26] There are tools available online to make sure you are getting your materials to a level fit for your audience, including one from the Agency for Healthcare Research and Quality.[27]

You should also assess cultural appropriateness of the message to the population receiving it. Awareness of cultural norms and expectations among your population will help you tailor your materials appropriately.[28,29] Your R/R materials should match the experiences of your target group.[30]

- Use images and examples that show the target group and that are realistic and positive. Including appropriate cultural descriptors in immunization messaging could help increase rates.[28,31]
- Specific cultural or language groups may have certain preferences. For example, parents in one study of urban low-income Latino patients found preferences for text message R/R, and they preferred receiving multiple texts that included personalization and interactivity.[32,33]
- If possible, reach out to parent and patient organizations as well as community leaders in your region to get input on language preferences and suggestions for cultural appropriateness.

Improve Readability and Suitability

Use plain language written in conversational style.

Check the reading level. Go with a 5th-6th grade level as measured by one of the sources listed here:

- Fry Formula: readabilityformulas.com/free-fry-graph-test.php
- SMOG, Flesch-Kincaid, Flesch Reading Ease: readabilityformulas.com/free-readability-formula-tests.php

Use white space in printed documents.

Choose common everyday words, e.g., “shot” instead of “vaccine.”

Use active voice.

Use first person (I, we, you).

Use short sentences.

Words Matter

It is important to be deliberate about the language used in your R/R messages. While a message may seem to be harmless to some, others may have a negative reaction to it. They might not heed the message, or worse, they might become angry with the messenger. Asking potential recipients what they think can help you hone your message. Research suggests most parents prefer the involvement of their doctor, prefer specific immunization information, and want messages that are neutral to positive in tone. These are examples of real parents or patients discussing immunization reminders:

- **Preference for including provider information:**
  "You feel more comfortable when [your child's doctor is involved in] reminding you about something."
- **Preference to customize message with needed vaccines:**
  "I don't want to have to call and ask for more information. Why do I have to go there? You know, what am I overdue for? Just tell me what I need to go there for and I'll make the appointment."
- **Neutral to positive wording of the message:**
  "[Messages] need to be not intimidating. Not scary. You can't be all freaked out after getting a reminder message."

Develop R/R Materials

Next you will create your materials. Scripts for autodial calls, texts, and postcards all have their nuances. For example, boiling your message down to the 140 characters of a text can be quite tricky! While autodial calls and postcards don't have the same restraints on words, you need to be aware of how long your phone call is (you should typically keep it under a minute) and how readable your postcard is (pepper it with pictures to make it more visually appealing). Review the sample scripts below and tips on writing readable scripts and postcards.

If you are doing a mailed reminder, utilizing the mail-merge function available in most word processing and publishing programs will allow you to quickly generate thousands of unique postcards. You should consider using this for the name and address fields, but you could also consider mail-merging parts of the main text, such as a partnering practice's name (see section on provider endorsement, page 20). When doing autodial or text R/R, you may be given certain fields that you will need to enter into your autodial system. Each system will have different requirements, but typically you can manipulate data in a spreadsheet program. Also note that the price for autodial and text companies will typically decrease as you increase the number of patient contacts. Be sure to inquire with each vendor.

No matter which route you choose to go, always consult your legal department about which messaging will work best for your agency. Some agencies may have restrictions that apply to phone or text messages or even have distinctions about the kind of information your message may contain if you are using a letter versus a postcard. Any message you send out will be reflective of your agency, so it is very important to make sure the agency fully supports the message itself.

Autodial Vendors

While we cannot endorse or recommend specific products or brands, the list below may aid you in your selection. These vendors typically offer both autodial and text message options. Things to consider when selecting a vendor include cost, data security, customization options (i.e., the option to include custom fields like specific vaccines or practice names), text-to-speech vs. live audio recording, and contracting limitations. Check the websites for their specific customizations or do an internet search and talk to a few vendors about your specific scenario.

