Getting Started with AU

Healthcare-Associated Infections (HAI) Program
Center for Health Care Quality
California Department of Public Health

Overall Agenda

- Introductions
- NHSN
- AUR Reporting
- Implementing AU Reporting
- CDA and the NHSN HAI IG
- Configuring NHSN for AUR
- Our Support
- Additional Resources

Speakers

KP Sethi

- Director of Information Analysis and Technology
- Lead Analyst on the CDPH project
- Quality and public health reporting expert

Project Background

- Project Goal

  Provide technical assistance to the CDPH HAI Program & California hospitals implementing National Healthcare Safety Network (NHSN) Antimicrobial Use and Resistance Reporting

- Background
  - CDPH distributed two surveys in 2015 to identify California hospitals with sufficient informatics capabilities to monitor AU and AR data with NHSN
  - Further progress requires assistance in implementing AUR reporting

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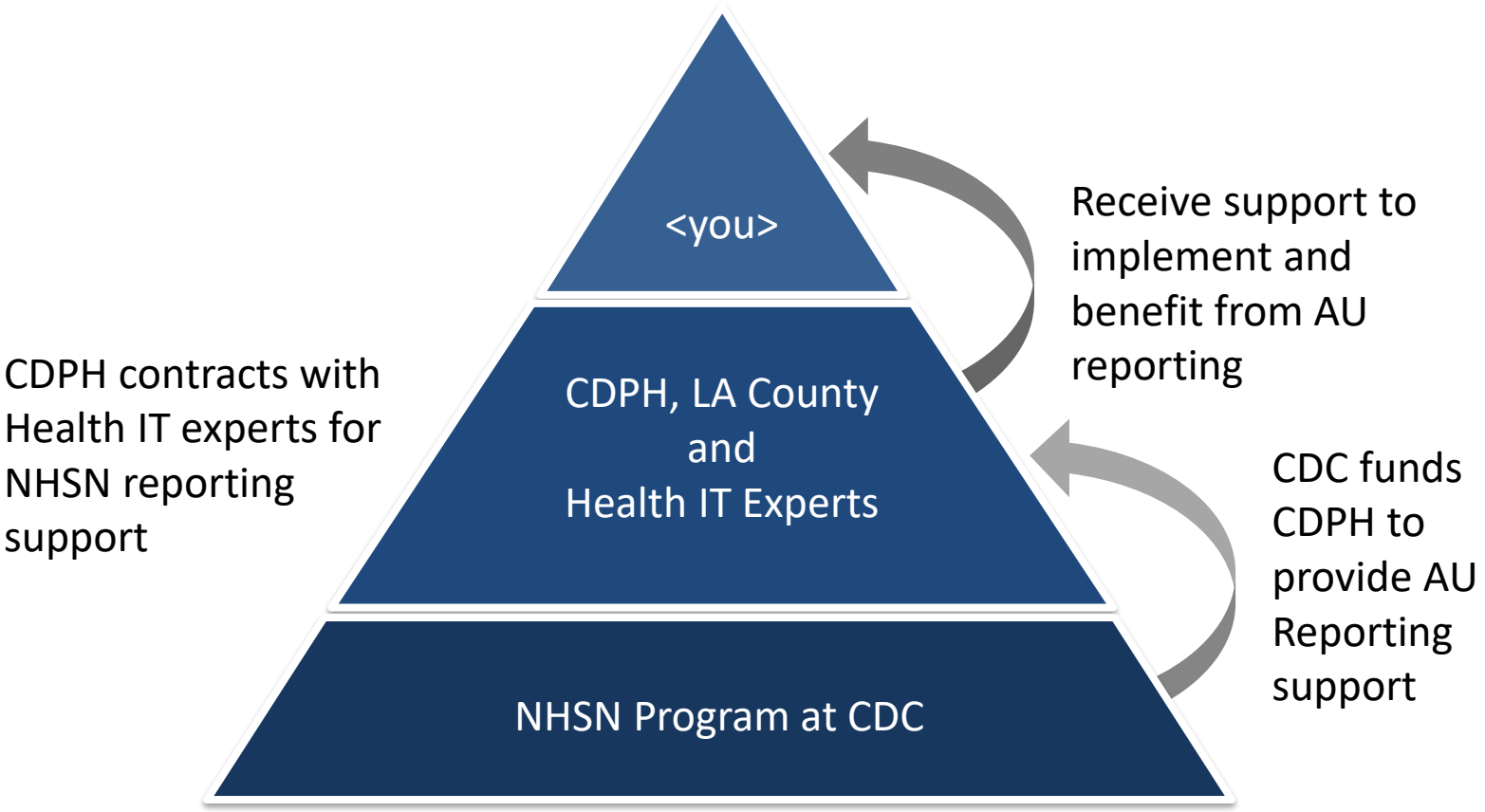
Organizations Involved



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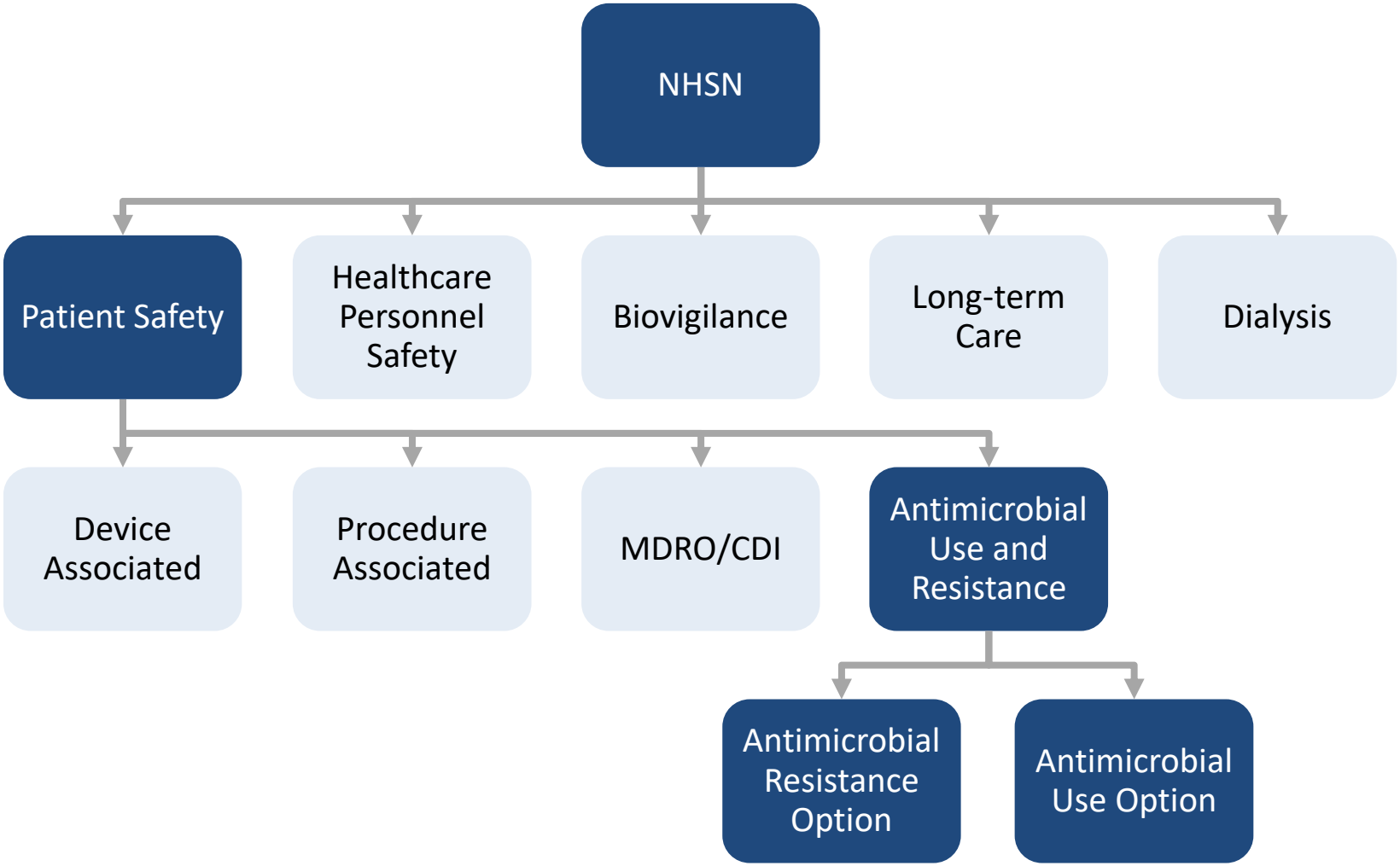
CDC NHSN Structure



