GUIDE FOR PROJECT LEAD

Vaccine 2D Barcode Scanning Implementation Toolkit

National Center for Immunization & Respiratory Diseases (NCIRD)
Centers for Disease Control and Prevention (CDC)

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Indicates that the page includes a checklist or activity.

Introduction

The Guide for Project Lead is part of the Vaccine 2D Barcode Scanning Implementation Toolkit, which contains a series of resources and tools to support different aspects and phases of vaccine two-dimensional (2D) barcode scanning implementation in ambulatory clinics, health care facilities, or health systems.

To determine if vaccine 2D barcode scanning is right for your organization, view the **Implementation Guide for Decision Makers.** Be sure to consider up-front costs (e.g., scanners, Wi-Fi, additional technology needs), electronic medical record (EMR) capabilities, and time constraints of staff. The information in the Guide for Project Lead may also be considered when determining if scanning is right for your organization.

It is recommended that a Project Lead is identified to manage the implementation of the new process. This Guide provides recommendations and tools for a successful implementation based on pilot projects and prior implementations.

Using This Guide

This Guide is divided into the following chronological phases:

1. **Plan**
2. **Prepare**
3. **Go-Live**
4. **Maintain**

Topics covered in this Guide describe three aspects of implementation, which can assist with planning and may help determine how to assign responsibilities within a team. Look for the icons of the key areas in the upper-right corner of the pages throughout this Guide.

- **Staff**
- **Technology**
- **Monitoring**

Benefits of Vaccine 2D Barcode Scanning

Scanning 2D barcodes on vaccines provides an alternative method of data entry to manual entry. Vaccine manufacturers are required to affix 2D barcodes on the secondary packaging or unit of sale (UoS). Most manufacturers are affixing 2D barcodes to the primary packaging (e.g., vial, syringe) or unit of use (UoU). Both 2D barcodes contain the vaccine National Drug Code (NDC), lot number, and expiration date. The UoS contains the vaccine serial number, as well. The barcode data can be imported to an EMR or other health information system upon scanning with a 2D barcode scanner, reducing the need for manual data entry. Implementing the practice of vaccine 2D barcode scanning can promote record accuracy, time savings, staff satisfaction, and patient safety.

Record Accuracy

Scanning improves the accuracy of vaccine data capture, including lot number, expiration date, and NDC, compared to data entered manually.

Time Savings

Data entry by 2D barcode scanning saves an average of 21 seconds per vaccine administered compared to manual entry.[1]

Staff Satisfaction

Health care providers described aspects of satisfaction with scanning, including reduced eye strain and hand- and joint-related problems, and safer process for syringe disposal.[1]

Patient Safety

Pop-up alerts can notify health care providers if the selected vaccine is incorrect or expired, adding an extra safety check prior to administration.

[1] Findings and data points are from the 2D Vaccine Barcode Scalability Pilot, conducted from 2016 to 2017 in 27 health care centers within a large health care system. Additional information from the pilot can be found in the **Findings Report: 2D Vaccine Barcode Scanning Pilot**.

Plan

Raise Awareness

Inform staff and leadership of implementation plans in the early stages of vaccine 2D barcode scanning implementation. Support and participation from stakeholders are critical for successful change management.

Engage staff and leadership to increase buy-in and satisfaction with utilizing scanners.

Ensure site-lead buy-in, as the leads are critical components of the site's culture.

Considerations for involving stakeholders:

- ☑ Review other materials available in the Toolkit, including one-pagers, that can assist with raising awareness.
- ☑ Communicate the **benefits** most relevant and compelling to each stakeholder group to gain support for the implementation and share additional Toolkit materials as needed.
- ☑ Determine which level(s) of leadership, if applicable, should be engaged or updated on activities and the frequency of communication needed with those leaders.
- ☑ Consider the appropriate venue(s) for information sharing (e.g., agenda item in weekly meeting, announcement in daily huddle, email memo).
- ☑ Collaborate with IT and EMR personnel to agree upon timelines, go-live date(s), and onboarding plans.

Key for success: Regularly provide updates to staff and leadership on progress and what to expect during implementation. Consider targeting communication to stakeholders' groups and providing additional, relevant information and attachments.

