



# Navigating NHTN Digital Measures: *What You Need to Know About Reporting FHIR<sup>®</sup> Measures to NHTN*

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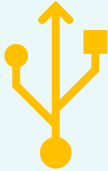
# Objectives

1. Understand foundational HL7® FHIR® concepts and their relevance to reporting digital quality measures (dQMs) to NHSN.
2. Explain the framework and rationale for reporting FHIR-based dQMs to NHSN.
3. Define the role of the Infection Preventionist in preparing for and supporting the success of FHIR-based reporting of dQMs to NHSN.



# Intro to NSHN FHIR® Measures: *What, Why, How*

# NHSN Vision: A Hands-Free Future for Reduced Burden



## Current State: Electronic

- Electronic data flows to NHSN via HL7 CDA payloads via APIs or uploads.
- NHSN also allows for manual webform data entry.

## Near Future: Fully Automated



- Electronic data flows automatically, hands-free to NHSN via FHIR APIs using USCDI defined data elements and HL7 NHSN FHIR Implementation Guides.
- CDA and webform entry still supported for certain circumstances.

# What is HL7 FHIR ?

- A **nationally-recognized standard** for sharing healthcare data
  - A common “language” with specific “grammar rules” that different healthcare systems and public health agencies can all understand—irrespective of where the data comes from (e.g., different hospitals) and who is sending the data (e.g., different vendors).
- Increasingly **adopted by EHR vendors, healthcare facilities, and government agencies**
  - 21<sup>st</sup> Century Cures Act required EHR vendors to adopt a baseline FHIR capability.
- Uses “**Resources**” to collect **clinical and administrative** information
  - Data are intended to be populated according to the same standards (known as “U.S. Core”) across EHR vendors.
- Enables access to **patient-level (vs. pre-aggregated)** data

# NHSN dQMs Under Consideration and In Development

## Antimicrobial Use & Resistance

- Acute care
- Long-term care\*

## Healthcare-Associated Infections (HAIs)

- Adult Sepsis Outcome
- Bacteremia and Fungemia, incl., hospital-onset bacteremia and fungemia (HOB)\*
- *C. difficile* infection (CDI), incl., healthcare facility-onset, antibiotic-treated *C. difficile* (HT-CDI)\* infection
- Neonatal late onset sepsis / meningitis (LOS/MEN)

## Adverse Events

- Glycemic control (inpatient medication-related hypoglycemia and inpatient hyperglycemia)\*
- Healthcare-associated venous thromboembolism (HA-VTE) and VTE prophylaxis
- Hospital-onset acute kidney injury (HAKI)
- Opioid-associated adverse events (ORAE)

## Public Health Preparedness

- Respiratory pathogen surveillance (RPS), incl. influenza, COVID-19, RSV admissions\*

\*Indicates measure is in piloting stages with NHSNCoLab sites

[www.cdc.gov/nhsn/nhsncolab](http://www.cdc.gov/nhsn/nhsncolab)

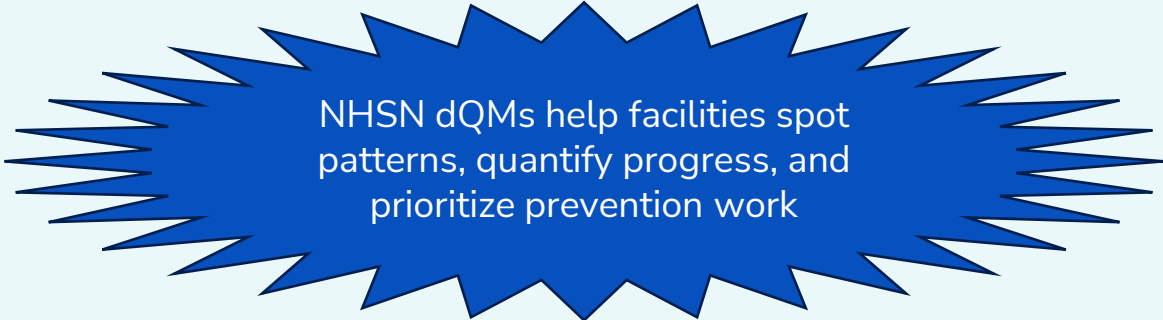
# NHSN Digital Quality Measures: Overview

## What They ARE

- ✓ Automated and standardized healthcare event surveillance
- ✓ Monthly quality improvement insights
- ✓ National healthcare event benchmarks

## What They are NOT

- ✗ Real-Time bedside alerts
- ✗ A replacement for clinical judgement
- ✗ Manual data-entry or abstraction tool



NHSN dQMs help facilities spot patterns, quantify progress, and prioritize prevention work

## Knowledge Check!

Which of the following are benefits of NHSN FHIR dQMs? (Select all that apply)

- a) Enables *automated* reporting to **reduce reporting burden**
- b) Supports *patient-level* data collection to improve data **accuracy**
- c) Uses *standardized data formats* across EHR vendors to support **interoperability**
- d) Requires *facility-level data aggregation* before submission

## Knowledge Check?

Which of the following are benefits of NHSN FHIR dQMs? (Select all that apply)