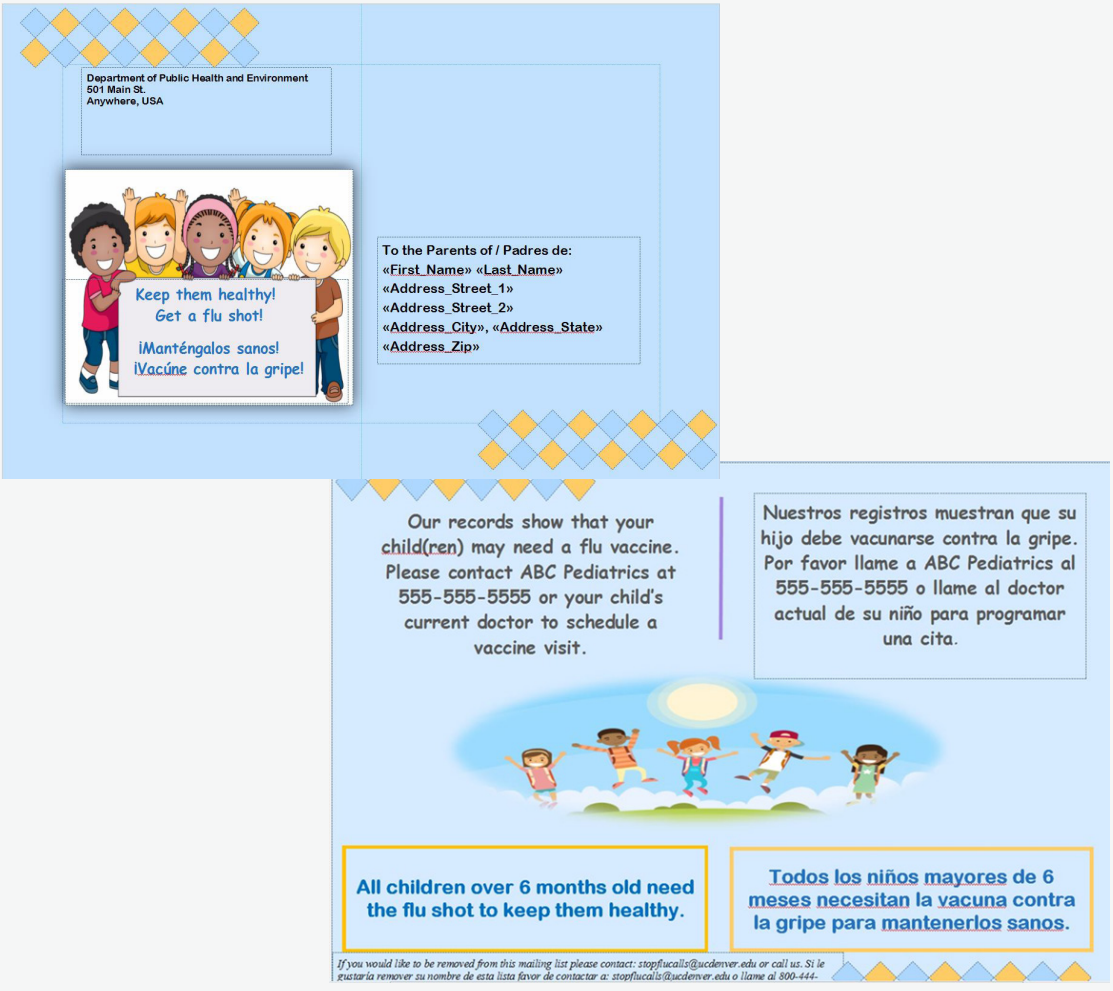
- Call-em-all: call-em-all.com
- Call Fire: callfire.com
- Teletask: teletask.com
- Televox: televox.com/appointment-reminders
- Voicent: voicent.com/autodialers.php

Here are some examples of phone scripts and postcards that were used in Colorado.

Example Phone Script:

> *"This is a call regarding your child's health. Press 1 for English; O presa 2 para Español. Hello! This is an important message on behalf of [Pediatric Practice Name OR health department]. Our records show your adolescent may be due for an HPV shot. The HPV shots can prevent several types of cancer and are recommended starting at age 11. Multiple doses are needed. Please call [Pediatric Practice Name OR health department] or your adolescent's current doctor to discuss. If you would like to be removed from this list, please press 9. Please press 0 to repeat this message."*

Example Postcards:



3 Executing

You are ready to launch the centralized IIS-based R/R once you have thought through the planning steps. There are several activities to consider during this process.

