TECHNICAL IMPLEMENTATION GUIDE: VACCINE ADMINISTRATION

Vaccine 2D Barcode Scanning Implementation Toolkit

National Center for Immunization and 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 Technical Implementation Guide: Vaccine Administration is intended for information technology (IT) personnel and/or electronic health record (EHR) personnel who are assisting with the implementation of vaccine two-dimensional (2D) barcode scanning for vaccine administration in ambulatory clinics, health care facilities, health systems, and pharmacies. This guide provides recommendations on technology and training needs drawn from pilot projects performed by CDC from 2011 to 2017, in addition to information obtained from the field.

It is important to note that the best practice for scanning upon vaccine administration requires a 2D barcode on the vaccine's primary packaging [e.g., the unit of use (UoU), vial, or syringe] to scan. While 2D barcodes are mandatory on the vaccine's secondary packaging, or unit of sale (UoS), the secondary packaging barcode is typically not needed while scanning for administration. Manufacturers are not required to add UoU barcodes to products, but an increasing number have added barcodes to the UoU packaging for the purpose of scanning upon administration. This document offers workarounds and alternatives to support use of scanning practices.

Using This Guide

This Guide is divided into the chronological phases. The first two and the last two phases are paired because they are closely related.

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

For more information on…

Implementing vaccine 2D barcode scanning for inventory, refer to **Technical Implementation Guide: Vaccine Inventory**.

Implementing vaccine 2D barcode scanning for data entry to the **Immunization Information System (IIS)**, jump to **page 23**.

Plan and Prepare

Overview of Technology Components

Scanners cannot work independently—they must communicate with computing devices to transmit data to an EHR when a 2D barcode is scanned on the UoU packaging. The scanners, computers, and EHRs must be properly configured in order to achieve a seamless integration of 2D barcode scanning into the vaccine administration workflow.

What's in a UoU vaccine 2D barcode?

A vaccine UoU 2D barcode is a GS1 Data Matrix containing a data string with critical information for a vaccine recipient's record. It includes the vaccine's National Drug Code within the Global Trade Item Number (GTIN), expiration date, and lot number (e.g., **01**00349281589058**17**131028**10**U4275AA,** where the green numbers are application identifiers, red are the GTIN, purple the expiration date and orange are the lot numbers, is the 2D barcode data string for this 2D barcode). Please see this appendix for more.

Providers must have three primary technical components to support the use of vaccine scanning practices to record vaccines, including:

Vaccine 2D Barcode
Contains vaccine information

2D Barcode Scanning Device
Captures and transmits data
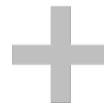
2D Barcode Scanning Software
Parses data into records

❖ Ideally, providers would have the infrastructure for barcode scanning in place to support scanning practices for routine and emergency use vaccines.

❖ In cases where one or more recommended components are unavailable for provider use, workarounds exist to support scanning practices.

RECOMMENDED COMPONENT OPTIONS	ALTERNATIVE COMPONENT OPTIONS
Almost 90% of vaccines on market have 2D barcodes on the **vaccine units-of-use** and universally on the **vaccine units-of-sale**.	Providers can **generate 2D barcodes** with software for vaccine products without 2D barcodes on the vaccine units-of-use.
Wired and wireless **2D barcode scanners** are widely available, with many models costing less than $100.	**Mobile devices and other technology** with supporting software can capture 2D barcode data if a scanner is not available.
Among ambulatory healthcare providers 80% use **EHR vendors which offer scanning functionality** in at least one offering.	Providers whose EHR does not offer scanning functionality can access scanning functionality through a **third-party vendor**.

Technology Considerations for Workflow Decisions

The Project Lead, IT personnel, and/or EHR personnel should discuss the feasibility of scanner installation in the desired location(s) identified by the health care providers. They will determine if additional equipment is needed to properly integrate 2D barcode scanning into the workflow. Hardware purchasing and installation decisions directly affect workflow, so it is important that all 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)

A sample process flow and suggested questions for the Project Lead can be found in the appendix.

Scanning Devices: Procurement

The revised vaccine administration workflow should determine the number and type(s) of scanners needed in the clinic or vaccination setting. There are several scanners in the market that are suitable for use. Below are some considerations to review before purchasing scanners. If implementing in a health system or pharmacy, procurement decisions may be made centrally.