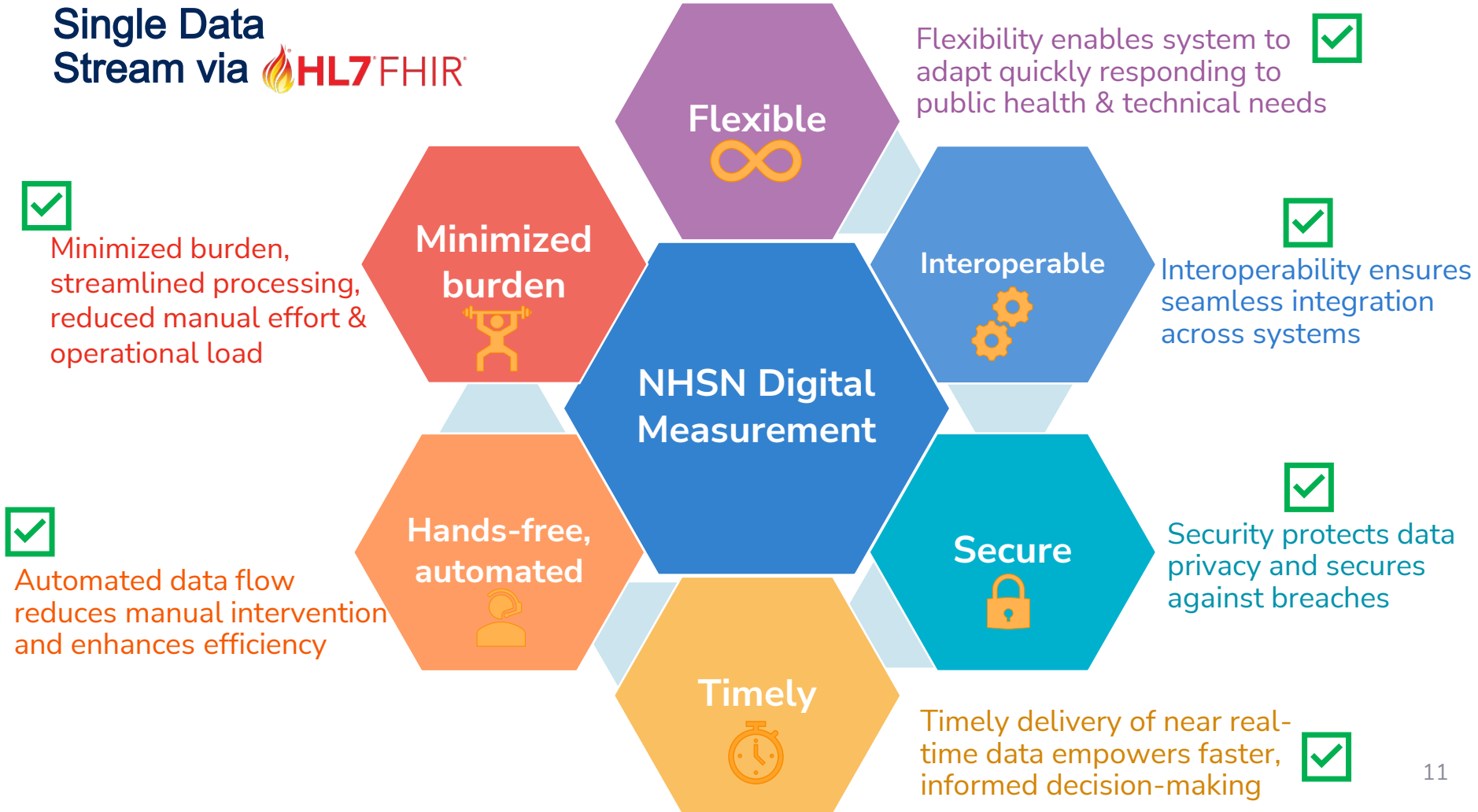
- Enables **automated** reporting to **reduce reporting burden**
- Supports **patient-level** data collection to improve data **accuracy**
- Uses **standardized data formats** across EHR vendors to support **interoperability**
- Requires **facility-level data aggregation** before submission

**Rationale:** Because FHIR enables data exchange in *standardized* formats at the *patient-level*, data can be aggregated centrally by NHSN. Pre-aggregation of data is not required by each facility and/or vendor.



# Intro to NSHN FHIR<sup>®</sup> Measures: *What, Why, How*

# Single Data Stream via



# NHSN dQMs: Rationale

## Data “Pull”: Reduce Data Latency

Connectivity is established with flexible, secure integration

Aligns with facility’s data-sharing security/privacy framework (i.e., share only what is “exposed”)

Scope and logic of measures are controlled centrally and easier to update (e.g., for new measures or during public health emergencies)

## Single Data Stream for Multiple Measures: Increase Data Parsimony

Data are extracted once, used many times across multiple measures

Minimizes burden of reporting, increases efficiency of surveillance

Reduces data duplication and re-collection for data analytics

## Centralized Measure Calculations by NHSN: Reduce Data Variability

Minimizes variability and subjectivity in interpretation of protocols and measure logic