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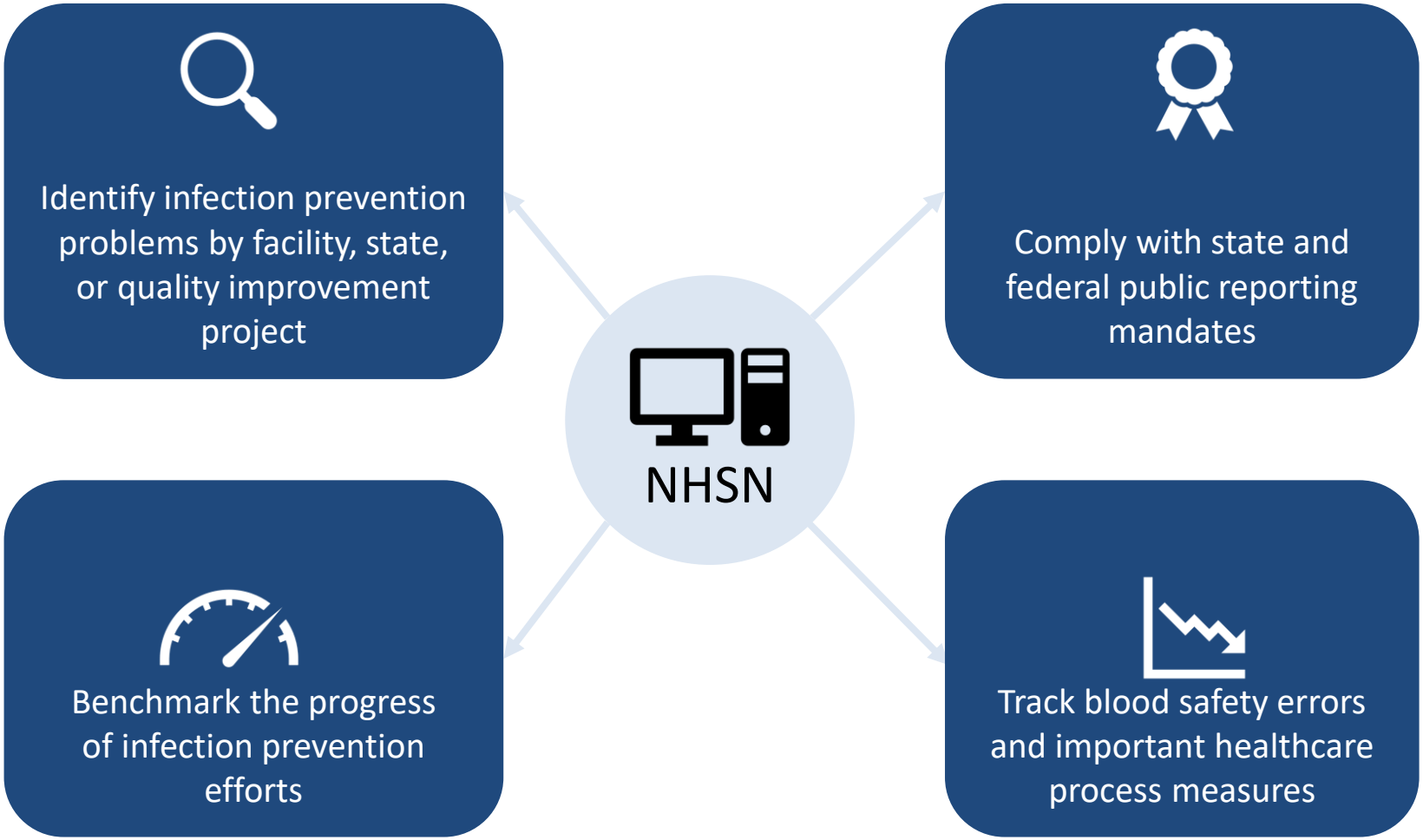
NHSN Goals



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Antimicrobial Use and Resistance Reporting

Antimicrobial Use Option	Antimicrobial Resistance Option
Tracks usage of antimicrobials across inpatient locations	Tracks the resistance of antimicrobials across inpatient locations

AUR Module allows choice of AU, AR, or both

Benefits of AU Reporting

Insights and Data Benefits

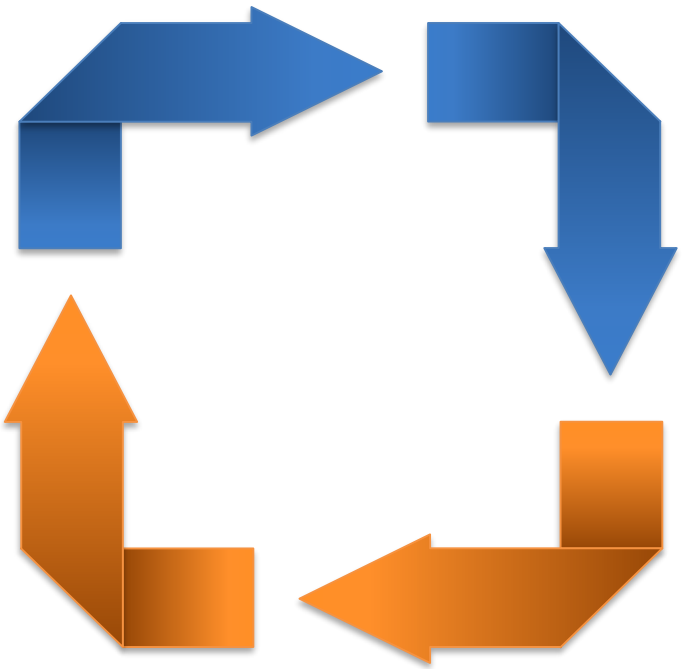
- Benchmarks for antimicrobial stewardship
- Benchmarks for antimicrobial quality improvement activities
- Compare with antimicrobial use trends across the nation
- Identify problem areas within a facility to target interventions

Regulatory and Payment Benefits

- Meet the Meaningful Use Stage 3 "certified technology" requirement
- Satisfy the Joint Commission's new antimicrobial stewardship standard
- Receive Anthem Quality-In-Sights bonus credit if implemented before December 31, 2017

AU Process Improvement Cycle

1. Track and record antimicrobial use
2. Submit reports to NHSN
3. Review NHSN comparison and analysis data
4. Adjust Antimicrobial use policies



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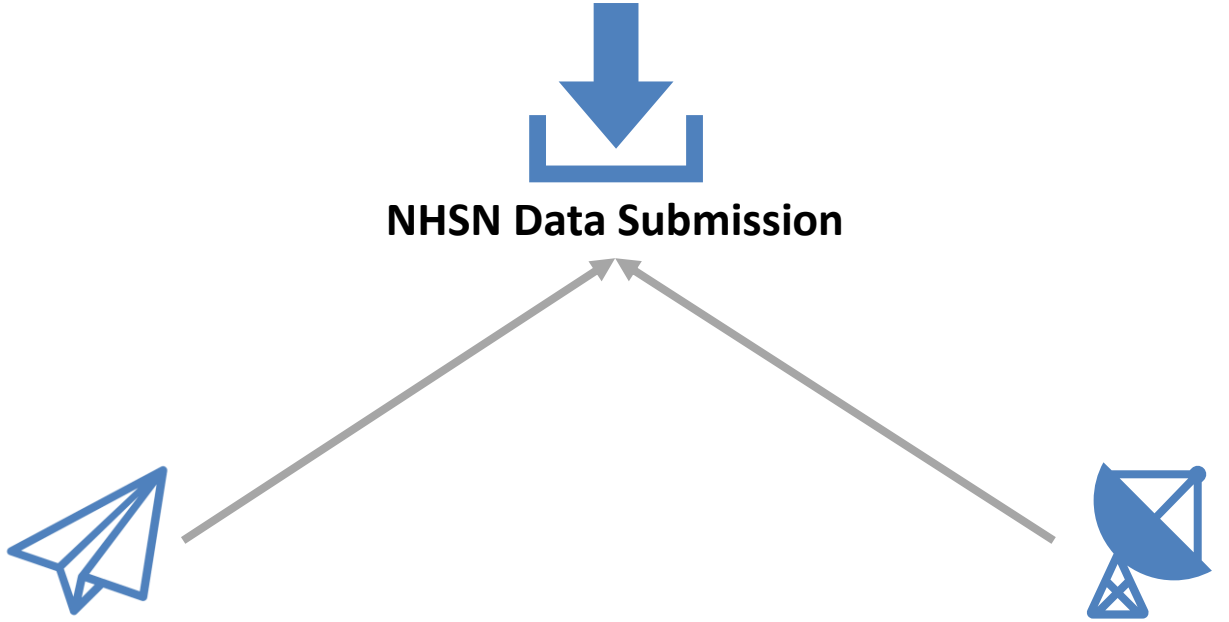
Data Submission



NHSN Data Submission

Manual Data Entry
All Modules other than AUR allow manual data entry

Electronic Data Submission
All modules can submit electronic data, which is a requirement for the AUR module.

Electronic Data Submission

Electronic Submission requires the HL7 Clinical Document Architecture (CDA) format

Data is submitted via the NHSN Portal

Submitted data is analyzed and benchmarked

NHSN CDA Submission Format

- HL7 Clinical Document Architecture (CDA)
  - Standard for electronic clinical documents
  - Used in Meaningful Use
  - Generic format for all NHSN HAI Modules
  - Specific document types per reporting option

Overview of Data Elements

IMPLEMENTING AU

Overall Agenda

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Key Concepts

- System and data requirements
- Hospital locations, routes of administration, and antimicrobials
- Algorithms for numerator and denominator data
- Calculation Walkthrough

AU Reports

- Two Types
  - FACWIDEIN
  - Location Specific
- Must report at least one inpatient location specific
  - Not just FACWIDEIN

Key Data Element List

	Data Field	Description
Individual Elements	Facility OID	Identifier assigned to facility, included in the importation file prior to submission.
	Month/Year	2-digit month / 4-digit year representing the data collection period
	Location	Patient care location
Numerator	Antimicrobial days/month per location	Sum of days for which *any* amount of specific agent was administered to a patient

Key Data Element List

	Data Field	Description
Denominator	Days Present	Risk for antimicrobial exposure per time unit of analysis stratified by location **Patient care location-specific:** • Number of patients present for any portion of each day location **Facility-wide inpatient:** • Number of patients present in an inpatient location within the facility for any portion of each day of a calendar month
	Admissions	Only for Facility-wide Inpatient • Aggregate number of patients admitted to an inpatient location within the facility through the reporting month