- ☐ Ensure that the chosen scanner is compatible with both your hardware (e.g., computers, workstations) and software (e.g., EHR, IIS).
  - **Reminder:** 2D barcodes require imager barcode scanners and cannot be read by 1D laser scanners.

- ☐ Determine the number of wired or wireless scanners needed.
  - Wired scanners cost ~$15 to $100 each, with wireless options costing ~$30 to $120 (as of June 2024).
  - Wired scanners can be moved from one computer to another if needed. Wireless scanners may rely on Bluetooth connections, which can make switching computers time-consuming and cumbersome.
  - If installing a Bluetooth scanner, confirm that computers have Bluetooth capability and consider any additional security requirements.
  - Confirm that the wire length of wired scanners supports the previously selected scanner location(s).

- ☐ Account for stands or wall mounts, if needed. Note that the preferences of the health care providers should be considered while determining location and set up of stands and wall mounts.

- ☐ If your clinic already uses a scanner or mobile device for another purpose and wishes to use this device for vaccine 2D barcode scanning, confirm that the device:
  - Has 2D barcode scanning capabilities.
  - Is placed in the proper location or can be relocated to the proper location.
  - Can be configured to the EHR/IIS using the configuration barcode.

The American Academy of Pediatrics (AAP) outlines other **considerations** for choosing a scanner.

Scanning Devices: Configuration

Configuration barcodes provide instructions to the scanner for how to parse the data contained in the 2D barcode. The scanner will follow those instructions until configured otherwise. For example, if the UoU configuration barcode is scanned, that scanner will be prepared to receive and parse UoU barcodes into the appropriate fields of the patient record in the EHR until a different configuration barcode is scanned. Configuration barcodes may also be rescanned to "reset" the scanner if any issues arise with configuration to the EHR. Note that configuration barcodes will be different from the setup barcodes provided by the scanner manufacturer, which may also need to be rescanned if a reset is needed.

Configuration barcodes will be unique for the type of barcode and for your EHR. For example, a Vaccine Information Statement (VIS) barcode contains different data than the UoU barcode and will need to populate different fields in the EHR (see **VIS Barcode Specifications** in the appendix for more information). However, once created, the same UoU and VIS configuration barcodes may be able to accommodate all scanners within the health facility or across health system locations (if applicable) using the same EHR.

If your EHR does not provide configuration technical assistance (TA), you may need to create a configuration barcode. To create a configuration barcode, the characters in the barcode's data string will need to be mapped to the corresponding data fields in the EHR.

> Some EHRs may provide configuration assistance and some scanner manufacturers may provide information on configuration. Reach out directly to confirm available services and information.

Tip from the field:

If your EHR does not provide configuration barcodes or TA for configuring your scanner, consider reaching out to other health care systems that use your EHR to discuss their existing configuration barcodes, which may be able to be modified to fit your needs.
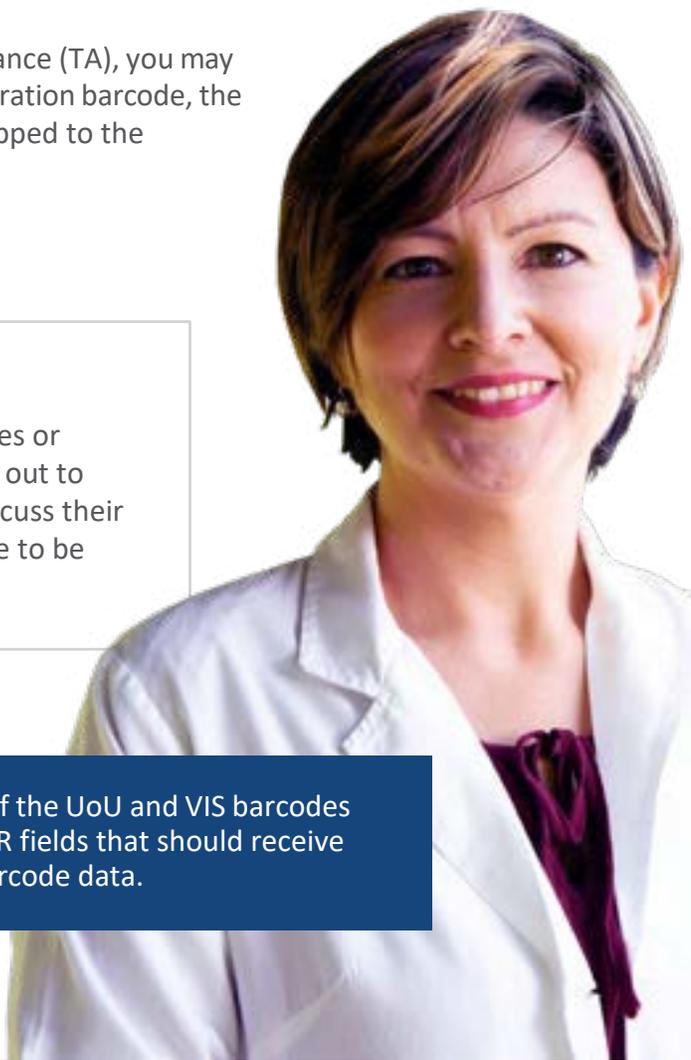
Scanning Devices: Installation