Minimizes burden on facility and vendor to implement the measure and logic

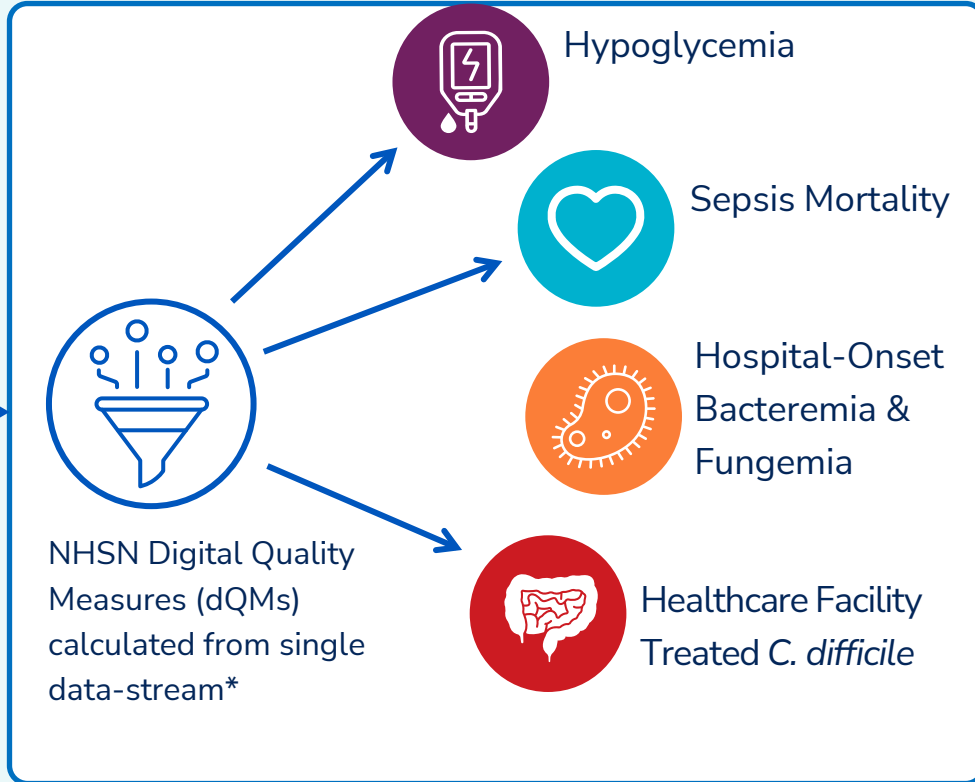
Permits scalability across many sites

# NHSN dQMs: Pipeline

One single data-stream to capture all hospital data



One touchless data-stream is transmitted monthly via FHIR (patient-level)



\*Data are collected for all inpatient, emergency, observation, and short-stay encounters overlapping the measurement period.



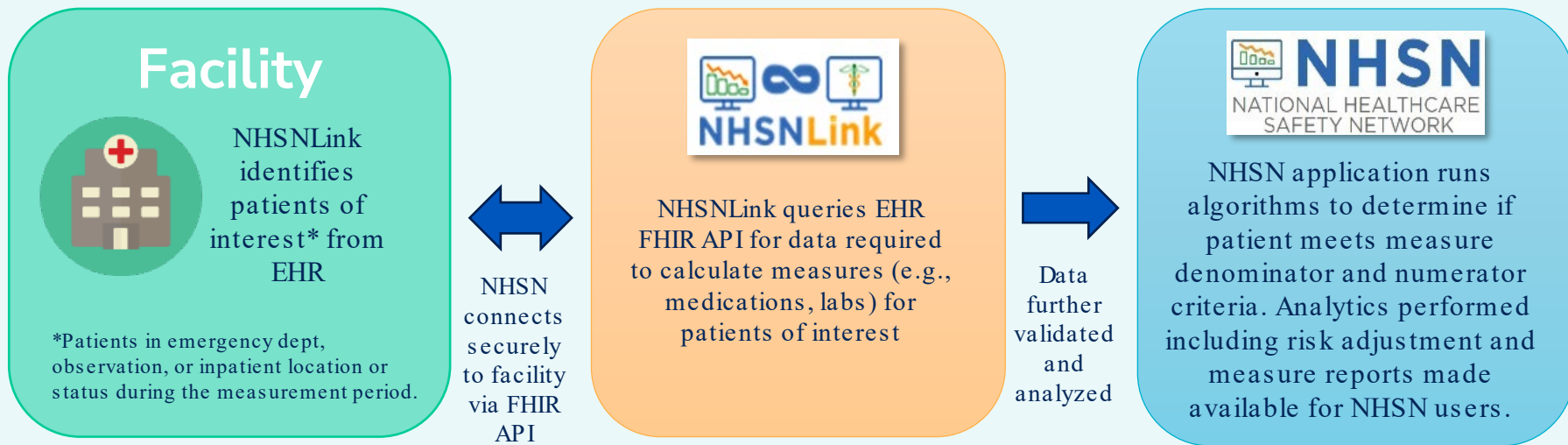
# Intro to NSHN FHIR<sup>®</sup> Measures: *What, Why, & How*

## NHSNLink: Background

- Open-source, secure, publicly available FHIR application for public health reporting
  - Supports NHSN dQMs with integrated informatics, standards, and analytic support for automated extraction of patient-level data
- Extensible and configurable query engine connects securely to EHRs via FHIR API
  - Identifies patients who qualify for measures using HL7 quality measure standards\*
  - Generates patient-level data in a MeasureReport Bundle
  - Passes the data to NHSN for data quality and analytic purposes
- Unidirectional (no write-back to the EHR)

\*Standards: [QI Core 6.0.0](#), [US Core 6.1.0](#), [FHIR 4.0.1](#), and [DaVinci DEQM](#)

# NHSNLink: Data Flow from EHR to NHSN



# NHSNLink: Requested FHIR “Resources”

## Condition Encounter Diagnosis (QI Core)

Detailed information about conditions, problems, or diagnosis.