Assemble a Team

A successful implementation will require a team effort within a clinic or across a health system. Determine which individuals or representatives will need to be involved in the Plan, Prepare, Go-Live, and Maintain phases. Strong collaboration between central leadership and a cross-functional team is recommended. Note that it is possible and likely that one person may take on several responsibilities throughout the implementation.

Project Lead

Site-lead, head nurse, health system administrator, or other staff member who will manage the implementation, gather the team and stakeholders as needed, and monitor progress. The Guide for Project Lead is intended for this role and provides recommendations and tools for successful implementation.

Key for success:
It is important to have a project champion who will support the initiative, promote adoption, and set expectations, particularly at larger practices and health systems.

Listed below are additional tasks and responsibilities that may be assigned to individuals to support the implementation. Take note of the description of each task listed below, as responsibilities may be assigned differently at your site.

Redesign Workflow

Coordinate the redesigned workflow by engaging and collaborating with the health care providers, act as first point of contact for troubleshooting, and monitor the success of the workflow.

Manage Procurement and Logistics

Procure necessary hardware and install in locations determined by redesigned workflow.

Coordinate Trainings

Prepare and lead trainings to introduce 2D barcode scanning and the redesigned workflow to staff.

Support EMR Activation

Provide EMR support for incorporation of scanning into workflow, including configuration of the scanner and updates to reference tables (may be external to the clinic).

Support Technology Needs

Provide technical support with scanner installation and configuration with EMRs.