After procurement, scanners must be connected to the computing device, configured to the EHR, and tested. To configure the scanner to the EHR, a configuration barcode should be obtained or created for each type of barcode (UoU for administration, and possibly VIS for VIS documentation) that will be scanned. Installation, configuration, and testing instructions are listed below. Note that the order of these steps may vary at your organization, or some steps may be bypassed depending on configuration services provided by your EHR.

INSTALL scanner

1. Use a USB cable to connect wired scanners to a computing device. Wireless scanners (or mobile devices) can be connected to a computing device through Bluetooth or other protocol in the scanner manufacturer's user manual.

2. Connect the power adaptor to a power source, if needed.

3. Power on the scanner and confirm that the scanner is functional.

SCAN configuration barcode

4. Log in to the EHR and navigate to the relevant page and field.

5. Follow the steps in the scanning manual (provided by your scanner manufacturer) to properly set up your scanner and to ensure connectivity.

6. Scan configuration barcode to instruct the scanner how to parse the data into the EHR fields.

TEST scanner on sample

7. Scan a sample UoU found on a vaccine product or VIS barcode found on a VIS. You may wish to use a nonproduction environment in the EHR while scanning a sample barcode.

8. Confirm that the system properly reads the data elements in the 2D barcode on the UoU or VIS.

9. Confirm that the system accesses the appropriate mapping tables in the back end by confirming the accuracy of the data in the populated fields.

10. Repeat steps 4 through 9 for each type of barcode (UoU and VIS). Remember that when a configuration barcode is scanned, the EHR will follow that configuration until it is given alternate instructions through a different configuration barcode.

Key for success: Consider storing copies of all configuration barcodes by each scanning station. The barcodes are helpful to have available if there are issues with configuration and the scanner needs to be "reset."

For scanner troubleshooting tips, see **page 13**.

EHR: Functionality for Vaccine Administration

Implementation of 2D barcode scanning for vaccine administration requires an EHR capable of capturing and processing the barcode data. Listed below are the required and recommended EHR functionalities for successful 2D barcode scanning during vaccine administration. Items are listed chronologically within each grouping.

Minimum Required Functionalities

- [ ] Monitor and establish connection with the barcode scanner.
- [ ] Receive and process incoming 2D barcode data from the UoU.
- [ ] Validate that the barcode is applicable to the EHR module.
- [ ] Read the data elements present in the 2D barcode string.

- [ ] Display the scanned data elements and other key data in the respective fields.
- [ ] Allow users to verify scanned data and manually enter additional data that cannot be automatically imported.
- [ ] Allow users to manually edit fields after data has been imported.
- [ ] Provide separate set of VIS fields to capture information for each VIS given (if applicable).
- [ ] Notify users when a barcode is not identifiable.

Third-Party Apps

If your EHR does not have 2D barcode scanning capability, reach out to your vendor to discuss compatible third-party applications with scanning functionality.

Additional Recommended Functionalities

- [ ] Use the scanned data to look up other key data about the vaccine or VIS (e.g., manufacturer and other product information) in the mapping table.
- [ ] If applicable, validate barcode data against the product identifier, expiration date, and lot number stored in the inventory for the same vaccine.
  - [ ] Warn users in the event of missing data or discrepancy.
  - [ ] Use all three data elements to access stored inventory data for additional data such as manufacturer and other product information.
- [ ] Save original scanned values (if providing an option to modify them).
- [ ] Alert users if the barcode indicates that the vaccine is expired.
- [ ] Validate the scanned vaccine against the patient medical record for accuracy.
- [ ] If administration module is connected to inventory, alert users if vaccine is not present in inventory or is recalled.