## Coverage (QI Core)

Describes self-pay or insurance plan coverage details

## Device (QI Core)

A manufactured item used in patient care, medical or non-medical.

## Diagnostic Report Profile for Laboratory Results Reporting (QI Core)

A laboratory report that organizes and references test result Observations for a patient

## Diagnostic Report Profile for Report and Note Exchange (QI Core)

A diagnostic report is the set of information such as results, text reports, images, and codes.

## Encounter (QI Core)

An interaction between a patient and healthcare provider(s) for the purpose of providing healthcare service(s) or assessing the health status of a patient.

## Laboratory Results Observation (QI Core)

Each Observation resource represents an individual laboratory test and result value

## Location (QI Core)

Location associated with a patient, provider or organization.

## Medication (QI Core)

Primarily used for the identification and definition of a medication for the purposes of prescribing, dispensing, and administering a medication as well as for making statements about medication use.

## Medication Administration (QI Core)

Describes the event of a patient consuming or otherwise being administered a medication.

## Medication Request (QI Core)

The Medication Request resource can be used to record a patient's medication prescription or order.

## Observation Vital Signs (US Core)

Represents a patient's vital signs (e.g., heart rate, blood pressure) using a standardized FHIR Observation format.

## Patient (QI Core)

Represents patient demographic data elements

## Procedure (QI Core)

Represents patient procedures.

## Service Request (QI Core)

Represents ordered service such as diagnostic investigations, treatments, or operations to be performed.

## Simple Observation (QI Core)

Used for simple observations such as device measurements, laboratory results, vital signs, height, weight, etc.

## Specimen (US Core)

A sample to be used for analysis usually linked to an observation.

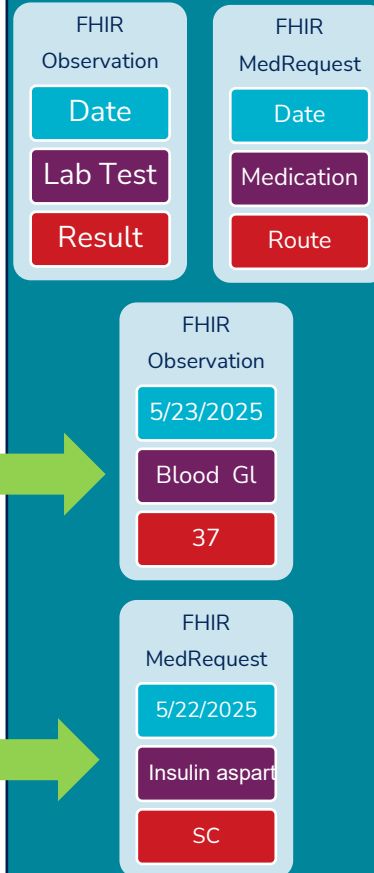
# From EHR to HL7 FHIR

## Example Data in EHR

LAB RESULTS		
Lab	Result	Date
Blood glucose	37	5/23/2025 1351

MEDICATION ORDERED		
Medication	Route	Date
Insulin aspart	SC	5/22/25 1954

## Standard Data Structure on Facility FHIR Server



## FHIR “Medication” Resource: Example Raw Data (JSON)

<pre>{   "fullUrl": "Medication1",   "resource": {     "resourceType": "Medication",     "id": "Medication1",</pre>	<b>Metadata</b>
<pre>  "code": {     "coding": [       {         "system": "http://www.whooc.no/atc",         "code": "A10AB05",         "display": "insulin <u>aspart</u>"       },       {         "system": "http://www.nlm.nih.gov/research/umls/rxnorm",          "code": "51428",         "display": "insulin <u>aspart</u>, human"       },       {         "system": "http://www.nlm.nih.gov/research/umls/rxnorm",         "code": "1653202",         "display": "3 ML insulin <u>aspart</u>, human 100 UNT/ML Pen Injector"       },     ],   }, }</pre>	<b>Body</b>

# NHSN End-user Analysis Report

## Line-listing for All (Adult) Inpatient Encounters with at least One Severe Hypoglycemia Event\*

### National Healthcare Safety Network

#### Line Listing - Severe Hypoglycemia Encounters, Adult (with Medication Request)

As of: April 3, 2026 at 7:07 PM UTC

Date Range: dqmmthlygold.hypoencounter All Dates

Filter: NHSNOrgID = 14596 AND (((patientAgeAtVisitEncGrpStartDate >= 18 ) AND (hypoEncounterQualifyingHypoEventSevereFlag = 1 ) AND (hypoEncounterHypoMedResourceTypeIndicator = MedReq )