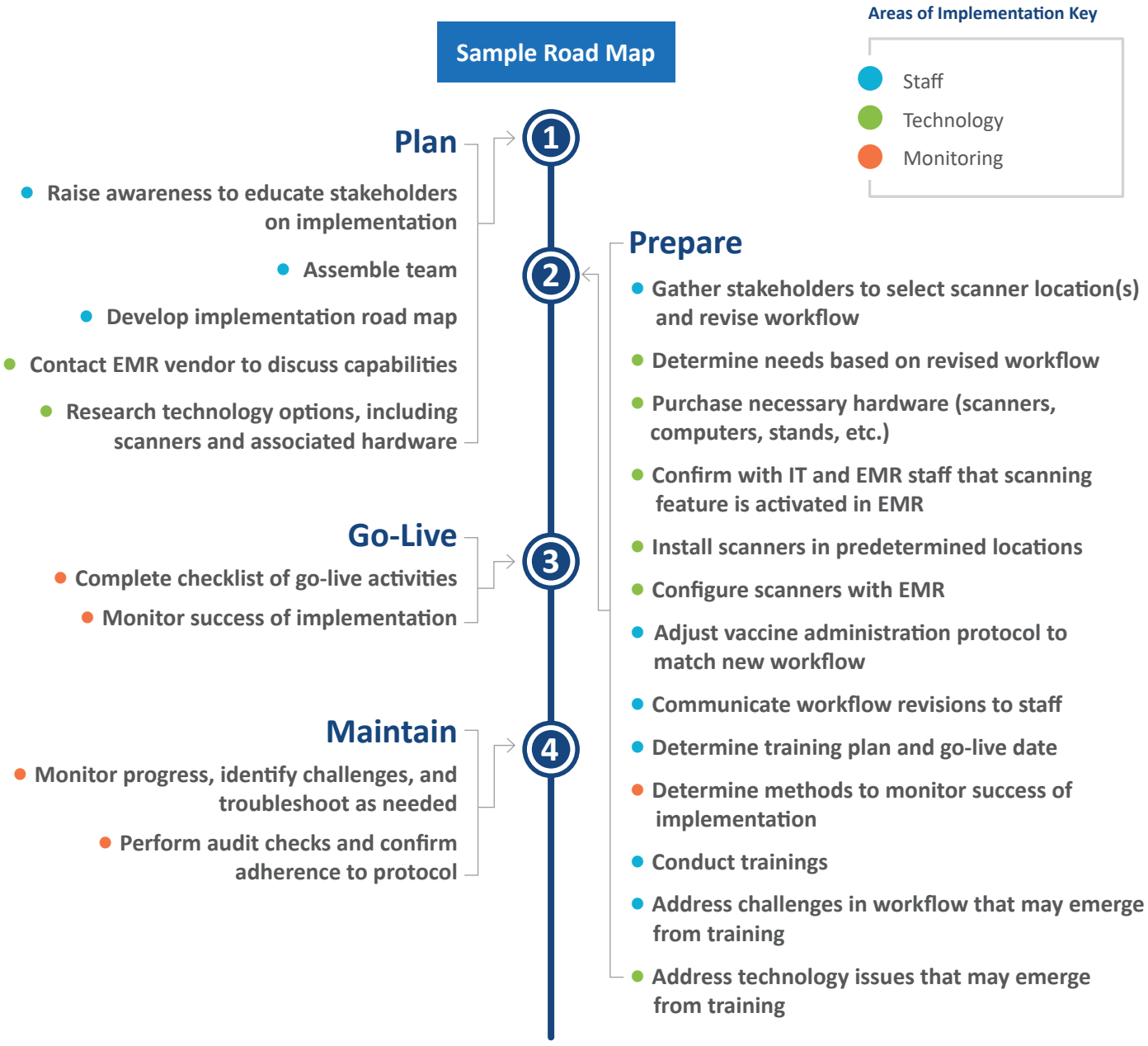
Manage Inventory Implementation

Incorporate scanning into inventory workflow, if applicable.

Note: If implementing at a health system, some roles may align to health system staff or be better suited for individuals at each of the clinics in parallel. If implementing at a smaller clinic, multiple roles may be assigned to one individual.

Develop an Implementation Road Map

Develop an implementation road map, task tracker, or workplan to compile a comprehensive list of steps required to implement vaccine 2D barcode scanning, understand what support will be needed, and track tasks against a timeline. The sample road map below can act as a starting point for your road map and should be adapted to fit your organization's needs. The steps, organized by phases, are color-coded to indicate which of the three key areas they address and may help determine how to split up responsibilities.



Note: This sample road map is not comprehensive and should be adapted to fit your organization's needs. Not all steps are discussed in detail in this guide, and some steps may be performed concurrently.

Prepare

Overview of Technology Components

Scanners cannot work independently—they must communicate with computing devices to transmit data to an EMR. Additionally, a 2D barcode must be present on the UoU. The scanners, computers, and EMRs must be properly configured for smooth implementation and seamless integration of 2D barcode scanning into the vaccine administration workflow.

1 2D Barcode Scanning Devices

Scanners or mobile applications with 2D barcode scanning capabilities must be available at the appropriate locations and should be configured to scan the appropriate barcode.

2 Computing Devices

Computers, tablets, and/or mobile workstations that can access and edit the EMR must be prepared to receive information from the scanners, either through a wired or wireless scanner.

3 EMR System

The EMR, or an approved third-party medical record application, must have the capability to capture and parse all data available in the scanned barcode (NDC, lot number, expiration date).

Technology Considerations for Workflow Decisions

The Project Lead and IT and/or EMR personnel should discuss the feasibility of scanner installation in the desired location(s) and determine if additional equipment is needed to integrate 2D barcode scanning into the workflow. Hardware purchasing and installation decisions directly affect workflow, so it's important that the Project Lead and IT/EMR personnel collaborate during this stage.

Suitable Scanner Locations
(e.g., central prep station, patient rooms, mobile stations)

Number of Scanners
(e.g., number of primary and backup scanners)

Types of Scanners
(e.g., wired, wireless)

Additional Equipment
(e.g., mobile workstations, computers, stands, mobile devices)

For additional guidance on…

- Technical implementation of 2D scanners, refer to the Technical Implementation Guides.
- Determining a workflow and scanner locations, refer to the Workflow Determination Tool.

Incorporate Scanning into Workflow

Thoughtful incorporation of 2D barcode scanning into the vaccine administration workflow is key for lasting success with high and consistent scanning rates. Prior to scanner installation, leaders and staff should determine how scanning best fits into workflow to install scanners where they will consistently be used.

