

# The MetroHealth System

## Optimizing Health Information Technology to Increase Vaccination Rates

The MetroHealth System in Cleveland, Ohio, was the first safety-net health care system in the US to implement the Epic electronic health record (EHR), starting in its ambulatory clinics in 1999. MetroHealth has been a pioneer in the implementation and innovative use of health information technology (HIT).

MetroHealth has received numerous, notable external recognitions for HIT-enabled efforts in health care, attaining HIMSS Electronic Medical Record Adoption Model (EMRAM) Stage 7 in all of their ambulatory clinics and hospitals in 2014, and was the recipient of the 2015 Davies Award, recognizing the outstanding achievement of healthcare organizations that have used health IT to substantially improve patient outcomes.

MetroHealth System's Chief Medical Officer and Vice President of Health Informatics is a member of the Epic Corporation's Care Everywhere Governing Council. MHS staff presented over 30 presentations at Epic User and Expert Group vendor EHR conferences. MetroHealth continually strives to evaluate, generalize, and disseminate EHR- and HIT-related activities from which others can benefit.

Creating the HIT  
Organizational Culture

Distinct HIT Strategy

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in HIT

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for Execution

Before a Patient Visit

During a Patient Visit

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## Creating the HIT Organizational Culture at MetroHealth

According to Dr. David Kaelber, MetroHealth's HIT organizational culture starts with a leadership vision of HIT and a structured investment strategy. Departments across the health care system have a culture of continually asking how HIT can help with their opportunities. MetroHealth views their **EHR as a critical component of administrative, clinical, operational, and quality activities.**

Over the last 5 years, MetroHealth has focused on enhancing the use of their EHR to meet needs and goals, and has instituted improvements in vaccination rates.

### Before a Patient Visit

- Identify Gaps in Care
- Provider Dashboard
- Outreach to Patients



### During a Patient Visit

- Best Practice Advisory
- Registry Use
- Health Information Exchange
- ePrescribing



### After a Patient Visit

- VAERS Reporting
- Appointment Scheduling
- After Visit Summary
- Outreach



HIMSS=Healthcare Information and Management Systems Society

VAERS=Vaccine Adverse Event Reporting System

# Priority: Leverage existing and new EHR functionality to improve vaccination rates

The innovative use of health information technology (HIT) interventions to improve vaccination rates aligns with MetroHealth's approach to population health management and their goal of closing care gaps. Although providing vaccination at every opportunity for every patient is a standard of care at MetroHealth, vaccination care gaps still exist. Enhancing EHR and other clinical software capabilities to transform data quality, clinical efficiency, usability, and patient engagement to increase vaccination rates is a priority for MetroHealth.

"Using standard Epic clinical decision support tools, I implemented reminders and alerts for all ACIP-approved vaccines. These reminders and alerts have resulted in a significant improvement in our vaccination rates across The MetroHealth System and become a model for Epic customers on how to do vaccination decision support."

David Bar-Shain, M.D.  
Director of Informatics for Clinical Decision Support  
The MetroHealth System

## Distinct HIT Strategy:

MetroHealth implements a comprehensive HIT strategy focused on impacting their population health management goals.

The strategy focuses on:

- Keeping patients healthy
- Caring for the sick
- Reducing health risk

After identifying their population health goals, MetroHealth pulls their data from multiple sources. The data is turned into actionable information, and HIT modifications are implemented to improve population health in their system.

## Results

By implementing vaccine-specific HIT interventions, MetroHealth achieved an increase in vaccination rates, achieved a better patient experience, enhanced provider/patient communication, created an efficient clinical workflow, and freed up time to concentrate on value-based care delivery.

# Developing Innovations in HIT: Taking the Initiative on Solutions

MetroHealth takes the initiative to make immediate and necessary modifications in their EHR. For example, within weeks of a new dosing recommendation being released by the ACIP for an adult vaccination, MetroHealth developed an HIT solution to help ensure that eligible patients received the appropriate vaccination. This solution was built by integrating vaccination information into wellness registries, tracking and forecasting using health maintenance reminders (HMRs), alerting providers using the Best Practice Advisory (BPA), and facilitating order through Smart Sets.