Sort: Sorted by NHSNOrgID,hypoEncounterQualifyingHypoEventDateTime

Facility Org ID	NHSN Encounter Group ID	Patient ID	Summary Year/Month	NHSN Encounter Group Period Start DateTime	NHSN Encounter Group Period End DateTime	Patient Age at Encounter	Sex	Blood Glucose Severity Level Description	Event Date	Blood Glucose Level	Hypoglycemic Medications Associated with Hypoglycemic Event	Location Display for Event Location	HSLOC Location of Event	CDC Location Code of Event
14596	6tMa65mpH3	fpUriLpXukJZ	2025/05	04/30/2025 12:04:00	06/11/2025 17:42:00	87	M	SEVERE HYPO	05/06/2025 09:34:00	32	insulin glargine	Floor7	1040-5	IN:ACUTE:CC:NURS
14596	xOBLU17RnY	8h6H8L7QGatT	2025/05	05/20/2025 15:42:00	05/25/2025 15:46:00	34	F	SEVERE HYPO	05/22/2025 10:21:00	24	insulin lispro	Floor7	1225-2	IN:ACUTE:CC:ONC_MS
14596	lhOipVYubc	ETaZnRZ7K6cq	2025/05	05/13/2025 09:36:00	06/06/2025 00:34:00	61	M	SEVERE HYPO	05/24/2025 07:42:00	30	insulin, regular, human ; linagliptin	UnitB	1056-1	IN:ACUTE:WARD:GNT
14596	feECaTPF7z	j69pQCudo4Lk	2025/06	05/18/2025 17:48:00	07/03/2025 09:00:00	52	F	SEVERE HYPO	06/01/2025 15:52:00	24	insulin isophane ; insulin, regular, human	NorthPod	1070-2	IN:ACUTE:WARD:REHAB
14596	nBRNtp3FaB	NfBMohNkyAxx	2025/06	04/16/2025 02:17:00	06/02/2025 16:19:00	58	M	SEVERE HYPO	06/01/2025 21:19:00	20	insulin lispro	SouthPod	1095-9	IN:ACUTE:OR:LD

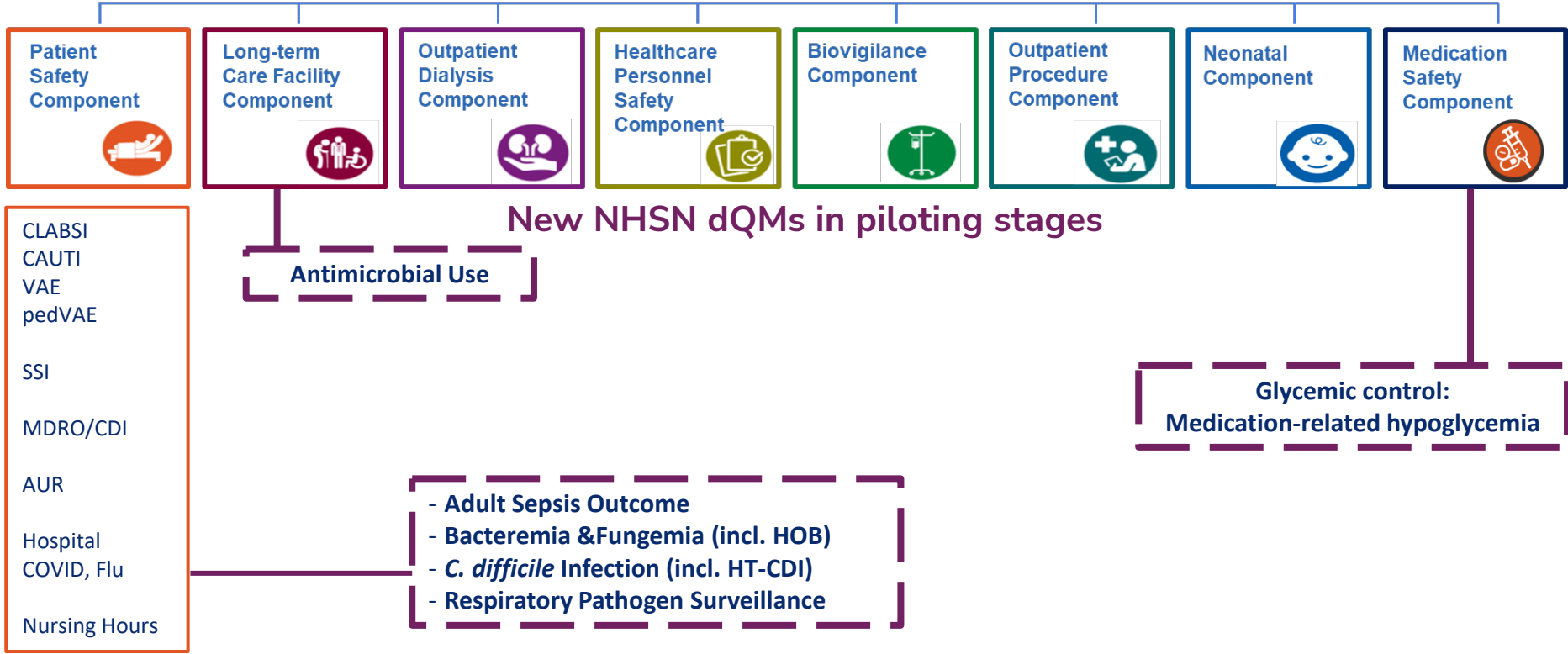
Reports are updated monthly with each new FHIR bundle pull and DMRP.