For more information on…

Required and recommended EHR functionalities, refer to the **EHR/IIS 2D Barcode Functional Capabilities Guide**.

Questions to ask your EHR vendor when determining compatibility and capabilities, refer to the **EHR capability guide in the appendix**.

Training

Train IT and EHR Personnel

All IT and EHR personnel should be properly trained to use 2D barcode scanners and equipped to support the staff that will be scanning 2D barcodes on vaccines. A "train-the-trainers" training may be helpful for health systems implementing scanning across facilities to ensure that IT and EHR personnel are prepared to support the health care providers and other personnel who may use the 2D barcode scanners.

Train Health Care Providers

Additionally, IT and EHR personnel may be able to support the overarching training conducted for staff prior to implementation or go-live. The IT and EHR personnel should coordinate with the Project Lead to confirm the training plan and their role in delivering the technology-related aspect of training.

At a minimum, it is recommended that the training for scanner use covers the follow technology-related topics:

- [ ] Barcode data and the fields that are expected to populate upon scanning.
- [ ] Instructions for scanner use.
- [ ] Explanation of setup barcodes provided by the scanner manufacturer and how to use them.
- [ ] Explanation of configuration barcodes and how to use them.
- [ ] Scanner maintenance.
- [ ] Basic troubleshooting tips:
    - Confirm that scanner is plugged in to the appropriate outlets if needed.
    - Clean lens of scanner.
    - Rescan configuration barcode.
    - Restart scanning screen in software to restart scanning process.
- [ ] Procedures for escalating issues (help desk contact information, ticket creation, etc.).
- [ ] Instructions for scanning to IIS, if applicable.

🔑 **Key for success:** Hands-on experience of scanning in a training or nonproduction environment in the EHR can enhance training for health care providers and other staff who may use the 2D scanners and may reduce the number of challenges and questions that arise after go-live.

For more guidance on training staff, refer to the **training materials**.

Go-Live and Maintain

Technology Checklist for Go-Live

Complete the following checklist for go-live to ensure that everything is functioning properly and ready for use. You may wish to add additional items to this checklist as you prepare.

☐ Have all scanners and other hardware been **installed, properly set up, and tested for functionality?**

☐ Have all scanners been plugged in and set up in desired locations?

☐ Have all scanners been configured using the appropriate (manufacturer, UoU, VIS, and/or IIS) **configuration barcode**?

☐ Has a sample UoU or VIS barcode been scanned by each scanner to confirm proper configuration with the EHR?

☐ Have the appropriate configuration barcodes been stationed by each scanner or workstation for troubleshooting?

☐ If applicable, is a configuration barcode available for IIS configuration?

☐ Have scanning instructions and/or **troubleshooting tips** been made available by each scanning station?

☐ Has the **mapping table** been updated and confirmed to be accurate?

☐ Have monitoring and evaluation methods been put in place (if applicable)?

⚷ Key for success: Confirm system administrators and EHR contacts are aware of implementation plans and the go-live date and confirm that the necessary personnel are available for immediate questions and technical assistance.

Maintenance

Maintaining functional technology is critical for implementation of 2D barcode scanning and sustaining high scanning rates. While the bulk of the work is done in the Plan and Prepare phase, maintenance and ongoing tasks will be required after 2D barcode scanning is implemented to continue supporting the practice.

Mapping Table| The mapping table will only be useful if the data is accurate. It will need to be regularly validated and maintained.

When a vaccine is restocked:

☐ Confirm that the UoU data elements in the mapping table are entered.

☐ Validate mapping table data to confirm that no changes have been made (e.g., quantity, dose, route of administration) since the last shipment.

If a new vaccine is ordered:

☐ Add data to the mapping table for the new vaccine. Some known information may be entered prior to receipt of the shipment (i.e., vaccine name).

☐ Scan the UoU barcodes and validate the data in the mapping table.

Technology | If any of the technology components—the scanning device, computing device, or EHR—changes or malfunctions, the scanning process will break down.

☐ Confirm scanners are functional. They may need to be reprogrammed or replaced after significant use.

☐ Monitor EHR updates. Review the release notes for updates that might impact scanning. For example, an EHR update may require a new configuration barcode.