Execution Activities to Consider

- Consider how you will create your list of patients to contact (R/R report).
  - Will you run the report on the "back end" using help from an IT or data person?
  - Will you use the IIS R/R report on the "front end" using the built-in IIS R/R function?
- Review generic steps needed to send out the reminders.
  - How will your report look in your IIS?
  - What data elements will be included?

Running the R/R Report

There are a couple of ways that a state or local health department or an IIS could create a list of eligible patients to send reminders to. If the IIS staff are located within your agency, perhaps a data analyst or an information technology (IT) staff person could run this as a data request on the "back end" of the IIS database to pull out patients of a certain age and in need of a particular immunization. This is especially useful if you are targeting a very specific population, for example those with certain medical conditions. You may need to consult with other data sources within the health department and/or your IIS vendor to determine what is possible.

The other, more common approach is that you would simply run a R/R report using the algorithm/platform already built within the IIS. This functionality is typically available for people with appropriate security clearance and does not require any additional programming. Using the readily available "front end" will require you to put in the specifications of the R/R (i.e., ages, vaccines, geographic areas of interest), and the built-in algorithms will do the work. For the purpose of this guide, we will focus on how it might look if you were to run the R/R algorithm within your IIS.

Generic Steps for Launching

Please note that the exact look and feel of the R/R functionality report will differ based on your IIS. The following are generic guidelines for the overall process. If you are not familiar with how to run R/R reports on your platform, you may need to consult with your IIS developer or IIS staff to learn how to do it. Your developer or IIS staff may even have training information you can review in running R/R reports.

1 Log in to the IIS and open the R/R functionality report in your IIS.

2 Enter your patient criteria (based on your planning process). Include age, location, vaccine, etc. and run the report.

3 When it's complete, you should be able to download a list of patients (often a CSV or Excel file) that can then be used to upload for mailing documents or autodial systems.

Example File Output

FName	LName	DOB	Age	Gender	Address	Phone	Need IZ	Provider
John	Doe	4/13/2010	8	M	123 Main St.	555-5555	Hep B	ABC Pediatrics
Jane	Doe	6/13/2017	1	F	101 Main St.	555-5555	Influenza	KPA

4 Review the downloaded file and make any revisions or updates to data as needed.

- Check to make sure your file does not contain too much missing data. If you are doing a mailed reminder and have patients without clearly viable addresses, it is a good idea to get rid of those patients to cut down on printing and mailing costs for undeliverable mail.
- You may have too much information in the file from the IIS for your mail merge or autodial system. For example, after determining all patients in your file are within the age parameters of your project, you can likely delete the age field.
- If you are doing a mail merge, check to see that data is in sentence case and there are no unwanted abbreviations in your data. Postcards written in all caps or without any capitalizations look unprofessional.
- If you are using an autodial system, the fields you will use may be required to be very specific. As an example, you may be able to customize each message by inserting the practice name in the autodial script using a practice code in the message. Each autodial company is different, so make sure you consult them if this is something you would like to do. Make sure to make any changes to the file needed before uploading it into the autodial system.

5 Send out reminders depending on your planning decisions:

- Method: mail, autodial, text, email
- Timing of project
- Frequency of reminders

4 Monitoring and Controlling

Even though your centralized IIS-based R/Rs have been sent out, there are several things you'll want to do to monitor and control your project to ensure optimal success.

Monitoring and Controlling Activities to Consider

- Consider how you will manage the reminder program.
  - Will you update addresses ahead of time using an address cleaning service?
  - Will you update addresses after the R/R has started?
  - How will you handle patients who call in with questions?
- Consider how you will evaluate results.
  - Does the IIS offer reports in the system to track improvements?
  - Do you have a graduate student or intern who could help you track or measure the results?

Managing Reminders

Inevitably, you will get returned mail and non-working phone numbers. Sometimes the contact information available in IIS is not routinely updated. Parents/patients may call and ask questions or want to be removed. You have several options. Determine if you will perform address or phone updates for patients with returned or undeliverable addresses or incorrect phone numbers. You may be able to get updated information from the patient's medical practice. However, this is a time-consuming process and has budget implications. In some cases, this may improve the reach of your reminder program, but it can add considerable time and costs.