Strategies for Revising Workflow

- [ ] Determine location of scanner and how scanning fits into workflow prior to installation and start of scanning.
- [ ] Include the health care providers in workflow redesign discussions so they can voice their preferences, contribute their day-to-day expertise in the workflow, and identify any concerns from the start.
- [ ] Adjust location and workflow process as needed, rather than struggling with a setup or process that is not working or not being used.
- [ ] Account for backup scanners, which can provide another option for scanning during busy times, when there are problems with primary scanner, or for sites with an expansive layout.
- [ ] Ensure staff are clear on expectations, whether scanning is mandatory and when in the vaccine administration process scanning is to take place.
- [ ] Provide sufficient time for onboarding so users can get accustomed to the new workflow.
- [ ] Consider outside factors that might affect the roll-out; it is hard to adjust to a new process in the middle of a busy vaccination event, so try to implement in advance of a busy season (e.g., flu vaccinations, back to school season) instead.

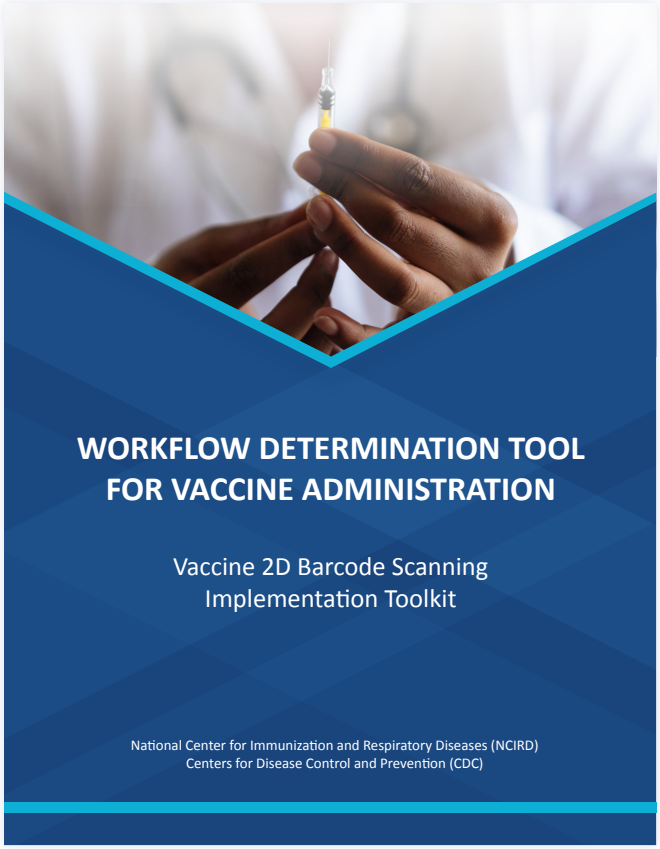
Note: Determining the vaccine administration workflow can be an iterative process. View **page 19** for suggestions on monitoring and troubleshooting workflow. Identify a point of contact for troubleshooting.

Workflow Determination Tool

The Workflow Determination Tool provides tips and lessons learned from prior implementations on revising workflows to incorporate scanning into the vaccine administration process and identifying locations for scanners. The tool includes:

- An activity that will guide you through revising your workflow to incorporate 2D barcode scanning.
- Tips to consider while determining workflow.
- Success stories and lessons learned from prior implementations.

The sample workflow to the right is an example of a vaccine administration workflow that incorporates 2D barcode scanning during vaccine administration.