☐ Be prepared to adjust technology and hardware according to changes in workflow. Identifying the best workflow can be an iterative process, so anticipate changes as 2D barcode scanning is implemented.

Training | Continuous and ad hoc training on technology and workflow expectations can improve staff performance. Below are a few instances where continued or ad hoc training may be required:

☐ The scanning workflow is revised.

☐ A new employee is onboarded.

☐ There is a reduction in adherence to scanning practices.

> Confirm that all parties are aware of their responsibilities, including the cadence for monitoring and maintenance.

Troubleshooting Tips

ISSUE	RESOLUTION
The scanner is not working at all.	• Verify that the scanner is properly connected to the computing device. ♦ Confirm wired scanners are firmly plugged into the computer. ♦ Confirm that the wireless scanner's Bluetooth is not disconnected from the computing device. If the scanner has a battery, confirm that the battery is sufficiently charged.
The scanner does not scan consistently.	• Verify that a red beam of light is visible when a vial is placed underneath the lens (in mounted mode). If a red beam is not visible, verify that the scanner is securely attached to the computer. • Confirm that the scanner lens is clean. If you are not sure, clean the scanner lens with an alcohol prep pad or a moist clean cloth and then dry with a clean cloth. Water droplets severely degrade scanning efficiency. • Check the scanner lens to see if it is scratched. If so, it will need to be serviced/ replaced. Please call or email the scanner manufacturer or call the number on the base of your scanner. • Try to scan the barcode with another scanner. If successful, then the problem is with the first scanner and it should be serviced. Try resetting the scanner to factory settings, scanning the setup barcodes from the manufacturer, and rescanning the configuration barcode.
Sometimes, the scanner has trouble reading barcodes.	• Vaccine manufacturers have tried to address readability of vaccine barcodes in terms of barcode label quality. However, if you still have trouble reading certain barcodes, please report to CDC at **idab2dbarcode@cdc.gov** after escalating appropriately within your organization. CDC regularly works with vaccine manufacturers to ensure all packaging meets regulatory requirements and usability standards. • If you need to reconfigure your scanner to a different system (EHR, inventory management system, and/or IIS) and have trouble reading the scanner configuration barcodes provided to you, repeated copying might have degraded the barcode quality. Try printing a fresh copy from the electronic copy to reinstate optimal quality of the barcodes.
The wrong fields are being populated with the barcode data.	• Confirm the scanner is properly configured by rescanning the scanner manufacturer's standard setup barcode and your organization's configuration barcode. • Confirm the configuration barcode is correct (e.g., confirm the UoU configuration barcode is scanned prior to scanning the UoU barcode on the vaccine). • Encourage quality assurance checks and allow for manual entry to adjust if data parsing is problematic, due to situations such as the lot number beginning with the same number as the GS1 application identifier.
The mapping table is not populating the expected fields.	• Confirm that the data in the mapping table are up to date. CDC's NDC Crosswalk tables may be useful resources when updating mapping tables, though they are not comprehensive and additional data sources may be needed.

FAQs

QUESTION	ANSWER
Will the scanner be damaged if it gets wet?	The sealed casing of your scanner protects it from minimal amounts of moisture. However, it should not be sprayed or immersed in liquid.
What are the software requirements and how does the system actually work?	No additional software is required, nor is there a "system" that is being added to yours. The scanner works in place of a keyboard. The user needs only to put the cursor on the field before scanning. The scanner is configured to read the 2D barcode from the vial or packaging and populate the lot number and expiration date fields into an EHR or IIS system.
Will the scanner be configured for both my IIS and EHR?	Yes, as long as the EHR and IIS have the data fields to capture lot number and expiration date, the scanner should work with both systems. In some EHR and IIS systems, the lot number field is a dropdown menu and the lot number is appended by other fields. For example, a lot number, such as 12345Y, may display with other fields: 12345Y|MCK|12302022. In such cases, scanning the 2D barcodes will not populate the right data fields and cannot be used.
Will the scanner be damaged if dropped on the floor?	The scanners are expected to survive a free fall of six feet onto a hard concrete floor. However, we encourage you to position it away from workplace settings that could damage its internal parts.
Can I detach the scanner any time or do I need to do something special first, such as a safe stop?	While it is advisable to "safe eject" attached devices, the scanners have not been shown to be adversely impacted if unplugged without doing so. However, please close out the EHR/IIS software menu if it is actively accessing the scanner to prevent potential data loss or interruption of workflow.