\*Note: Data are from test environment.

\*For Epic sites, data are based on medication orders as the vendor does not make medication administration data available via FHIR.



# Preparing to Report NHSN Digital Measures



AUR: antimicrobial use and resistance; CDI: *Clostridioides difficile* infection; CAUTI: catheter-associated urinary tract infection; CLABSI: central line-associated bloodstream infection; HOB: hospital-onset bacteremia & fungemia; HT-CDI: healthcare facility, antibiotic-treated *C. difficile* infection; MDRO: multi-drug resistant organism; SSI: surgical site infection; VAE: ventilator-associated event; pedVAE: pediatric VAE

Components Followed ✓ Select Component

Follow/ Followed	Component	Warning	Agreement
<input checked="" type="checkbox"/>	Biovigilance	12/1	
<input type="checkbox"/>	Dialysis		
<input checked="" type="checkbox"/>	Healthcare Personnel Safety	12/1	
<input type="checkbox"/>	Long Term Care Facility		
<input checked="" type="checkbox"/>	Medication Safety (pilot facilities only)		
<input type="checkbox"/>	Neonatal		
<input type="checkbox"/>			
<input checked="" type="checkbox"/>			

A Primary Contact for this component must be entered in the Contact Information section prior to entering data. Note: You will be prompted to complete a facility survey for the current calendar year the first time you log-in to this component. The survey can be printed using the Print Survey link next to

### Add Annual Survey

Mandatory fields marked with \*

Facility ID:

Survey Type:

Survey Year:

[Print Form](#)

✓ Complete Annual Survey

Section 1. Facility Information

1. Ownership:

If facility is a Hospital

2. Number of Patient Encounters:

3. Number of Admissions:

For any Hospital:

4. Is your hospital a teaching hospital for physicians and residents? If Yes, what type:  MAJOR  GRADUATE

5. Number of beds set up and staffed in the following locations:

a. ICU beds (including adult, pediatric, and neonatal)

b. All other inpatient locations:

### Add Digital Measure Reporting Plan

Mandatory fields marked with \*

Facility

Facility ID:

Glycemic Control Module

Data are collected from and include all inpatient locations, ED locations, and ambulatory locations.

Measure	Following	Start Month
Hypoglycemia Measure Reporting	<input type="checkbox"/>	<input type="text"/>

[Add Row](#)

✓ Submit Digital Measure Reporting Plan

During the specified reporting period, the facility authorizes the use of the Glycemic Control Module. Based on these data, your facility will generate reports and reporting options (e.g., line-level lists).

- To participate in the NHSN Glycemic Control Module, a Medication Safety Report must be submitted for the current reporting period.
- Completion of the reporting plan indicates that data transmitted by the facility meets the technical specifications for value sets (i.e., local or non-local).

### Analysis Reports ✓ Generate Datasets and Reports

[Expand All](#) [Collapse All](#)

- 1 Digital Measure Reports
  - 2 Glycemic Control Module
    - 3 Hypoglycemia
      - Line Listing - Severe Hypoglycemia Encounters, Adult (with Medication Request)
      - Line Listing - All Inpatient Encounters with greater than or equal to 1 Hypoglycemic Medication (with Medication Request)
      - Rate Table for Severe Hypoglycemia Encounters, Adult (with Medication Request)
      - Line Listing - All Inpatient Encounters with greater than or equal to 1 Hypoglycemic Medication (with Medication Administration)
      - Line Listing - Severe Hypoglycemia Encounters, Adult (with Medication Administration)
      - Rate Table for Severe Hypoglycemia Encounters, Adult (with Medication Administration)



## What's New

- Data are **pulled**
- Data are at **patient-level**
- Data are “cleaned”, aggregated, and **metrics calculated by NHSN**

With <b>Manual or Semi-Automated Measures</b>	With <b>Digital Quality Measures</b>
Data standards are <b>specific to the measure</b> and the organization to which they are reported	Data are represented using <b>nationally recognized standards</b> across the EHR vendors, facilities, and agencies
Data are <b>pushed</b> (NHSN waits for the facility to transmit data)	Data can be <b>pulled</b> , making real-time surveillance feasible
Data are often <b>aggregated</b> , <i>facility-level risk adjustment is typical</i>	Data are at the <b>patient level</b> , <i>patient-level risk adjustment is possible</i>
Measures are <b>pre-determined</b> before transmission	Measures can be <b>adapted</b> after data transmission



## NHSN dQM Resource Center

- Definitions
- Protocols
- Flow Diagrams
- Value Sets (Terminology)