## Principled Guidelines for Execution:

### Not Just Some Vaccines, All Vaccines

As a standard practice for HIT changes, when MetroHealth implements HIT changes, they look broadly before getting specific. For example, instead of implementing a clinical reminder for certain vaccinations (school-age required vaccinations), clinical reminders were implemented for each ACIP-recommended vaccine.

# Before a Patient Visit

## Provider Dashboard - Comprehensive

MetroHealth uses a comprehensive dashboard to enhance the visibility of care delivery opportunities and benchmark how well providers are doing against their peers. This dashboard gathers data from multiple sources and includes all metrics on which The MetroHealth System is focused.

## Identification of Gaps in Care Identified and Automated

Turning clinical data and gaps in clinical care into actionable information is a priority for MetroHealth. For example, if a patient misses an appointment when a vaccination was scheduled, the system flags this patient and encourages the patient to return via automation processes in the EHR (My Chart) and through use of third-party vendors (automated outreach). This automated approach increases communication to the patient and increases the likelihood the patient will return for the missed vaccination. MetroHealth believes that creating a fully automated approach has increased staff efficiency by decreasing staff time spent manually generating reports and conducting outreach to patients.



## Awareness of Social Determinants of Health

Given MetroHealth's population, they don't expect all patients to have home internet access. They found while home internet access may not be available to 100% of patients, a large majority of their patient population have smartphones. **Many of MetroHealth's initiatives take into consideration that smartphones are the device people will be using as opposed to the home computer.**

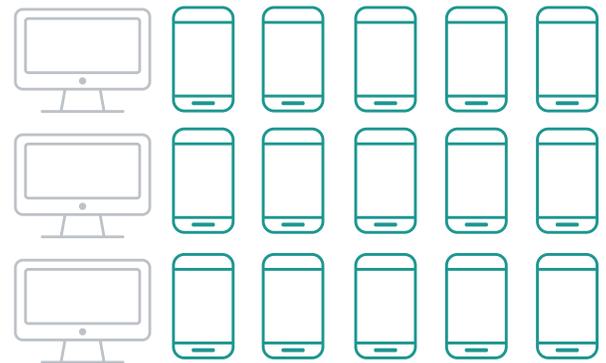
## Targeting Patients Overdue for Vaccination: Outreach

### Wellness Registry: The Complete Population

MetroHealth has created a wellness registry that looks at their entire population and the wellness opportunities that exist, identifying touchpoints that might exist outside of a face-to-face office visit. This population-level registry is enabled to send auto-generated messages, outlining wellness needs to patients and their caregivers, as appropriate.

### Automated Messages

Use of routinized automated messaging may increase vaccination and patient engagement. MetroHealth used their registry to identify adolescents overdue for at least one vaccination. They implemented an outreach campaign using automated delivery methods to parents and guardians of adolescents in need of a vaccination. An automated vaccination reminder message was sent via phone, text, and direct mail. The parents and guardians were contacted every 2 months for up to 6 messages using other channels of communication if the adolescents remained unvaccinated.



## Results

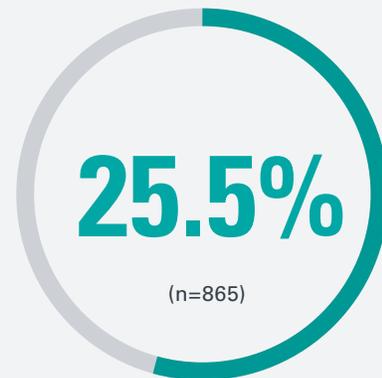
### Direct messaging has had a positive impact on adolescent vaccination rates

MetroHealth identified **3,393** eligible patients who fit the following criteria: ages 11–18 years who had at least one primary care visit within the last 2 years, and who needed at least one adolescent vaccine.