Appendix

Acronyms

Acronym	Description
2D	Two-dimensional
AAP	American Academy of Pediatrics
EHR	Electronic health record
EUA	Emergency Use Authorization
GDTI	Global Document Type Identifier
GTIN	Global Trade Identification Number
IIS	Immunization Information System
IT	Information technology
NDC	National Drug Code
TA	Technical assistance
UoS	Unit of sale
UoU	Unit of use
VIS	Vaccine Information Statement

Sample Process Flow for Vaccine Administration

Outlined below is the sample process for 2D barcode scanning in a facility that has implemented scanning for administration.

The sample process flow assumes that the EHR has a mapping table that can populate EHR fields, the EHR pushes data to the IIS, and the VIS is scanned. This process flow is a sample and may be adapted to fit your organization's needs if helpful for implementation.

Physician orders vaccine

Health care personnel collects ordered vaccine

Vaccine UoU barcode scanned for administration

UoU data can also be manually entered, if needed (e.g., product not 2D barcoded).

Health care personnel prepares vaccine

Additional fields may be populated by a doctor's order or from a mapping table when UoU is scanned.

EHR record populated with UoU information

Vaccine administered and recorded

Scanning the vaccine prior to administration is the best practice for patient safety. This will also prevent EHR system pop-up warnings.

This is an optional step depending on the requirements of your EHR. See **page 21** for details.

VIS scanned

Vaccine administration record saved

Data submitted directly to IIS

If your IIS does not accept data directly from your EHR, see **page 23**.

For more details on workflow, refer to the **Workflow Determination Tool.**

Questions for Project Lead

Hardware purchasing and installation decisions have direct implications on workflow. The Project Lead, IT personnel, and health care providers should work together during this planning stage to ensure that the technology fits the vaccine administration workflow needs and vice versa. Below are questions to discuss with the Project Lead to understand hardware and technology needs.

- [ ] Where will scanners need to be installed?
- [ ] How many scanners are needed at each location?
- [ ] Are computers already set up near the desired scanner locations?
  - [ ] Can any computers be relocated?
  - [ ] How many additional computers may be needed?
  - [ ] Are mobile workstations or devices an option?
- [ ] Are wired or wireless scanners preferred in each location?
  - [ ] If a wire is needed, how long should the wire be?
  - [ ] If wireless, do any security issues need to be addressed?
- [ ] Is there enough space to install the scanner, or is rearranging needed?
  - [ ] Is a wall mount or stand needed?
- [ ] Will any scanners be used with mobile stations?
- [ ] Will the scanners be used with one or more processes (e.g., administration, inventory, IIS, VIS)?

After discussing with the Project Lead, refer to for considerations to keep in mind while purchasing scanners and other equipment.

EHR Capability Guide

2D barcode scanning can play a role in recording vaccine administration and Vaccine Information Statements (VIS). Both use cases require unique functionalities from your EHR. Below are some sample questions you can ask your EHR vendor to help determine your 2D barcode scanning capability.

Task	Questions for EHR Vendor

Vaccine administration	• Does the EHR have 2D vaccine barcode scanning capability in its current use?
	  ♦ If not, is scanning capability available in a different or upgraded package?
	  ♦ If not, could a third-party application be used for this purpose?
	• Does the EHR recommend certain 2D barcode scanners or require certain scanner specifications?
	• If inventory is managed through the EHR and linked to the vaccine administration module, is it set up so that it will create an alert if the vaccine is:
	  ♦ Expired.
	  ♦ From the wrong funding source.
	  ♦ Not one which has been ordered.
	  ♦ Active in the office's inventory.
	  ♦ The one with the shortest expiration date.

VIS recording	• Is the EHR capable of recording VIS prior to administering a vaccine? • Can the EHR use scanned data elements (i.e., VIS document code and edition date) to look up additional information about the VIS?

For additional list of questions, please visit the **AAP website**.