System Requirements

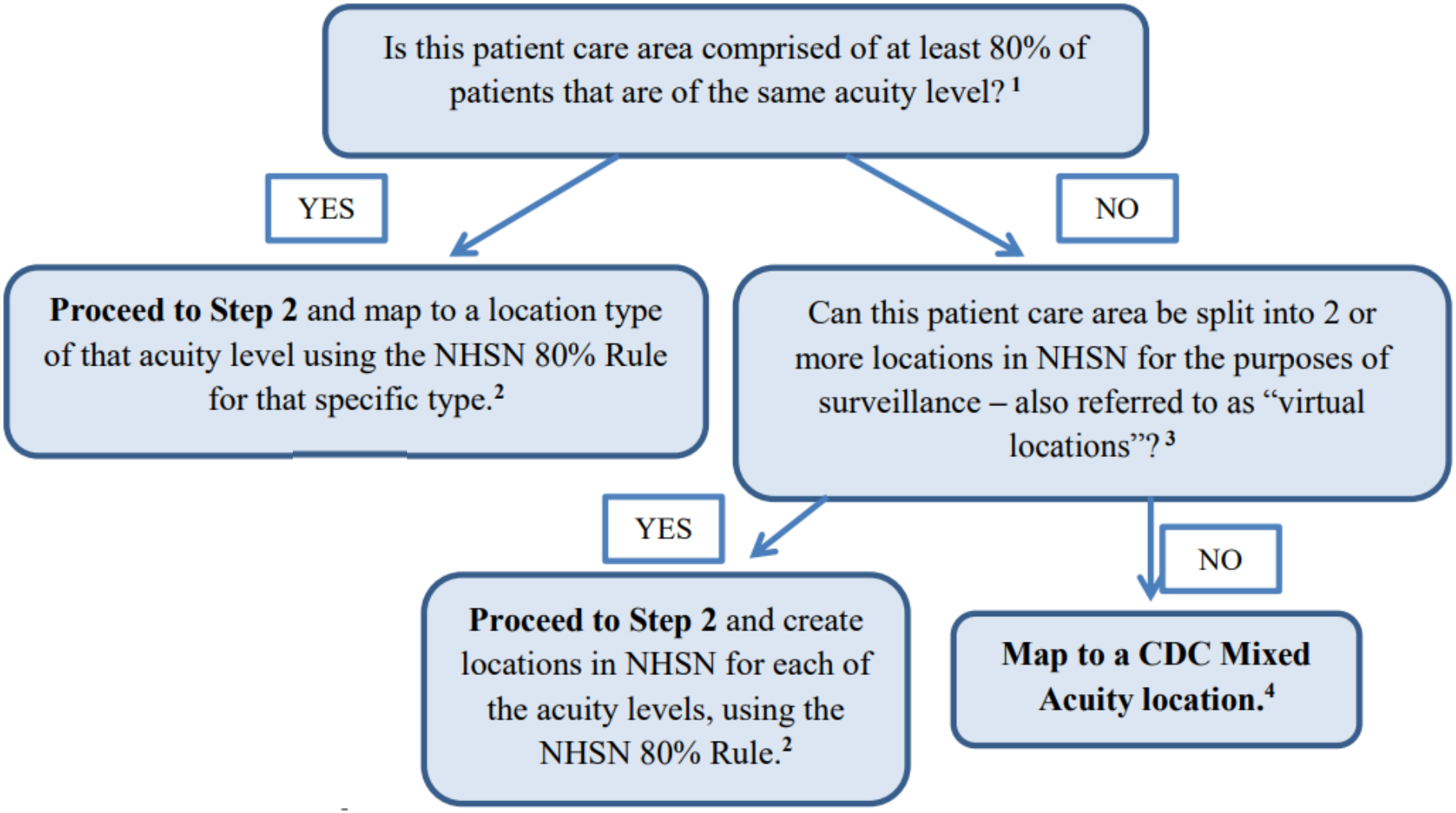
- Denominator: Days Present and Admissions
  - Admission Discharge Transfer System
  - Tracking patient flow by location, and time
- Numerator: Days of Therapy
  - Electronic Medication Administration Record
  - Bar Code Medication Administration System
  - Tracking administrations by location, time, antimicrobial administered, and route of administration

Locations

- Uses the same mapped locations across other NHSN reports
- Facility Wide Inpatient (FacWideIN)
- Location Specific
  - Inpatient
  - Select Acute Care Outpatient:
    - Outpatient Emergency Department
    - Pediatric Emergency Department
    - 24-hour observation area

CDC Locations and Descriptions and Instructions for Mapping Patient Care Locations

Location Mapping



Antimicrobial Ingredient List

- Can only report antimicrobial ingredients recorded electronically (e.g., eMAR, BCMA)
- NHSN provides a list of 90 antimicrobial ingredients
- All 90 antimicrobials must be included
  - Ability to null out if not used
- Antimicrobials are stratified by route

Routes of Administration

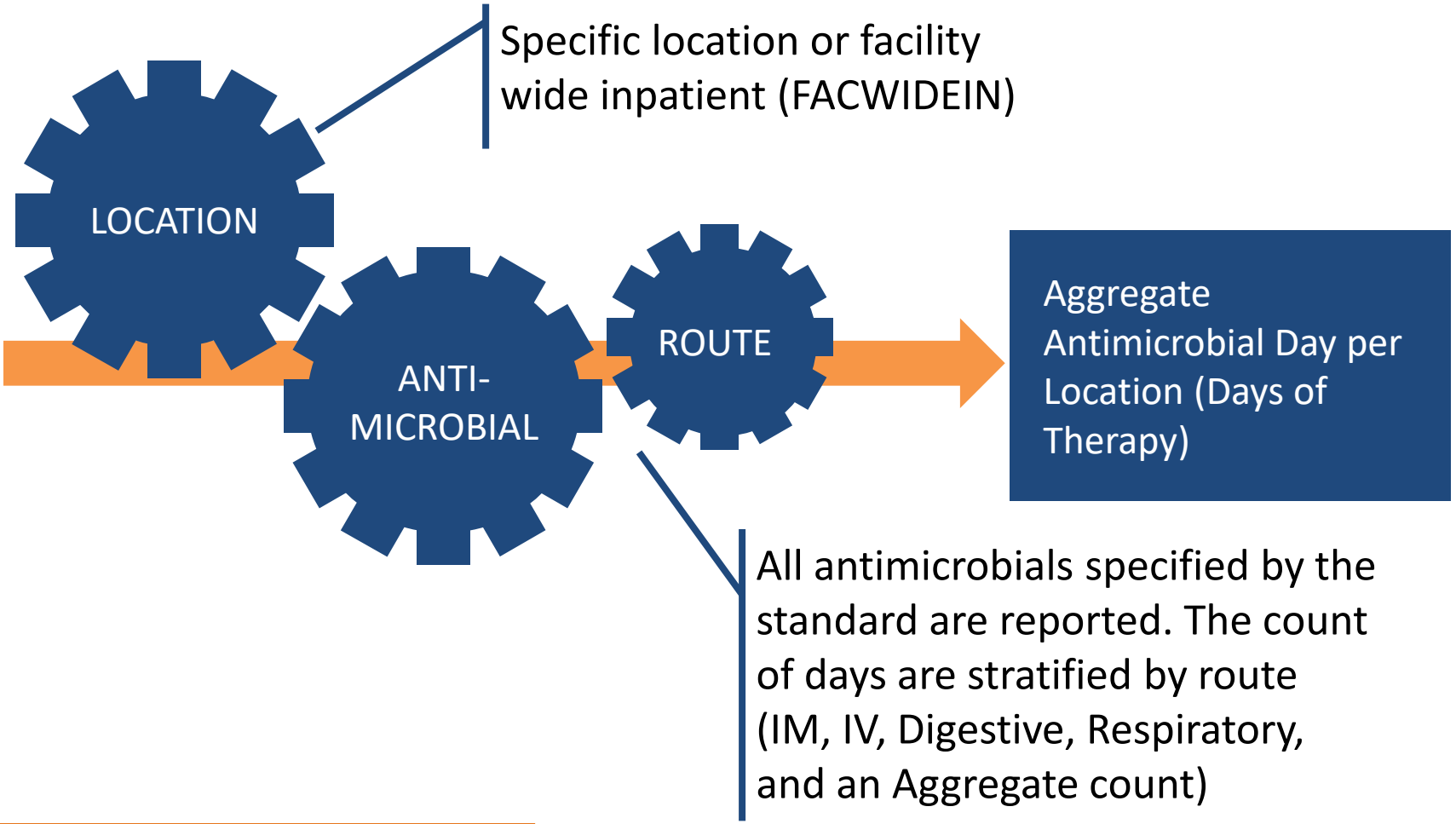
Route of Administration	Definition
Intravenous (IV)	Intravascular route that begins with a vein
Intramuscular (IM)	Begins with a muscle
Digestive Tract	Begins anywhere in the digestive tract extending from the mouth through rectum
Respiratory Tract	Begins within the respiratory tract, including the oropharynx and nasopharynx (includes nebulizer)

Other routes of administration are excluded

Numerator: Antimicrobial Days
(Days of Therapy)

Data Element	Description
Antimicrobial Agents	Antimicrobial agents, stratified by route
Data Source	Antimicrobial days derive from administered data in the eMAR and/or BCMA
Location	Facility-wide inpatient, each inpatient, and three select outpatient acute-care settings per NHSN location definitions
Time Unit	Antimicrobial days for a specific antimicrobial agent, stratified by route of administration and aggregated monthly per location