A total of **7,094** messages were sent:

- 3,334 automated voice messages
- 2,631 text messages
- 1,129 postcards

Within 24 weeks of messaging, **1,324 vaccinations occurred in 959 visits**. Automated texts, voice messages, and postcards had a significant positive effect on vaccination rates in adolescents needing vaccination.



Overall, **25.5%** of the adolescents whose parents or guardians were messaged received at least 1 needed vaccine.

## Vaccination Outreach

In line with MetroHealth's efforts to improve population health and due to the success of the adolescent outreach program, MetroHealth now uses automated message reminders for all patients to complete vaccination. Specifically, MetroHealth built into their HIT platform a unique, automated method to forecast patients due or overdue for vaccination. Each identified patient receives automated outreach, regardless of whether the patient has an appointment scheduled or not.

### Result of Automated Outreach

In 2013, MetroHealth implemented adult vaccination patient messages for a variety of vaccines, based on their experience with adolescent messaging.

Adult vaccination messages are estimated to have helped contribute to a substantial increase in adult vaccinations throughout the MetroHealth System.



## Use of the Patient Portal

### Increasing Patient Engagement

To increase patient engagement and health care quality, MetroHealth encourages patients to utilize their electronic patient portal. MetroHealth has elected to forecast all future preventive services, including vaccinations, which informs patients in advance when future services are due and encourages patient engagement in their health care needs. Portal-generated reminders prompt the patient to schedule an appointment for services. To increase the portal utilization, patients are educated on the benefits of the patient portal at all points of contact. This approach yielded a significant increase in MetroHealth's patient population accessing the portal routinely.

## Self-Reporting of Vaccines

### Accurate Vaccination Record

Recognizing there are other places where patients can receive vaccines, a forecasted personal health record vaccination reminder for adult vaccinations prompts the patient to self-report any vaccines they received outside The MetroHealth System. If the patient hasn't reported that a specific vaccine was given outside the system, they are asked to choose one of 3 options:

- Intend to get it
- Unsure if they will get it
- Are declining to get it

MetroHealth has seen that thousands of patients have reported vaccination that occurred outside the system. Depending on the patient's response, MetroHealth performs additional targeted outreach. For example, outreach to the patient may include where or when the patient can be vaccinated in the health care system.

## During a Patient Visit

### Clinical Decision Support: The Best Practice Advisory (BPA)

MetroHealth utilizes clinical reminders, BPAs, for all ACIP-recommended vaccines based on: demographic data, prior vaccine history (available from the EHR/state vaccination registry, health information exchange with other health systems, and from patient-reported vaccinations), allergy and adverse event history, current and prior clinical conditions, and forecasted vaccinations based on vaccination schedule. Since additional "clicks" or steps can lead to missed opportunities, the BPA was modified to simplify the EHR workflow. When the provider enters the patient's chart, they can view the BPA. The vaccine orders are then generated directly from the BPA's Smart Set. The only step needed is to click "accept." Because the orders are generated directly from the BPA, providers do not need to open multiple screens.

### Vaccines in a Series

#### Routinizing Compliance to Series Completion

If a vaccine is part of a series, future orders are generated for the subsequent doses by initiation of the first dose through the initial BPA. When the patient presents for the additional doses, the order is already in the system for the clinical staff to administer the vaccine. MetroHealth believes that creating a fully automated approach has increased staff efficiency by decreasing staff time spent manually generating reports and conducting outreach to patients.

## Health Information Exchange

MetroHealth believes the HIE must be efficient and integrated into the clinical workflow to the greatest degree possible and have a goal of improving the patient experience. MetroHealth exchanges health information across the metro Cleveland area thousands of times a day with other health systems using the same EHR. Specific to vaccines, this robust exchange of information has helped ensure vaccination records are accurate, so that missed opportunities can be avoided.