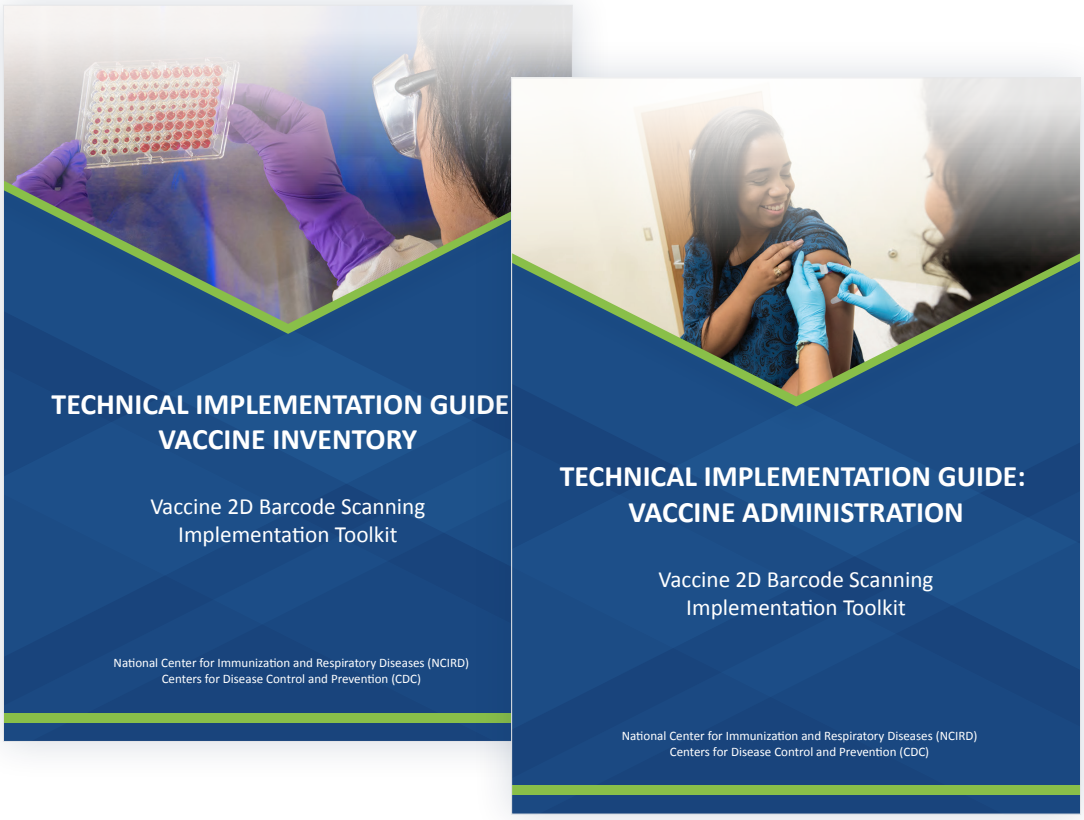
Sample Workflow

1. Receive patient vaccine orders in EMR
2. Collect ordered vaccine
3. Scan vaccine
4. Prepare vaccine
5. Provide patient with Vaccine Information Statement (VIS)
6. Administer vaccine
7. Properly dispose of waste
8. Complete vaccine record manually (e.g., time, site of vaccination)
9. Save vaccine administration record

Technical Implementation Guides

The Technical Implementation Guides provide guidance, tips and lessons learned from prior pilot implementations on how to prepare the technology and hardware for the implementation of vaccine 2D barcode scanning.

The practice of 2D barcode scanning may be applied to vaccine administration and vaccine inventory separately or jointly. For scanning during vaccine administration, a 2D barcode must be present on the vaccine primary packaging (e.g., the UoU vial or syringe). If scanning for vaccine inventory, a UoS barcode on the secondary packaging may be scanned. Separate guides are available for the implementation of scanning in each process.



Both Technical Implementation Guides include:

- Required functionalities of your EMR for 2D barcode scanning
- Scanner considerations, maintenance, troubleshooting tips, and FAQs
- Guidance for configuring your scanner, including barcode specifications
- Information on the use of mapping tables while scanning
- Sample process flows

Checklist for Training Staff

Dedicate time to train staff, make tweaks and adjustments based on feedback during training, and answer any questions staff may have about the process, technology, and workflow. Below are suggested steps for training staff that can be incorporated into typical training protocols.

Prepare

- ☐ Identify trainers and staff to train.
- ☐ Select and compile training materials.
- ☐ Prepare a training environment (e.g., nonproduction environment in EMR).
- ☐ Plan setup and logistics for training.
- ☐ Ensure equipment is received, set up, properly programmed, and in working order for hands-on training.
- ☐ Confirm that trainings are specific to the identified workflow.

Conduct

- ☐ Log in to training environment prior to training.
- ☐ Introduce trainer and training purpose.
- ☐ Walk through training materials; consider including videos from the **CDC website** or created by your organization.
- ☐ Allow all users hands-on experience to try out scanners using the training environment.
- ☐ Walk staff through revised workflow in the clinic, if possible, and include the scanning step.
- ☐ Conduct Q&A session.
- ☐ Capture feedback to improve subsequent trainings and workflow.

Maintain

- ☐ Post step-by-step instructions by each scanning station.
- ☐ Identify point(s) of contact to answer questions as needed.
- ☐ Consider additional strategies to increase use of scanners.
- ☐ Conduct ad hoc training or refreshers post-implementation.