If you aren't doing updates, determine if you wish to continue sending those patients reminders or if you can remove them from future recall lists to save money. See the box about data scrubbing for another way to prevent using incorrect contact information.

Data Scrubs for Contact Information

You may wish to "scrub" your contact information prior to sending.

- Mailing addresses can be checked to see if they are accurate via the U.S. Postal Service or a program called SmartyStreets. This service may work better for adults.
- If you are sending text messages, there are programs that can tell if your phone numbers are cell phones or land lines. Search for these programs online.

By scrubbing your data before launch, you could potentially save money by not sending postcards, calls, or texts that won't reach your intended audience.

Consider establishing a toll-free line and/or generic email address that people can call or email if they have questions or comments about the reminders. Respond to them if needed and remove their names from your contact list if requested. Many autodial and text companies offer automatic ways for people to opt out using their phone or by text. For example, "press 9 to opt out" or "text STOP to stop texts." You may want to track this information for any future R/R projects. Some IIS systems have a checkbox for the patient to be excluded from R/R via the R/R report. Check with your IIS to find out if this is possible. If not, determine how you will keep these people out of future R/R projects.

Evaluating the Results

Once you have completed the reminders, you will want to evaluate your results. Many funders—both external and division heads at your health department—will want to know how their money was spent and what outcomes they received from their efforts. Be sure to build in some time to measure the results of your program. If you do not have staff who can dedicate time to these efforts, consider alternatives like using student interns or graduate students to help you evaluate. Evaluation can be used to inform future programs and thus is an important process to be considered.

Other stakeholders, such as provider groups or vaccine advocates, may also want to learn about your work. Consider your audience and make a plan for presenting your results in a format that works best for that group. Your evaluation and what you report may vary based on their needs.

Consider how detailed you want to make your evaluation. As a starting point, you might just view immunization rates in certain areas and compare them between years. To take your evaluation further, try actually following some of the same people who were sent R/R to see if they received the needed vaccines. Staff time and cost studies may also be useful to some stakeholders, especially if they are determining how to allocate staff and financial resources for

Types of Evaluations:

Effectiveness – did rates go up or stay the same? You can use IISAR, or determine rates using your IIS data or other data sources.

- A note on population health: Research on R/R shows modest improvements in vaccination rates.[1,2] Don't be discouraged if your intervention is only showing an increase in rates of 3% to 10%. At a population level, this can mean immunizing a lot of people, preventing a lot of disease, and potentially saving lives!

Cost – how much did it cost to do the R/R? Who paid for it? Was it worth the cost?

Reach – were you able to contact the people you wanted to? This may be important when determining future modalities of R/R.

- Some autodial programs will tell you if people hung up or listened to the entire message.
- Incorrect address rates can be useful to know, since mailing is so expensive. Are you reaching the people you think you are?

Attitudes and feasibility – How did providers or patients in your area react to the messages?

- Survey local providers and/or parents who received the messages.
- Interview a few providers to find out how it went.

future R/R programs. Other factors that may be of interest include how many people you reached and what the rate of bad addresses or phone numbers was.

If you want to be able to say with any certainty that your efforts led to an increase in immunizations, we recommend an evaluation that includes a group that did not receive the R/R, or a matched control group (patients with similar demographics and from a similar area). After your R/R effort, compare rates of immunizations between the people who received the R/R and those that didn't. This will control for local immunization trends and other interventions that may be happening in your community and will help you to conclude that the R/R intervention, and not other factors, is the reason for increased immunization rates. The box on the previous page lists types of evaluations to consider.

5 Closing

Once your centralized IIS-based R/R project is nearing an end, you'll want to think about closing it out. Below are a few things you may want to think about.

Closing Activities to Consider

- Document lessons learned.
  - What went well?
  - What needs improvement?
  - Write down important contacts and experiences that you should remember each time.
- Communicate with stakeholders.
- Understand what is needed to close the process.

Document lessons learned. Take some time to meet with co-workers to discuss what worked well and what things need to improve. Write down the items for improvement and keep for the future. Think through what parts you could have done differently. Bringing lessons to your department chief or funders can help show you are improving processes and may be important for planning the sustainability of your project. Future efforts may use your lessons learned to fine-tune the process, potentially increasing efficacy and reducing costs.