AU Report Numerator Calculation



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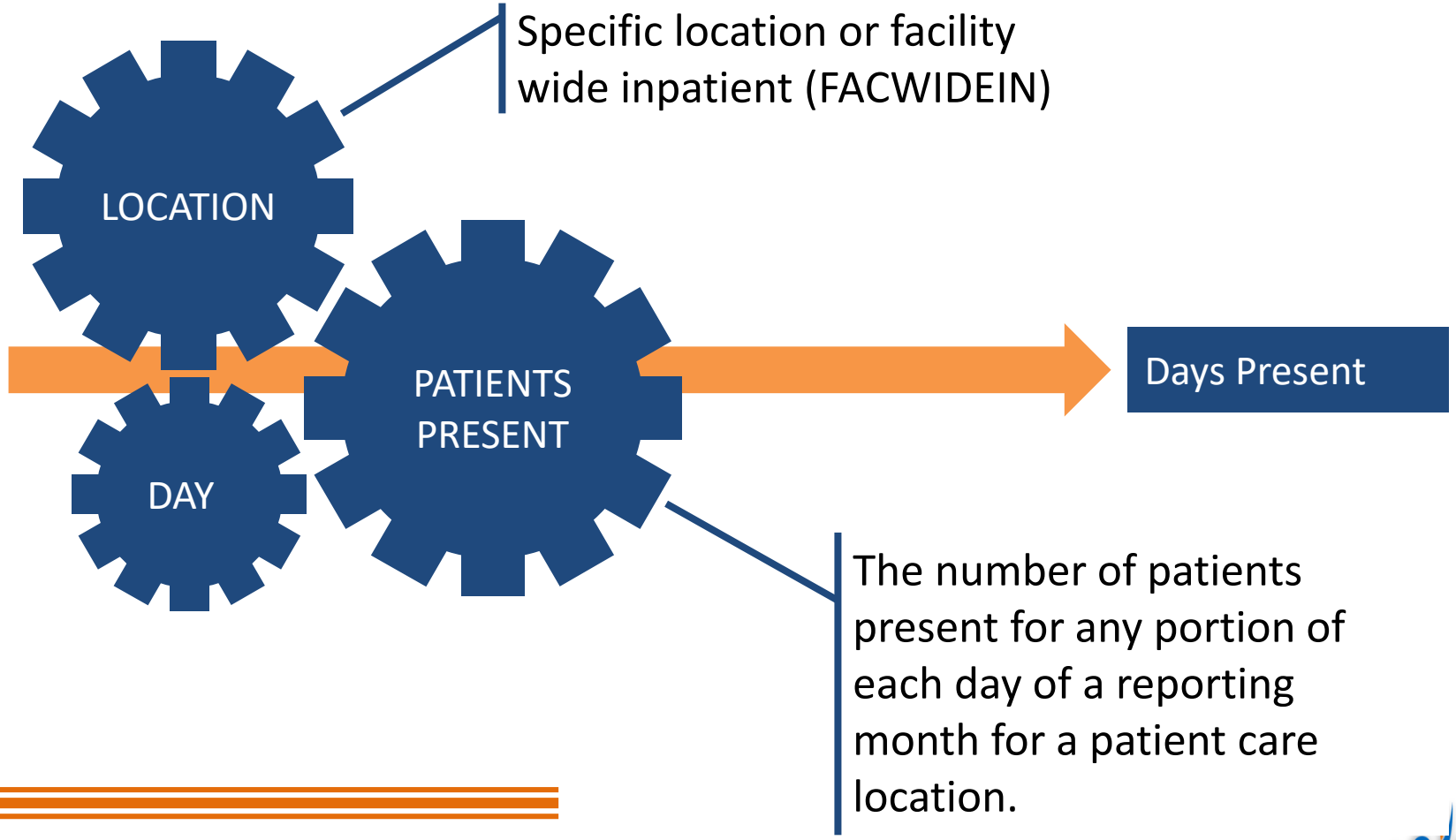
Denominator: Days Present

- Facility-wide:
  - Number of patients present in an inpatient location within the facility for any portion of each day of a calendar month
  - One patient can contribute only one day per calendar day
- Location Specific
  - The number of patients present for any portion of each day of a calendar month for a patient care location
  - Does not account for patient status (e.g., inpatient, observation)

AU Report Denominator: Days Present



Days Present vs. Patient Days

- Other HAI reports use Patient Days
- Days Present =/= Patient Days
- Days present represents the number of days in which a patient spent any time in specific unit or facility
- Patient days represents where patients are located during the midnight census

Days Present vs. Patient Days

	Patient Movement	Days Present	Patient Days (Midnight Count)
Patient A	Medical Ward: 00:01-23:59	Medical Ward = 1	Medical Ward = 1
Patient B	Medical ICU: 00:01-23:59	Medical ICU = 1	Medical ICU = 1
Patient C	Medical ICU: 00:01-08:30 Medical Ward: 08:31-23:59	Medical ICU = 1 Medical Ward = 1	Medical ICU = 0 Medical Ward = 1
Patient D	Medical ICU: 00:01-10:00 Step Down: 10:01-15:00 Medical Ward: 15:01-23:59	Medical ICU = 1 Step Down = 1 Medical Ward = 1	Medical ICU = 0 Step Down = 0 Medical Ward = 1
Totals:		Medical Ward = 3 Medical ICU = 3 Step Down = 1	Medical Ward = 3 Medical ICU = 1 Step Down = 0

Denominator: Admissions

- FACWIDEIN Only
- Aggregate number of patients admitted to an inpatient location within the facility during the reporting month

Tracking an example patient

CALCULATION WALKTHROUGH

Scenario: Patient A

Patient A is admitted into the Medical ICU at 00:01 and is given Amoxicillin by IV. At 08:30, Patient A is transferred to the Medical Ward and given an Amoxicillin tablet. The patient is there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU						
Med Ward						
Step Down						

Scenario: Patient A

Patient A is admitted into the Medical ICU at 00:01 and is given Amoxicillin by IV.
At 08:30, Patient A is transferred to the Medical Ward and given an Amoxicillin tablet.
The patient is there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU						
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Step Down						

Scenario: Patient A

Patient A is admitted into the Medical ICU at 00:01 and is given Amoxicillin by IV.
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The patient is there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU						1
Med Ward						1
Step Down						

Scenario: Patient A

Patient A is admitted into the Medical ICU at 00:01 and is given Amoxicillin by IV.
At 08:30, Patient A is transferred to the Medical Ward and given an Amoxicillin tablet.
The patient is there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU			1		1	1
Med Ward	1				1	1
Step Down						

Scenario: Patient B

Patient B is admitted into the Medical ICU at 00:01 and is given an Amoxicillin tablet. At 10:30, Patient B is transferred to the Medical Ward and stays there until 15:30. The patient is then transferred to Step Down, where the patient is given Amoxicillin by IV and remains there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU			1		1	1
Med Ward	1				1	1
Step Down						

Scenario: Patient B

Patient B is admitted into the Medical ICU at 00:01 and is given an Amoxicillin tablet. At 10:30, Patient B is transferred to the Medical Ward and stays there until 15:30. The patient is then transferred to Step Down, where the patient is given Amoxicillin by IV and remains there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU			1		1	1
Med Ward	1				1	1
Step Down						

Scenario: Patient B

Patient B is admitted into the Medical ICU at 00:01 and is given an Amoxicillin tablet. At 10:30, Patient B is transferred to the Medical Ward and stays there until 15:30. The patient is then transferred to Step Down, where the patient is given Amoxicillin by IV and remains there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU			1		1	~~1~~ 2
Med Ward	1				1	~~1~~ 2
Step Down						1

Scenario: Patient B

Patient B is admitted into the Medical ICU at 00:01 and is given an Amoxicillin tablet. At 10:30, Patient B is transferred to the Medical Ward and stays there until 15:30. The patient is then transferred to Step Down, where the patient is given Amoxicillin by IV and remains there for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	1		1		~~1~~ 2	2
Med Ward	1				1	2
Step Down			1		1	1

Advanced Scenario: Patient C

Patient C is admitted into Med ICU at 22:30. Patient C is administered 1 amoxicillin tablet and put on IV with amoxicillin before midnight. The next day, at 09:00, the patient is transferred to the Step Down for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	1		1		2	2
Med Ward	1				1	2
Step Down			1		1	1

Advanced Scenario: Patient C

Patient C is admitted into Med ICU at 22:30. Patient C is administered 1 amoxicillin tablet and put on IV with amoxicillin before midnight. The next day, at 09:00, the patient is transferred to the Step Down for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	1		1		2	~~2~~ 3
Med Ward	1				1	2
Step Down			1		1	1

Advanced Scenario: Patient C

Patient C is admitted into Med ICU at 22:30. Patient C is administered 1 amoxicillin tablet and put on IV with amoxicillin before midnight. The next day, at 09:00, the patient is transferred to the Step Down for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	1		1		2	~~3~~ 4
Med Ward	1				1	2
Step Down			1		1	1

Advanced Scenario: Patient C

Patient C is admitted into Med ICU at 22:30. Patient C is administered 1 amoxicillin tablet and put on IV with amoxicillin before midnight. The next day, at 09:00, the patient is transferred to the Step Down for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	1		1		2	4
Med Ward	1				1	2
Step Down			1		1	~~1~~ 2

Advanced Scenario: Patient C

Patient C is admitted into Med ICU at 22:30. Patient C is administered 1 amoxicillin tablet and put on IV with amoxicillin before midnight. The next day, at 09:00, the patient is transferred to the Step Down for the rest of the day.

Location	Therapy Days (Amoxicillin)					Days Present
	Dig	IM	IV	Resp	Aggregate	
Med ICU	~~1~~ 2		~~1~~ 2		~~2~~ 3	4
Med Ward	1				1	2
Step Down			1		1	2

The Data Structure of AU Reports

INTRODUCTION TO CDA

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- Introductions
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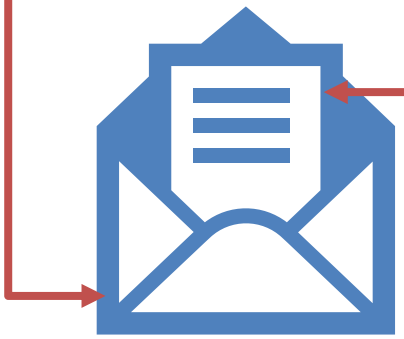
Overview

- CDA Basics
- Implementing CDA within your organization
- NHSN CDA Format
- CDA Validation

CDA R2

- Clinical Document Architecture (CDA)
- Common model defining the structure and semantics of clinical documents
- Developed by Health Level Seven
- XML syntax
- First released in 2005

CDA Body and Header



- Header
  - Facility OID
  - Authoring vendor
- Body
  - Report Data:
    - Location
    - Numerator: Therapy Days
    - Denominator: Days Present

Object Identifier (OID)

- A unique identifier that represents an object:
  - A tree of nodes and edges (i.e., branches and leaves, sometimes called OID arcs)
  - A positive integer is assigned to each edge in the tree.
- OIDs in CDA:
  - Add global uniqueness to identifiers in clinical documents.
  - Identify the Facility submitting data to NHSN
  - Identify the vocabulary terminology systems in a document.