Key for success: Hands-on training with scanners in a non-production environment in the EMR can help staff get accustomed to and comfortable with scanning and troubleshooting.

Maximize Scanning Use

Benefits of scanning are only realized if scanning is consistently used during the vaccine administration process. Below are tips to maximize scanning uptake and utility.

Identify Strategies to Maximize Scanning

Various adherence strategies can improve scanning rates in addition to training.

- Signing commitment cards (sample shown to the right), providing scanning rates to practitioners, and receiving visits from leaders can greatly improve scanning rates.


Commitment to Patient Safety with 2D Scanning

I, _____,
am committed to patient safety and protecting the health of my patients. I will do my best to scan each vaccine product with a 2D barcode that I administer to my patients.

I believe that scanning is important to patient safety because:

Signature _____ Date _____

Identify Sites/Staff Likely to Need Additional Support

Anticipate where additional support may be needed.

- Consider a phased implementation with an onboarding period, so staff can get accustomed to using scanners.
- In a recent pilot, sites with a lower volume of vaccines administered (e.g., internal medicine) had lower scanning rates and required more support to fully implement 2D barcode scanning, compared with sites with higher volumes (e.g., pediatrics).

Identify Areas Where Continuing Education Is Needed

Consistency is key to realize all benefits of 2D barcode scanning. Promote the consistent use of scanning among staff members.

- Consider evaluating scanning behavior and identifying areas in which continuing education or additional training might be helpful.

For additional information and existing training materials, please visit CDC's webpage Vaccine 2D Barcode Scanning Implementation Toolkit.

Determine Methods to Monitor Success

Prior to go-live of scanner use, consider how to define success or identify challenges during and after implementation. Determine what metrics, data collection methods, and frequency of data collection are feasible for your organization. If applicable, develop plans for monitoring specific metrics, identify and set up data collection methods, and record baseline measurements. This can include conferring with staff members to ensure satisfaction and understanding of protocol and changes, and providing opportunities for feedback on challenges experienced.

Below are three sample methods of collection to provide examples from prior implementations at a large health system. Additional staff may need to be engaged for data collection efforts depending on monitoring activities selected.

1. **Verbal/Written Feedback:** Providing a venue for feedback, such as an anonymous comment box/log or standing agenda item, encourages staff members to share experiences with the new process. Input from actual scanner users can indicate success of scanning and identify areas for improvement.

2. **Post-Implementation Survey:** A survey (paper or electronic) can collect information on the implementation process and scanning practices. Consider the use of closed- and open-ended questions to get details on various aspects of the implementation or challenges being experienced.

3. **Scanning Rates from EMR Data:** If your EMR can "flag" when a vaccine is scanned, your site may be able to track data and produce reports on scanning rates by site and/or by practitioner. Contact your EMR vendor to verify capabilities.

Note: Collect information and feedback on individual products that create challenges, such as unreadable barcodes. If challenges persist, feel free to reach out to **iissb2dbarcode@cdc.gov**. Feedback can be communicated to manufacturers if necessary.

Go-Live

Checklist for Go-Live | 16

Checklist for Go-Live

Complete the following checklist for go-live to ensure that all staff and all technology are prepared for the new scanning process. Coordinate with the rest of the team while preparing and reviewing this checklist. You may wish to add additional items relevant to your organization as you prepare.

- [ ] Are all stakeholders aware of the go-live date and/or onboarding period?
- [ ] Have all users been trained?
- [ ] Have all of the users' questions regarding the process been answered?
- [ ] Are users aware of where to find resources or support if additional questions arise?
- [ ] Have all scanners and other hardware been installed, set up in desired locations, and checked for functioning?
- [ ] Has a sample 2D barcode been scanned by each scanner to confirm proper configuration with the EMR or inventory management system?
- [ ] Are the appropriate configuration barcodes available near each scanner or available to each user for troubleshooting?
- [ ] Are scanning instructions and/or troubleshooting tips available by each scanning station?
- [ ] Is the mapping table up to date to enable additional fields in the EMR to be populated and to update inventory counts (if applicable)?
- [ ] If applicable, are data collection methods in place for monitoring, such as assessing successes and challenges, tracking scanner usage, and assessing implementation?