## ePrescribing

The system maximizes the use of ePrescribing functionality. When a vaccine cannot be administered in the clinic setting, the vaccine prescription is sent electronically to their pharmacy of choice. Surescripts prescription fill information allows MetroHealth to automatically receive information about vaccinations administered in retail pharmacies.

“MetroHealth recognized the inherent potential for their technology to connect clinical information from outside their 4 walls. By creating a strategy, this technology was integrated into clinical workflow to improve health care quality and improve the patient experience.”

David Kaelber, MD, PhD, MPH  
Chief Medical Informatics Officer and  
Vice President of Health Informatics  
The MetroHealth System

## After a Patient Visit



### Vaccine Adverse Event Reporting System, Reporting Through HIT

#### Automated Directly to the CDC

Established in 1990, the Vaccine Adverse Event Reporting System (VAERS) is a national early warning system to detect possible safety problems in US-licensed vaccines. VAERS is managed by the Centers for Disease Control and Prevention (CDC) and the US Food and Drug Administration (FDA). VAERS accepts and analyzes reports of adverse events (possible side effects) after a person has received a vaccination. Health care professionals are required to report certain adverse events and vaccine manufacturers are required to report all adverse events that come to their attention.

MetroHealth was the first site in the US to develop a system using the open-source Electronic Support for Public Health (ESP) platform connected with their EHR to identify and report vaccine adverse events. Intelligent algorithms in the public platform identified possible and probable vaccine adverse reactions. Daily data feeds occur between the ESP platform and EHR, including demographic, diagnoses, vaccination, and laboratory information. Probable vaccine adverse reactions are sent directly to the CDC VAERS.

### Appointment Scheduling for Vaccines in a Series

#### Ensuring Origination

MetroHealth wants to increase the likelihood that patients originate for subsequent vaccine doses by having the staff immediately schedule vaccine appointments for all subsequent doses.

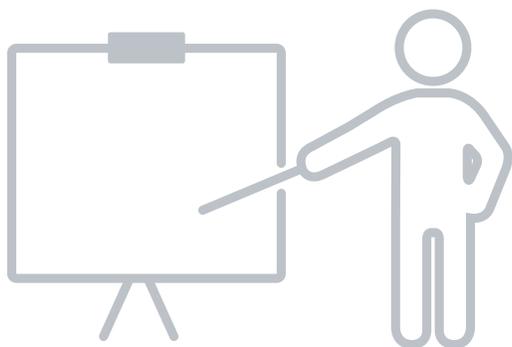
## Cancellation or Missed Appointment for Next Dose of a Vaccine

### Flagging for Outreach

If the patient cancels or misses a vaccine appointment and then becomes overdue, the EHR automatically flags the patient for outreach through their preferred mode of communication to ensure they reschedule their visit.

### After Visit Summary

Patients with access to the patient portal can view visit history and visit summaries. Those without access to the patient portal will receive an after visit summary via paper copy. Patients using the patient portal can view their vaccination records and forecasting from EHR data and receive an alert when vaccinations are due.



## Education and Training of MetroHealth Staff

### Process, People, Workflow

MetroHealth believes that training their staff on the right process to use HIT thoughtfully can make significant improvements in patient care. MetroHealth invests in training by an end-user support team to help the staff utilize the technology to its fullest potential. They achieve this by **EHR-trained personnel to conduct in-person training**, various training modules, and presentations to achieve their HIT educational goals.

### Potential Impact of HIT on Providers

According to Dr. David Kaelber, MetroHealth's HIT impacts providers in the following ways:

1. Helps providers be more efficient
2. Assists providers in delivering quality patient care
3. Allows for providers to work at their highest level by using HIT to enable non-providers to give vaccination when appropriate

## Summary

Over the last 18 years, The MetroHealth System has learned that having an HIT vision, strategy, and implementation framework, as well as knowing how best to utilize the technology, will help them meet their system's goals.