HL7 V3 Data Types: R1 in CDA

BASIC DA		CODED VALUES	
ANY		CS	Coded Simple
BL	Boolean	CE	Code Value
ED	Encapsulated data	CD	Coded with Equivalence
ST	Character String		
NAMES		ADDRESSES	
PN		ADXP	Address Part
ON		AD	Postal Address
COLLECTIONS		IDENTIFIERS	
SET	Set	II	Instance Identifier
LIST	List	COMMUNICATIONS	
IVL	Interval	TEL	Telecommunication Address
QUANTITIES		TIME	
INT	Integer	TS	P
PQ	Physical Quantity	PIVL	P
REAL	Real	IVL	In
RTO	Ratio	GTS	General Timing Specification

Route Codes
Antimicrobial
Ingredients

OIDs

Patient Days
Therapy Days

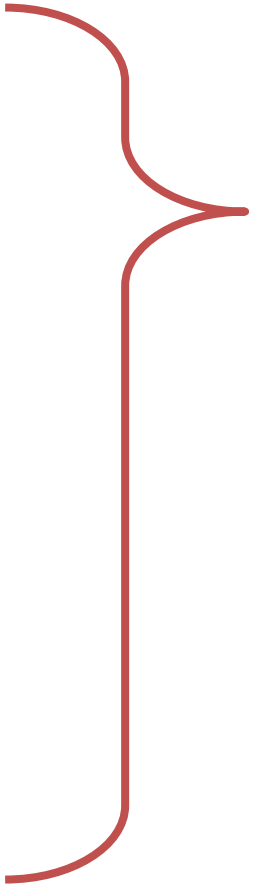
Value Sets and Code Systems

- Code – a sequence of characters assigned meaning by some formal system

  Expression, Symbol
- Code System – formal definitions that define the meaning of a set of concepts, with codes
  - Terminology, Ontology, Enumeration, Classification…
  - SNOMED, LOINC, RxNorm
  - Drive meaning/analysis off code systems
- Value Set – a group of code/codeSystem pairs
  - Doesn't define it's own codes
  - Picks codes from multiple code systems
  - AU examples:
    - Antimicrobial Ingredient List
    - Routes

Example of Code System Vs. Value Sets

- Ice Cream flavors code system
  - Chocolate
  - Vanilla
  - Strawberry
  - Mango
  - Pear
  - Rocky Road
  - Cookie Dough
  - Cake
  - Caramel
  - Coffee
  - Blueberry
  - Raspberry



- "Berry Flavors" Value Set
  - Strawberry
  - Blueberry
  - Raspberry

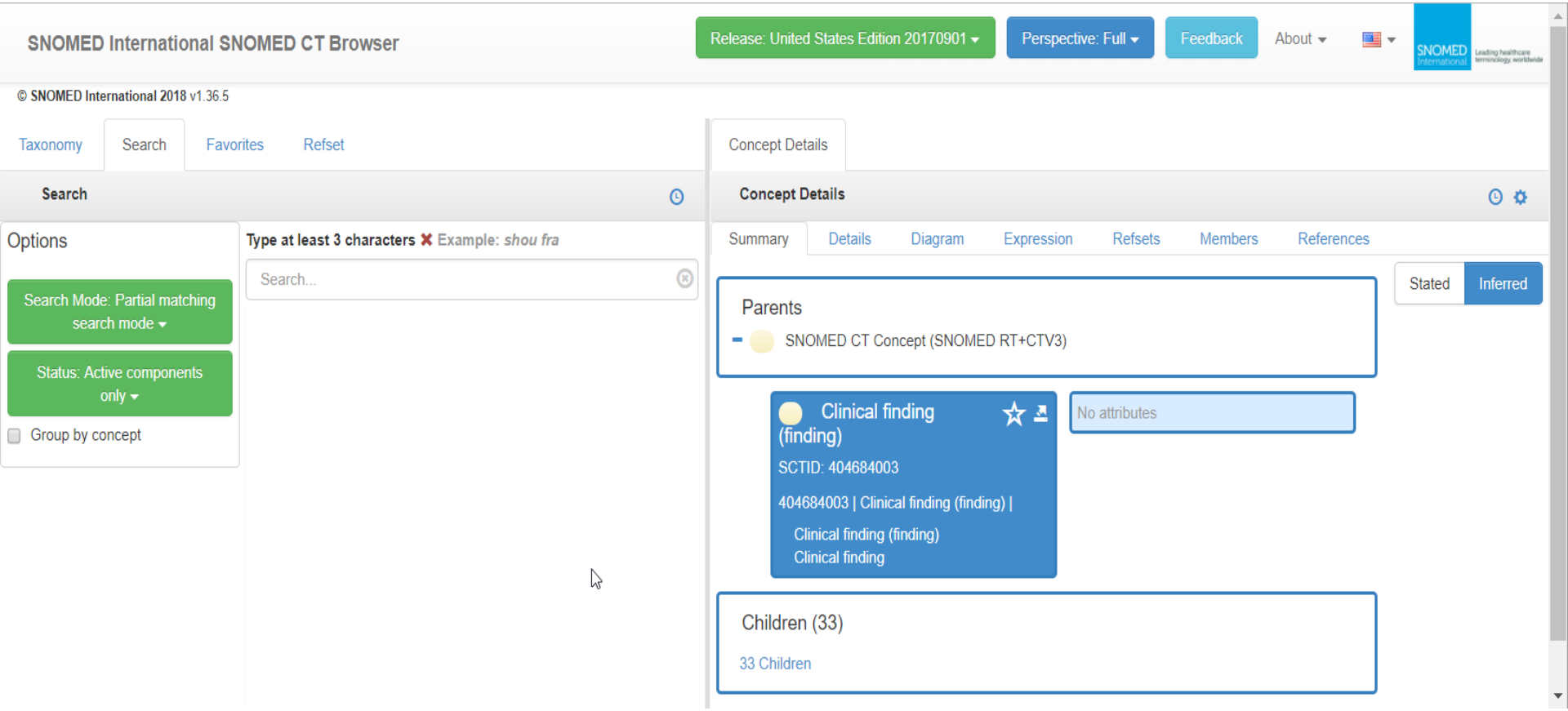
Code Systems

- **SNOMED-CT:** Systematized Nomenclature Of Medicine Clinical Terms
  - Used for Route Codes
- **LOINC:** Logical Observation Identifiers Names and Codes
  - Used for document and section codes
- **RxNorm**: RxNorm provides normalized names for clinical drugs
  - Used to specify antimicrobial ingredients

Tools

- Tools find codes from the three hierarchies:
  - SNOMED Browser
  - LOINC on-line (LOINC.org)
  - RxNorm's RxNav
- Finding value sets:
  - Value Set Authority Center (VSAC): https://vsac.nlm.nih.gov
    - General Source of truth for most (all) Value Sets
  - HAI_VOC.xslx
    - Spreadsheet with HAI specific value sets

SNOMED Browser



LOINC

Options Help loinc.org Go Premium! Set Language

LOINC from Regenstrief

bmi Search

LOINC	LongName	Component	Property	Timing	System
82271-8	Activity metabolic rate/Standard resting metabolic rate [Relative Energy/Time] adjusted for age+sex+race+BMI 1 minute mean Estimated	Activity metabolic rate/Standard resting metabolic rate^^adjusted for age+sex+race+BMI	RelEngRat	1M^mean	^Patient
74728-7	Vital signs, weight, height, head circumference, oximetry, BMI, and BSA panel - HL7.CCDAr1.1	Vital signs, weight, height, head circumference, oximetry, BMI, & BSA panel	-	Pt	^Patient
85353-1	Vital signs, weight, height, head circumference, oxygen saturation and BMI panel	Vital signs, weight, height, head circumference, oxygen saturation & BMI panel	-	Pt	^Patient
59574-4	Body mass index (BMI) [Percentile]	Body mass index	Prctl	Pt	^Patient
59575-1	Body mass index (BMI) [Percentile] Per age	Body mass index	Prctl	Pt	^Patient
59576-9	Body mass index (BMI) [Percentile] Per age and gender	Body mass index	Prctl	Pt	^Patient
39156-5	Body mass index (BMI) [Ratio]	Body mass index	Ratio	Pt	^Patient
88087-2	Estimated BMI greater than 40	Estimated body mass index greater than 40	Find	Pt	^Patient

Search generated 8 hits in 0.009 secs.

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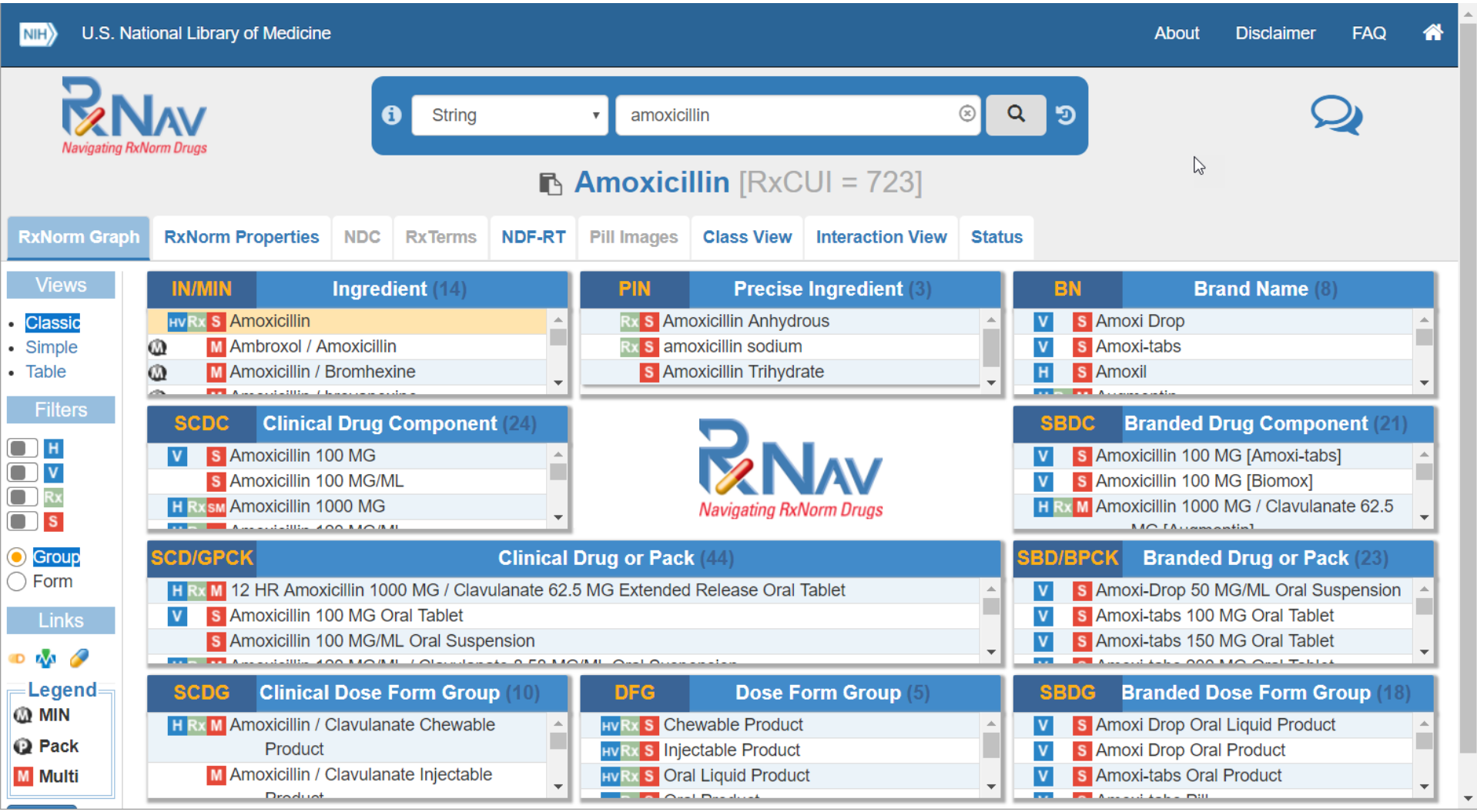
RxNav