Key for success: Continue communicating with stakeholders throughout implementation for a seamless transition to the new scanning process.

Maintain

Monitor Success

Begin the monitoring methods as determined in the Prepare phase. Confer with staff to understand how implementation and onboarding is going and track selected metrics, if applicable, to compare progress over time. Measure the success of the newly implemented process and monitor data accuracy and completeness. Identify and address any challenges reported by staff and revealed by data collection, then course-correct as needed.

- [ ] Consider all methods for collecting feedback, including logs for users to document challenges, staff meetings, and reports.
- [ ] Take action on challenges as they arise and follow up to confirm that all challenges have been addressed.
- [ ] Collect data as planned in the Prepare phase and ensure staff members are aware of their responsibilities.
- [ ] Reassess the monitoring process as needed. Adjust the frequency and methods of data collection to fit evolving needs.
- [ ] Evaluate data regularly to identify challenges.

Common challenges and troubleshooting tips can be found on the following page, as well as in the Technical Implementation Guides and Workflow Determination Tool.

Record Lessons Learned

- If the implementation is occurring at a health system, 2D barcode scanning may be implemented in phases or regionally. Lessons learned could be recorded for reference during sequential implementations.
- Feel free to share your lessons learned with CDC at **iissb2dbarcode@cdc.gov**.

Troubleshooting

Rather than struggling with a workflow or process that is not working, identify challenges early and troubleshoot as needed. Observe the vaccine administration process to identify challenges, and consider disseminating a survey to collect feedback on the process and insight into challenges that scanner users are facing.

Challenge	Potential Solution or Adjustment
Scanner is in inconvenient location.	Revisit **Workflow Determination Tool** to determine if an alternative scanner location is more aligned with the users' workflow. Consider if a stand or mount would make the scanner location more convenient.
Use of scanner disrupts workflow.	Revisit **Workflow Determination Tool** to identify challenges in the revised vaccine administration workflow and discuss options to better incorporate scanning.
Health care providers are choosing to manually enter data.	Revisit the **training materials** and remind participants why scanning is important and the benefits of scanning. Allow the health care providers to discuss tips and tricks with each other. Consider adding adherence strategies, even midcourse (providing scanning rates, (re)signing commitment card), to encourage scanning.
Scanner is unable to read barcode.	Some barcodes are more easily read by scanners while held against a white background. If barcode is still unreadable, please share your experience with CDC at **iissb2dbarcode@cdc.gov** so it can be shared with manufacturers.
Leadership buy-in is lacking and leaders are not encouraging use of scanners.	Re-engage leaders to remind them of why scanning is important and the benefits of scanning. Reference the **training materials** as needed and evidence from pilots of the importance of leadership buy-in for implementation success.

For more troubleshooting tips, refer to the **Workflow Determination Tool** and **Technical Implementation Guides**.

Appendix

Acronyms

Acronym	Description
2D	Two-dimensional
EMR	Electronic medical record
FAQ	Frequently asked questions
IIS	Immunization Information System
IT	Information technology
NDC	National Drug Code
UoS	Unit of sale
UoU	Unit of use
VIS	Vaccine Information Statement

Overview of Toolkit Contents

Resource	Description	Intended User
One-pager: Vaccine 2D Barcode Scanning	Informational one-pager with overview of vaccine 2D barcode scanning and benefits to implementation	Health care leadership, site-level administrator, personnel unfamiliar with or new to 2D barcode scanning
Technical Implementation Guide: Vaccine Administration	Guide for technology and hardware needs for implementing 2D barcode scanning for vaccine administration	IT/EMR personnel
Technical Implementation Guide: Vaccine Inventory	Guide for technology and hardware needs for implementing 2D barcode scanning for vaccine inventory	IT/inventory management personnel
Workflow Determination Tool	Activity, tips, and process maps to support the incorporation of 2D barcode scanning into vaccine administration workflow	Health care leadership, site-level administrator, inventory manager
One-pager: Vaccine 2D Barcoding for Mass Vaccinations	Informational one-pager on the benefits of 2D barcode scanning in a mass vaccination scenario	Health care leadership, site-level administrator, inventory manager

Please contact **iissb2dbarcode@cdc.gov** for questions and/or to share your experience with this guide and your implementation.

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 | www.cdc.gov