UoU Barcode Specifications

The data string pictured below is sample data for a UoU barcode. This diagram should be referenced when **creating a configuration barcode**. The NDC, expiration date, and lot number should be parsed to populate the respective fields in the EHR after proper scanner configuration.
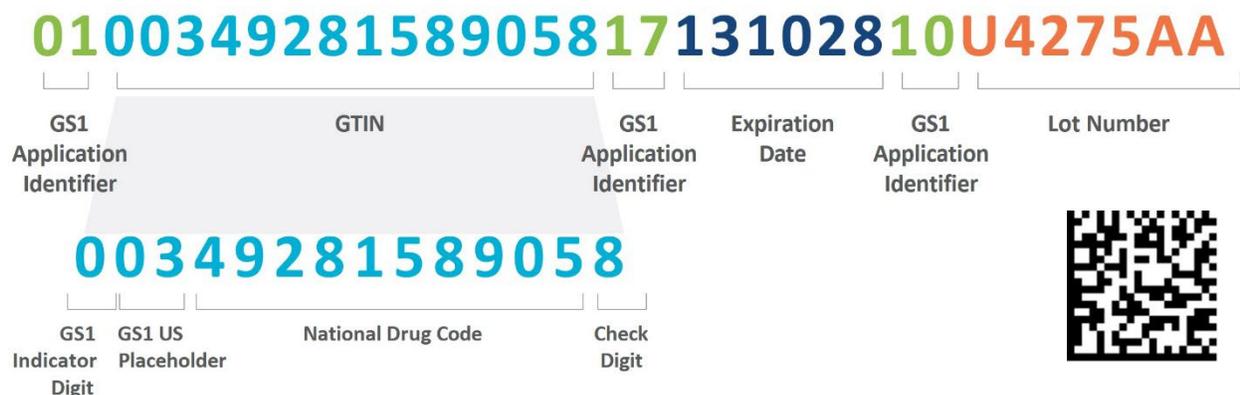
The sample vaccine administration record below includes several fields commonly displayed in EHRs during vaccine administration. Based on your EHR's data fields, the lot number, NDC, and expiration date fields may be populated when the UoU 2D barcode is scanned. However, EHRs vary across health systems so the displayed fields will be dependent on your EHR. For example, an EHR might not have the NDC displayed on the record, but it will capture and process it in the back end.

Vaccine Administration Record

| Lot Number | | Date | |
Manufacturer		Time	
NDC		Dose	
Product		Site	
Exp. Date		Route	

A mapping table or database with stored vaccine data may enable the remaining fields to be populated when a 2D barcode is scanned. See **Mapping Table for Vaccine Administration** for more information.

VIS/EUA Recipient and Caregiver Fact Sheets Barcode Specifications

2D barcodes are also included on **Vaccine Information Statements (VIS) and Emergency Use Authorization (EUA) Recipient and Caregiver Fact Sheets**, which are informational documents shared with the patient at the time of vaccine administration. The purpose of this barcode is to provide the option of electronically capturing the name and the edition date of the VIS or Fact Sheet, as required by the National Childhood Vaccine Injury Act (NCVIA).

Requirements and protocols for VIS documentation may vary among EHRs and clinic policies. There are several **approved methods for sharing the VIS with the patient**. Some clinics may provide electronic VIS documents to patients and require only a checkbox in the EHR to confirm that the VIS was given to the patient. Other clinics may provide hard copies and require data entry in the EHR.

Work with the Project Lead to confirm the VIS protocols at your clinic or health system and what information needs to be entered in the EHR at the time of vaccine administration. If documentation of the Global Document Type Identifier (GDTI) and edition date is required in the EHR, the use of 2D scanning may be a useful method for entering this information. The data string pictured below indicates the components of a VIS barcode and can be referenced when creating a configuration barcode.
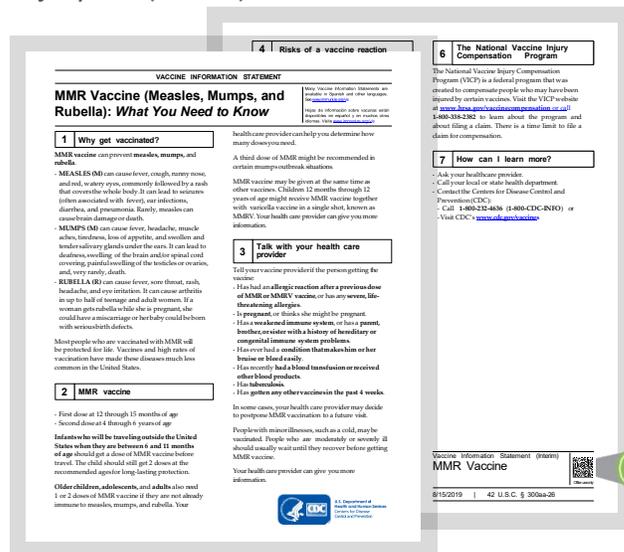
Sample VIS with barcode shown next to the magnifying glass icon.