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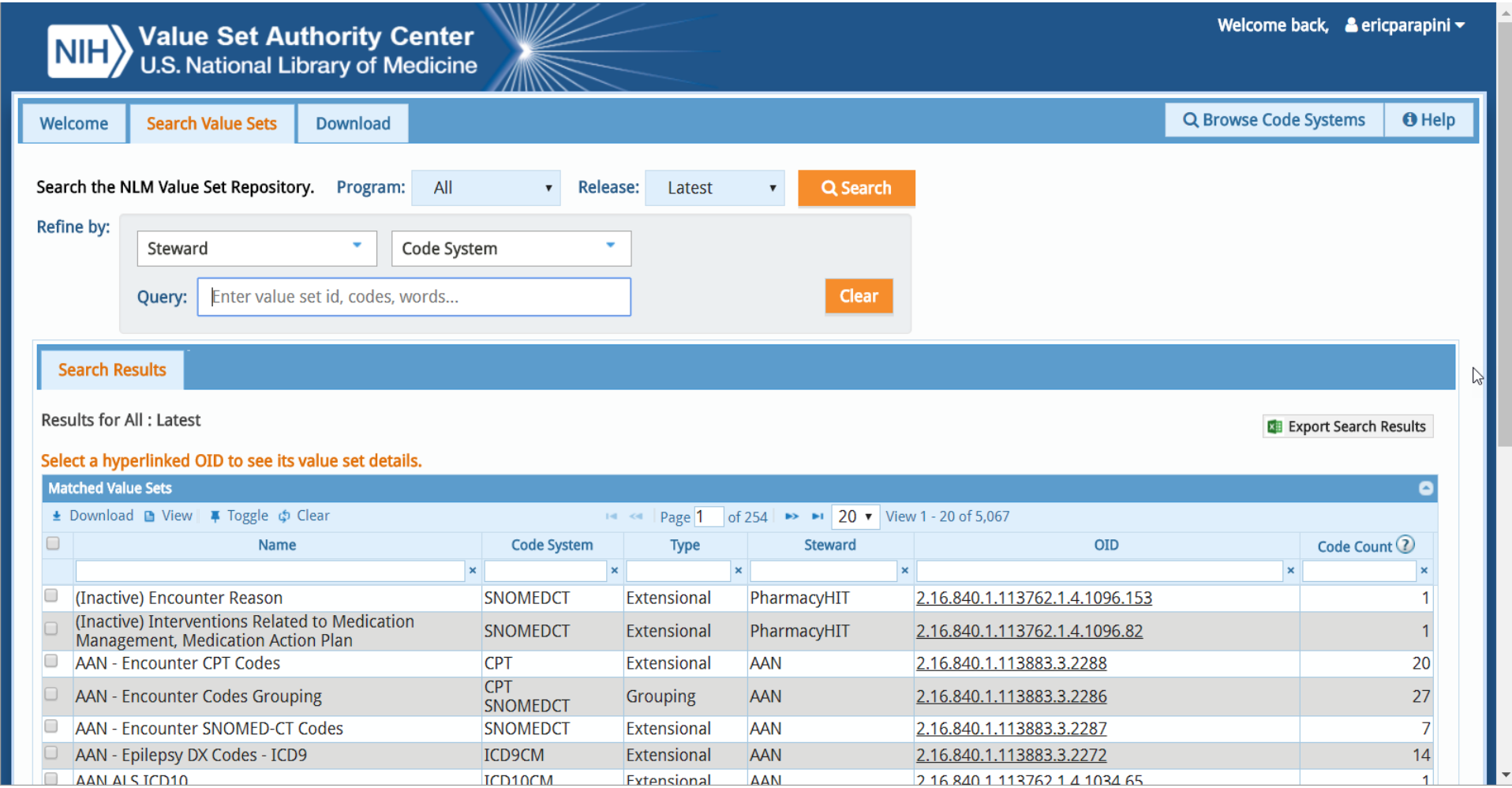
VSAC



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HAI_VOC.XLS

	A	B	C	D	E	F
1	**Healthcare Associated Infection (HAI) Reports, Normative Release 1, vocabulary**					
2						
3	Each tab in this Workbook contains an HAI value set or list of single-value bindings; the index below provides links to each tab. Three large					
4						
5	The top row of each worksheet indicates value set name, OID, and binding. A list of code system OIDS and names is at the bottom of this					
6						
7	Each worksheet contains the codes and standard displayNames for the value set (arranged by code). Additional columns may also give					
8						
9	**Special character strings are used in some instances to permit proper coding for the Schematron:**					
10	**Character string**	**Represents**				
11	®	® (Registered)				
12	™	™ (Trademark)				
13	>	>				
14	>=	>=				
15	<	<				
16	<=	<=				
17						
18	**Large Value Sets Not Included in this Spreadsheet**					
19	**External Link**	**Value Set Name**	**Value Set OID**	**Value Set Binding**	**codeSystemName**	**codeSystemOID**
20	http://phinvads.cdc.gov	NHSNBloodProductCodabarCode	2.16.840.1.114222.4.11.3335	STATIC	ABC Codabar	2.16.840.1.113883.6.290
21	http://phinvads.cdc.gov	NHSNBloodProductISBTCode	2.16.840.1.114222.4.11.3334	DYNAMIC	ISBT-128	2.16.840.1.113883.6.18
22	http://www.wpc-edi.com/taxonon	NHSNClinicalSpecialtyCode	2.16.840.1.114222.4.11.3191	DYNAMIC	NUCCProviderCodes	2.16.840.1.113883.6.101
23						
24	**Index of Tabs / Value Sets -- Single-Value Bindings (SVBs) are listed at the end**					
25	**Tab Name**	**Value Set Name**	**Value Set OID**	**Value Set Binding**	**Note**	
26	Administration Location Type	NHSNAdministrationLocationTypeCode	2.16.840.1.114222.4.11.3188	STATIC		
27	AntibioticSuscTest	NHSNAntibioticSuscTest	2.16.840.1.114222.4.11.7161	STATIC		
28	Anitmicrobial Agent AURP	NHSNAntimicrobialAgentAURPCode	2.16.840.1.114222.4.11.3360	DYNAMIC		

Introduction | AdministrationLocationType | AntimicrobialAgentAURP | AntibioticSuscTest | ASAClass | BSIE ...

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Null Flavor

- Expresses details about a lack of value
- Difference between antimicrobial ingredient not administered this reporting period vs. antimicrobial not recorded by the facilities information system

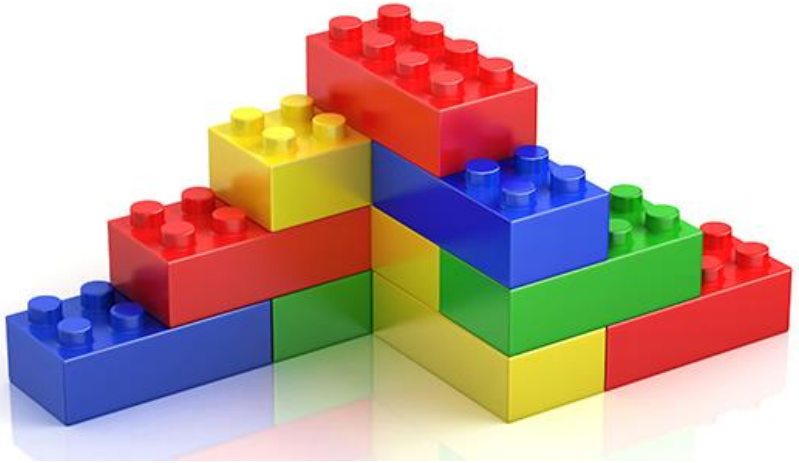
VALUE	MEANING
NI	No Information (default NULL)
OTH	It is not in the domain for the variable.
NINF	Negative infinite
PINF	Positive infinite
UNK	Unknown
ASKU	It was asked, but it is unknown
NASK	It was not asked
NAV	Temporarily not available. Can be known later.
TRC	Content is greater than zero but cannot be quantified.
MSK	The information exists but cannot be revealed based on business rules (policy, privacy, etc.)
NA	Not applicable