<a href="#">Title</a>	Module	<a href="#">CBE ID*</a>	Download Specifications	<a href="#">Component</a>
<a href="#">Severe Hypoglycemia</a>	<a href="#">Glycemic Control</a>	3503e	ZIP file	Medication Safety
Hospital Onset Bacteremia	Bacteremia and Fungemia Surveillance	3686	Coming soon.	Patient Safety
Healthcare-associated, antibiotic treated <i>C. difficile</i> Infection	<i>C. difficile</i> Surveillance	3688	Coming soon.	Patient Safety
Adult Community-Onset (CO) Sepsis Standardized Mortality Ratio (SMR)	Sepsis Surveillance	TBD	Coming soon	Patient Safety



## NHSN dQM FHIR Readiness

- Key Personnel
- Roles and Responsibilities
- Key resources for EHR vendors and facility information systems

### Preparing Your Facility for Reporting FHIR Digital Quality Measures (dQMs) to NHSN

[Print](#)

#### AT A GLANCE

- **Prepare Stakeholders:** Engage key personnel at your facility for the transition to reporting digital quality measures (dQMs) using Healthcare Level Seven International (HL7®) Fast Healthcare Interoperability Resources® (FHIR®).
- **Appoint a Coordinator:** Appoint a staff member to serve as the NHSN dQM Implementation Coordinator to oversee reporting tasks.
- **Task Guide:** Use this page as a resource to prepare for reporting dQMs to NHSN and for compliance tasks.



[www.cdc.gov/nhsn/fhirportal/dqm/fhir-ready.html](http://www.cdc.gov/nhsn/fhirportal/dqm/fhir-ready.html)

# FHIR Implementation Guides

- FHIR specification – “Resources,” data elements, and value sets used in acquiring the patient population to calculate dQMs

## 10.14.1.1 Formal Views of Profile Content

Description of Profiles, Differentials, Snapshots and how the different presentations work [↗](#).

Key Elements Table					Differential Table	Snapshot Table	Statistics/References	All
Name	Flags	Card.	Type	Description & Constraints	Filter:			
MedicationRequest		0..*	USCoreMedicationRequestProfile	Ordering of medication for patient or group				
id	Σ	1..1	id	Logical id of this artifact				
implicitRules	?! Σ	0..1	uri	A set of rules under which this content was created				
modifierExtension	?! Σ	0..*	Extension	Extensions that cannot be ignored				
status	?! S Σ	1..1	code	active   on-hold   cancelled   completed   entered-in-error   stopped   draft   unknown <b>Binding:</b> medicationRequest Status (required): A code specifying the state of the prescribing event. Describes the lifecycle of the prescription.				
intent	?! S Σ	1..1	code	proposal   plan   order   original-order   reflex-order   filler-order   instance-order   option <b>Binding:</b> medicationRequest Intent (required): The kind of medication order.				
category	S	0..*	CodeableConcept	Type of medication usage <b>Binding:</b> medicationRequest Category Codes (extensible)				
priority	S Σ	0..1	code	routine   urgent   asap   stat <b>Binding:</b> RequestPriority (required): Identifies the level of importance to be assigned to actioning the request.				
doNotPerform	?! S Σ	0..1	boolean	True if request is prohibiting action				
Slices for reported[x]	S Σ	0..1		Reported rather than primary record <i>Slice: Unordered, Open by type:\$this</i>				
reportedBoolean			boolean					
reportedReference			Reference(US Core Patient Profile   US Core Practitioner Profile   US Core Organization Profile)					
reported[x]:reportedReference	S Σ	0..1	Reference(US Core Patient Profile   US Core Practitioner Profile   US Core Organization Profile)	Reported rather than primary record				
reference	S Σ C	1..1	string	Literal reference, Relative, internal or absolute URL				
Slices for medication[x]	S Σ	1..1		Medication to be taken				



# The Important Role of the Infection Preventionist in Digital Measures

# NHSN dQMs: Facility “Readiness”

## Shared Readiness, Shared Success

- **Facility readiness is multi-factorial** — spans leadership (governance), technical (FHIR), data validation (clinical), and cross-team coordination
- **IPs and NHSN facility administrators are key leaders** — serving as champions, coordinators, and partners with clinical, IT, and leadership teams
- **Success is team-based** — readiness and implementation extend beyond any single role

# NHSN dQMs: The Important Role of the Infection Preventionist (IP)

*Automation supports—not replaces—clinical expertise: Infection preventionists remain central as **champions**, **coordinators**, and **decision-makers** guiding dQM implementation and use.*

- **Data Validation:** partner with IT to validate mappings, ensure data quality, and maintain alignment with NHSN standards.
- **Collaboration:** IPs work across teams (IT, leadership, vendors) to operationalize dQMs and sustain accurate, compliant reporting.
- **Data to Action:** Interpret results, identify risks, and lead prevention strategies that improve patient safety.

# NHSN dQMs

## The Important Role of the Infection Preventionist (IP)

### dQMs

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- Automate data collection
- Standardize and streamline reporting
- Reduce manual tasks

### IPC / Clinician

- Ensure data accuracy and validity
- Drive cross-team communication and collaboration
- Turn automated data into patient safety/outcomes


# New Role: “dQM Implementation Coordinator”

## Key Personnel for Reporting dQMs to NHSN

Facilities preparing to report FHIR dQMs to NHSN should identify key personnel, including those in the following roles:

### NHSN dQM Implementation Coordinator

The NHSN dQM Implementation Coordinator is crucial for the success of the facility’s health system in this effort. This individual will:

- Coordinate with the NHSN Facility Administrator for submission of FHIR dQMs to NHSN.
- Serve as an educator for key personnel at the facility involved with reporting FHIR dQMs to NHSN
- Ensure the IT team is aware of and has implemented [Key Action Items for Reporting FHIR dQMs to NHSN](#)  [PDF – 85 MB].
- Share feedback with NHSN about the facility’s experience in implementing reporting of FHIR dQMs to NHSN.