253 08869830001 11121206

GS1 Application Identifier for GDTI	GDTI (Global Document Type Identifier)	Serial Component Edition Date 11 + YYMMDD

For more information on VIS, visit **https://www.cdc.gov/vaccines/hcp/vis/**.

Mapping Table for Vaccine Administration

A mapping table or database with stored vaccine data enables additional fields to be populated when a 2D barcode is scanned. Even though the UoU barcode contains only three data fields, additional fields in the vaccine administration record, such as the product name, manufacturer, dose, and route, may be populated upon scanning. The sample vaccine administration record below portrays sample data fields that might be populated by the mapping table.

Vaccine Administration Record

Lot Number		Date	
Manufacturer		Time	
NDC		Dose	
Product		Site	
Exp. Date		Route	

Depending on the facility's workflow, a doctor's vaccine order may populate some of the fields of the record from the mapping table prior to scanning for administration. In this case, the EHR can validate that the scanned vaccine matches the ordered vaccine or can alert the vaccine administrator if the incorrect vaccine was scanned.

If a similar mapping table is not already in use in your EHR, a one-time setup may be needed. After the mapping table is set up, it is important that the data are accurate and up to date. The information should be validated upon the receipt of a vaccine shipment, or any other time that the data may have updates. If available, follow your EHR's recommendations for populating and validating the data.

Basic recommended data elements are listed to the right, but additional data elements may be helpful and applicable to your clinic's needs. CDC's **NDC Crosswalk Tables** may be a useful source for populating the table, though it is not comprehensive and additional data sources may be needed.

Recommended Data Elements for Mapping Table

UoU NDC*
UoU GTIN*
UoU Lot Number*
Expiration Date*
Product Name
Manufacturer
Dose
Route of Administration

Indicates which elements are found in UoU barcodes. If the scanned data elements match the data found in the mapping table, the corresponding data elements may populate the EHR record fields.

Immunization Information System

In addition to scanning for vaccine administration and vaccine inventory, a third use case for scanning is for data entry to the Immunization Information System (IIS). Many EHRs push data to the IIS so that dual entry of vaccine data to the IIS is not necessary. However, the IIS may accept scanned data if the EHR does not push data to the IIS.

Because vaccine administration records are frequently transmitted from the EHR directly to the IIS, IIS data can benefit from the increased data accuracy of 2D barcode scanning. If the EHR transmits vaccine administration data directly to the IIS, no further action is needed.

However, if the IIS does NOT automatically accept data from the EHR and manual/dual entry is required, vaccine administration data entry may be performed with 2D barcode scanning.

☐ If the IIS platform already accommodates 2D barcode scanning, reference the configuration instructions to create a unique configuration barcode. Though the same information will be imported, the IIS is a different interface than the EHR and will likely require a unique configuration barcode.

☐ If the IIS platform does not accommodate 2D barcode scanning, it may be helpful to discuss system capabilities with your IIS vendor, as the requirements for integrating 2D barcode scanning into the EHR are the same for the IIS.

Note: Integration with the IIS may be managed from the health system level. If the clinic is part of a health system, confirm how the IIS is managed prior to following the steps listed above.

Resources

[Immunization Information Technology: A Guide for Pediatricians on Immunization Information Systems and Two-Dimensional Barcoding](#), AAP

[Functional Capabilities Report](#), CDC

[NDC Lookup Crosswalk](#), CDC

Below are other resources available in the Implementation Toolkit listed roughly in the order that they may be referenced during implementation.

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 scanning
[Guide for Project Lead](#)	Guide for all aspects of planning the implementation of vaccine 2D barcode scanning	Health care leadership, site-level administrator
[Technical Implementation Guide: Vaccine Inventory](#)	Guide for technology and hardware needs for implementing 2D barcode scanning for vaccine inventory	IT personnel, inventory management system personnel
[Workflow Determination Tool](#)	Workflow process maps for identifying where and how to add 2D barcode scanning into the 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

For more information, contact CDC
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TTY: 1-888-232-6348 | www.cdc.gov