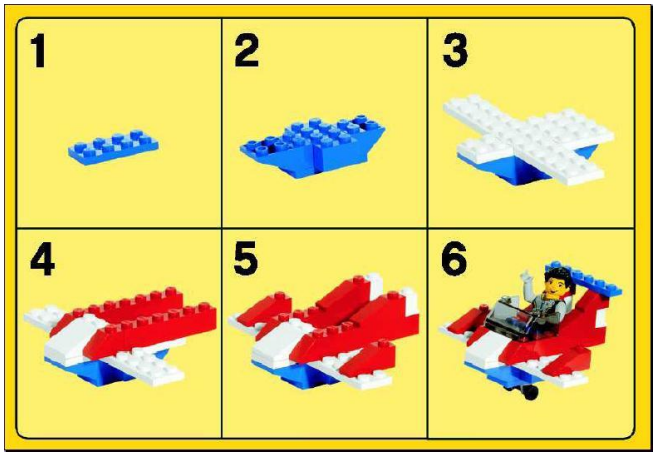
NHSN CDA Format

CDA TEMPLATES AND HAI REPORTS

Templates: The Lego Analogy

CDA



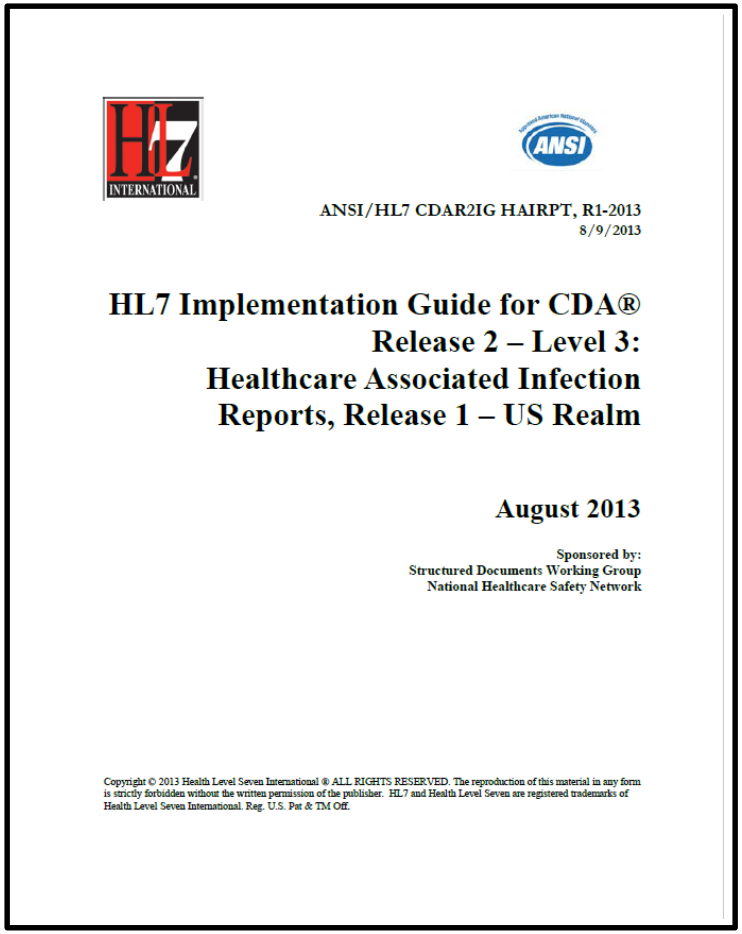


Templates

HAI Reports

The HL7 Implementation Guide for Healthcare Associated Infection Reports is a collection of documents for NHSN reporting

- Population Summary Reports
  - ARO Reporting
  - AUP Summary Report
  - ICU Summary Report
  - …
- Single Person Reports
  - HAI AUR Antimicrobial Resistance Option
  - HAI Bloodstream Infection Report
  - …



HL7 INTERNATIONAL

ANSI

ANSI/HL7 CDAR2IG HAIRPT, R1-2013
8/9/2013

HL7 Implementation Guide for CDA® Release 2 – Level 3: Healthcare Associated Infection Reports, Release 1 – US Realm

August 2013

Sponsored by:
Structured Documents Working Group
National Healthcare Safety Network

California Department of PublicHealth

Evolution of the HAI IG

- HAI Reporting has moved through several releases – most notably:
- Early Releases (2008 – 2013)
  - R1 -> R9
  - Incremental changes, draft standard
- First Normative Release (2013)
  - AU/AUR Reporting is Introduced
- Second Normative Release (2015)

Troubleshooting Scenario

Using the HAI IG

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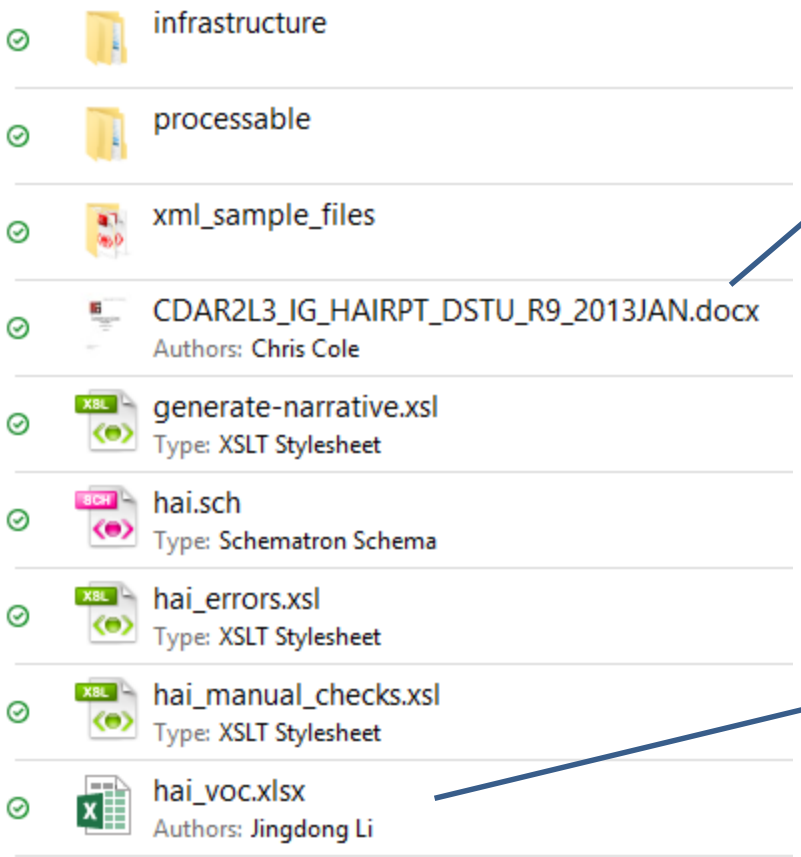
Materials



The NHSN HAI Implementation Guide

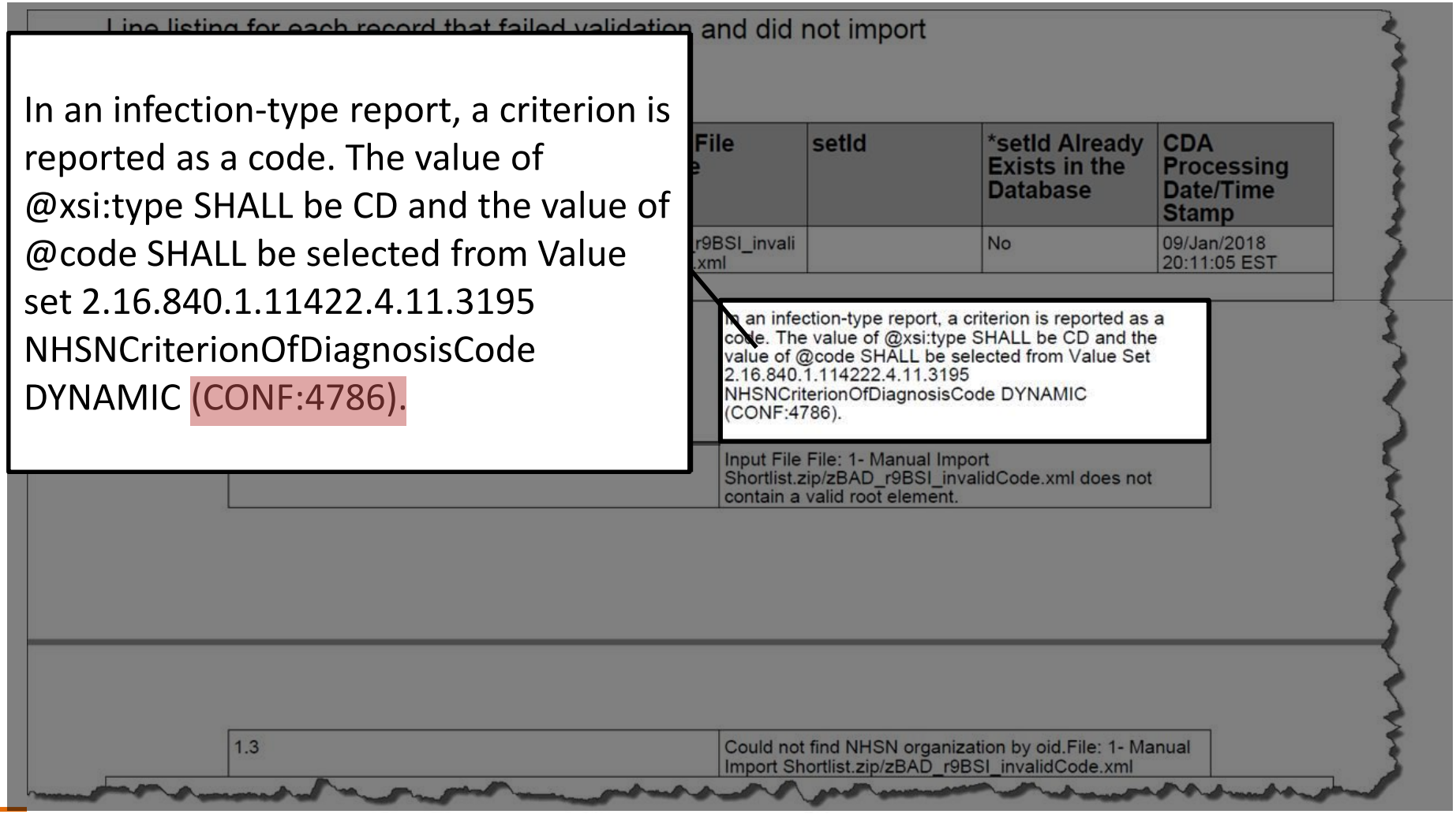
Source of truth for HAI value sets (download)

Troubleshooting Scenario

- The CDA zip file that was obtained from the vendor system contained some CDA files that were rejected by NHSN on import.
- Received an error output PDF file.