# NHSN Digital Measures: Status and Progress

# NHSNCoLab: 12 Sites\* Connected & Exchanging FHIR Data for Patient Safety and Healthcare Accountability

The NHSNCoLab: Leading U.S. Health Systems Informing Nationwide Implementation of NHSN dQMs

## Glycemic Control

5 sites in Production for the severe medication-related hypoglycemia measure and validating NHSN analysis reports

## Bacteremia & Fungemia

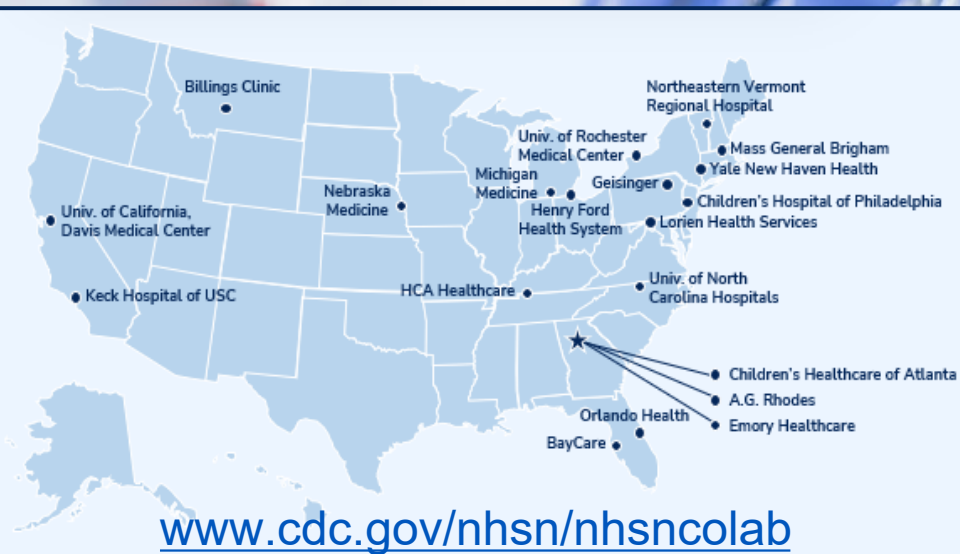
3 sites in Production for the HOB measure and validating NHSN analysis reports

## Respiratory Pathogen Surveillance

4 sites in Production with data under review for completeness and feasibility

## Sepsis Outcome

6 sites in Production with data under review for completeness and feasibility



\*21 total health systems with signed collaborative agreements

# NHSN dQMs: Current Status of Selected Measures



Severe Hypoglycemia



HOB



HT-CDI



Sepsis Outcome



HOB = healthcare onset bacteremia/fungemia; HT-CDI = healthcare-associated, antibiotic-treated C. difficile infection

## NHSN dQMs: Seeking Early Adopters

- **Lead** the transformation of automated public health surveillance nationwide.
- **Shape** a smarter, more reliable dQM framework by advancing data accuracy and workflow efficiency.
- **Inform** the national standard by identifying solutions before broad implementation.
- **Partner** at the forefront of innovation with NHSN and EHR vendors.
- **Accelerate** progress through continuous learning, turning insights into scalable improvement.

# NHSN dQMs: How to Participate as an Early Adopter

- **Submit ticket to NHSN ServiceNow with the following information:**
  - Component: **“Patient Safety”**
  - Category: **“Early Adopter”**
  - dQM(s) your facility is interested in reporting:
    - **Glycemic Control, and/or**
    - **Bacteremia & Fungemia Surveillance Module (HOB)**
  - Your facility’s EHR vendor
  - Confirmation from your IS representative that your EHR uses **“FHIR R4”** (or later)
  - Acknowledgement that you and your IS representative have reviewed the **NHSN FHIR readiness webpage**: [https://www.cdc.gov/nhsn/fhirportal/dqm/fhir\\_ready.html](https://www.cdc.gov/nhsn/fhirportal/dqm/fhir_ready.html)

**Selection of early adopters is subject to evaluation of facility readiness and NHSN development timelines. Early adopters are volunteer facilities and are not funded for their participation.**

# Thank you.

For any questions or concerns, contact the NHSN Helpdesk.

- **NHSN-ServiceNow** to submit questions to the NHSN Help Desk.
- Access new portal at <https://servicedesk.cdc.gov/nhsncsp>.
- If you do not have a SAMS login, or are unable to access ServiceNow, you can still email the NHSN Help Desk at [nhsn@cdc.gov](mailto:nhsn@cdc.gov).

For more information, contact CDC

1-800-CDC-INFO (232-4636)

TTY: 1-888-232-6348 <https://www.cdc.gov/>

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The findings and conclusions in this report are those of the authors and do not necessarily represent the