Be sure to summarize your results and share back with providers in your community, leadership within your organization, and beyond.[34] Results and lessons learned can be put in a slide presentation or just a one-page document and could be emailed out or distributed in a newsletter. Providing these results to stakeholders can help them understand your project goals and can support the success of future efforts.

Find out what is needed to close out the project. Was there anything you needed to follow up on? Perhaps providers in the community are interested in learning more about the efforts or federal funders need to see the results of the project as part of a final report. Tie up any loose ends. If this project went well, your agency may consider an ongoing program to continue these efforts.

Finally, remember to celebrate the successful close of the program! Whether this was the first time conducting Centralized Reminder/Recall or you are trying different approaches, this is truly a novel use of an IIS to do a public health intervention.

Sharing is Caring

We conducted surveys and interviews during 2018 among IIS staff around the United States and found that the majority of IIS have at least tried centralized IIS-based R/R. This news was not well known to other IIS staff, who thought their program was one of a few in the nation! Sharing results and lessons learned can be very useful for advancing centralized R/R and improving ways for increasing immunization rates across the country. Here are immediate lessons that can be applied today:

- **Stop reinventing the wheel.** Many new programs could benefit from understanding the lessons learned from existing programs. Understanding what works and doesn't work for IIS is important for those just starting out.
- **Think outside the box.** From funding sources to modes of communication, there are lots of things successful centralized R/R interventions can show newer programs.
- **Increase population health.** By sharing successes, we can help one another increase immunization rates and work toward a healthier nation.

Sustaining Centralized IIS-Based R/R Efforts for the Long Haul

Once your centralized IIS-based R/R project is complete, think about if these R/R efforts could be sustained. Planning for sustainability means you take what you learned (both positive and negative) and apply it to the next round.

After evaluating your efforts and considering how you could improve the project, you see it is a worthwhile endeavor. Now you can think about how to sustain it within your organization. Consider adopting the Continuous Quality Improvement (CQI) approach, which is a philosophy that encourages all team members to continuously ask "How are we doing?" and "Can we do it better?"[35]

Continue to engage and communicate with your organization's leadership. This can be done through meetings, presentations of your results, and using your political capital within your organization. The organizational leaders need to empower those on the ground to do their jobs. CQI efforts that lack leadership buy-in and support don't take hold. The worst approach would be to attempt a CQI effort without including the leadership at all.

Next, form a team with the appropriate people. This team may be the group that put together the first R/R project—those who are doing the work on the ground. Be sure your CQI team feels a sense of ownership in the project. The team will want to consider adopting a PDCA (plan-do-check-act) approach.[36] This quality improvement cycle involves:

- **PLAN:** Design or revise process components to improve results.
- **DO:** Implement the plan and measure its performance.
- **CHECK:** Assess the measurements and report the results to decision makers.
- **ACT:** Decide on changes needed to improve the process.

The key here is to start small and make the project manageable so as to be able to actually follow through several cycles.

This process requires data: making objective decisions based on metrics that are identified as important for success. Data typically include clinical benchmarks, of course, but also customer satisfaction (from both internal and external customers).

Make sure you have consensus about how to define success. Change doesn't necessarily equal success. Therefore, it is really important to know ahead of time how success is defined. The question to ask is: How do I know if the change we made actually resulted in an improvement? Once you know this, you will be ahead of the game.

In any case, if you are able to implement a centralized IIS-based R/R project, take time to celebrate your successes and continue building on the foundation to sustain the efforts in the future.

Resources

Other links and resources that may be helpful in your efforts:

Sample Postcards and Scripts

http://www.ndhealth.gov/Immunize/NDIIS/AdolescentRR.aspx

https://health.mo.gov/living/wellness/immunizations/pdf/Lit301.pdf

https://health.mo.gov/living/wellness/immunizations/pdf/Lit302.pdf

https://chirp.in.gov/chirp_files/docs/autodialer/Autodialer_Sample_Script.pdf

Reminder/Recall in Immunization Information Systems

http://repository.immregistries.org/files/resources/5835adc2dc122/mirow_reminder_recall_in_iis_full_guide.pdf

Agencies

American Immunization Registry Association (AIRA): immregistries.org

American Immunization Managers (AIM): immunizationmanagers.org

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