Output Walkthrough

In an infection-type report, a criterion is reported as a code. The value of @xsi:type SHALL be CD and the value of @code SHALL be selected from Value set 2.16.840.1.11422.4.11.3195 NHSNCriterionOfDiagnosisCode DYNAMIC (CONF:4786).



Output Walkthrough

- CONF: 4786

5. **SHALL** contain exactly one [1..1] **statusCode** (CONF:11338).
    a. This statusCode **SHALL** contain exactly one [1..1] **@code="completed"** Completed (CodeSystem: ActStatus 2.16.840.1.113883.5.14 **STATIC**) (CONF:2062).
6. **SHALL** contain exactly one [1..1] **value** (CONF:2063).
    a. In an infection-type report, a criterion is reported as a code. The value of @xsi:type **SHALL** be CD and the value of @code **SHALL** be selected from Value Set 2.16.840.1.114222.4.11.3195 NHSNCriterionOfDiagnosisCode **DYNAMIC** (CONF:4786).
    b. In an Evidence of Infection (Dialysis) Report, (CONF:10908).
        i. To record a criterion of diagnosis as a code, the value of @xsi:type **SHALL** be CD and the value of @code **SHALL** be selected from Value Set 2.16.840.1.114222.4.11.3195 NHSNCriterionOfDiagnosisCode **DYNAMIC** (CONF:10909).
        ii. To record a criterion not included in the NHSNCriterionOfDiagnosisCode value set, the value of @xsi:type **SHALL** be ST and a text value **SHALL** be present (CONF:10910).

Output Walkthrough

a. In an infection-type report, a criterion is reported as a code. The value of @xsi:type **SHALL** be CD and the value of @code **SHALL** be selected from Value Set 2.16.840.1.114222.4.11.3195 NHSNCriterionOfDiagnosisCode **DYNAMIC** (CONF:4786).

- The value in the report must be selected from the NHSNCriterionOfDiagnosisCode value set

Locate in HAI_VOC.xlsx

	A	B	C	D
22	http://www.wpc-edi.com/taxonor	NHSNClinicalSpecialtyCode	2.16.840.1.114222.4.11.3191	DYNAMIC
23				
24	**Index of Tabs / Value Sets -- Single-Value Bindings (SVBs) are listed at the end**			
25	**Tab Name**	**Value Set Name**	**Value Set OID**	**Value Set Binding**
26	Administration Location Type	NHSNAdministrationLocationTypeCode	2.16.840.1.114222.4.11.3188	STATIC
27	AntibioticSuscTest	NHSNAntibioticSuscTest	2.16.840.1.114222.4.11.7161	STATIC
28	Anitmicrobial Agent AURP	NHSNAntimicrobialAgentAURPCode	2.16.840.1.114222.4.11.3360	DYNAMIC
29	ASA Class	NHSNASAClassCode	2.16.840.1.113883.13.10	STATIC
30	BSI Evidence Type	NHSNBloodstreamInfectionEvidenceType	2.16.840.1.113883.13.7	DYNAMIC
31	Catheter Type	NHSNCatheterTypeCoce	2.16.840.1.114222.4.11.3185	STATIC
32	Certainty	NHSNCertaintyCode	2.16.840.1.114222.4.11.3387	STATIC
33	Closure Technique	NHSNClosureTechniqueCode	2.16.840.1.114222.4.11.6051	STATIC
34	Criterion of Diagnosis	NHSNCriteriaOfDiagnosisCode	2.16.840.1.114222.4.11.3195	DYNAMIC
35	Drug Susceptibility Finding	NHSNDrugSusceptibilityFindingCode	2.16.840.1.113883.13.13	STATIC
36	Drug Susceptibility Tests	NHSNDrugSusceptibilityTestsCode	2.16.840.1.113883.13.15	DYNAMIC
37	Eligibility	NHSNEligibilityCode	2.16.840.1.114222.4.11.3248	DYNAMIC
38	Encounter Type	NHSNEncounterTypeCode	2.16.840.1.113883.13.1	STATIC
39	EthnicityGroup	CDC Ethnicity Group	2.16.840.1.114222.4.11.837	STATIC
40	Healthcare Service Location	NHSNHealthcareServiceLocationCode	2.16.840.1.113883.13.19	DYNAMIC
41	Hip Replacement	NHSNHipReplacementCode	2.16.840.1.113883.13.3	STATIC
42	Imputability	NHSNImputabilityCode	2.16.840.1.114222.4.11.3388	STATIC
43	Infection Condition	NHSNInfectionConditioncode	2.16.840.1.114222.4.11.3196	DYNAMIC
44	Infection Risk Factors	NHSNInfectionRiskFactorsCode	2.16.840.1.113883.13.6	STATIC
45	Infection Type	NHSNInfectionTypeCode	2.16.840.1.113883.13.20	DYNAMIC
46	Insertion Site	NHSNInsertionSiteCode	2.16.840.1.114222.4.11.3180	DYNAMIC
47	Knee Replacement	NHSNKneeReplacementCode	2.16.840.1.113883.13.4	STATIC
48	Occasion of Detection	NHSNOccassionOfDetectionCode	2.16.840.1.113883.13.12	DYNAMIC
49	Organism AST	NHSNOrganismASTCode	2.16.840.1.114222.4.11.3283	DYNAMIC
50	Outcome Type	NSHNOutcomeTypeCode	2.16.840.1.114222.4.11.3386	STATIC

Introduction | AdministrationLocationType | AntimicrobialAgentAURP | AntibioticSuscTest | ASAClass | BSIEvide

VALIDATION

Validation

Implementation Guide	
Is it CDA? Tested by Schema	Is it a Car? (4 wheels, seats, headlights, steering)
Is it HAI? Tested by Schematron	Is it a Ford Mustang? (powerful engine, muscular body, big wheels)

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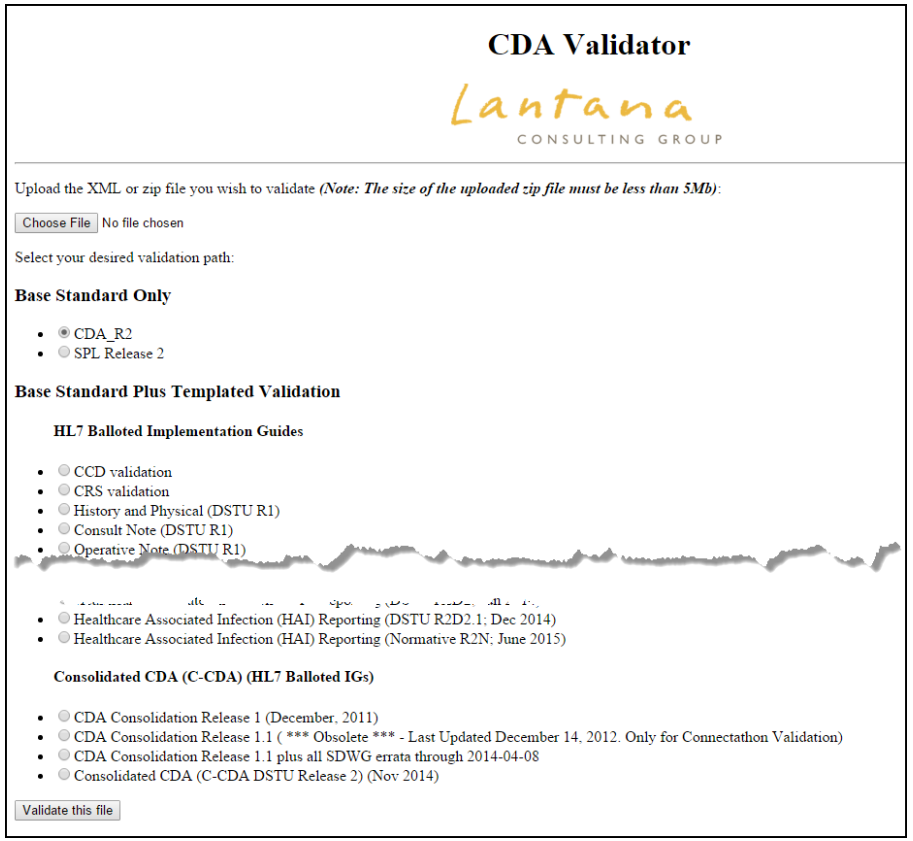
Validation: Sample Implementation

- Online CDA Validator
  - Implements a basic multi-stage validation pipeline
  - Freely available
  - Validation for most SDWG-developed IGs
    - CDA Validator website



California Department of PublicHealth

Validation vs. Verification

Validation:

Ensure the report format and structure is correct.

Verification:

Ensure the information found within the report is accurate.

RENDERING

NHSN Transformation and Stylesheet

- Developed by NHSN
- Creates CDA Narrative from machine readable entries
    - Recreates the forms they are representing

Example

NHSN National Healthcare Safety Network

Denominator for Antimicrobial Resistance Option (ARO)

Document Id	20202201 (2.16.840.1.113883.3.117.1.1.5.2.1.1.2)
Document Created	July 1, 2008
Case	Summary data reporting antimicrobial resistance patterns at a facility from June 1, 2008 to June 30, 2008
Author	aSoftwareID (2.16.840.1.113883.3.117.1.1.5.2.1.1)
Document maintained by	2.16.840.1.114222.4.3.2.11
Encounter Location	2.111.111.111.10709
Legal authenticator	aLegalAuthenticatorID (2.16.840.1.113883.3.117.1.1.5.1.1.2) signed date/time: July 1, 2008

Summary Data

Facility Location	FACWIDEIN All Inpatient Locations [FACWIDEIN]
Number of patient days	235 d
Admission count	46
Number of blood cultures performed	24

Antimicrobial Use, Pharmacy Option (AUP) Summary Report.html

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Overall Agenda

- Introductions
- NHSN
- AUR Reporting
- Implementing AU Reporting
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- Additional Resources

NHSN SETUP

Adding New NHSN Users

1. **Add Users**: Select “Users” and then “Add” on the home page. Each user will need an assigned ID and email.
2. **Assign User Rights:** Assign Rights within the NHSN System

Rights	Patient Safety	Healthcare Personnel Safety	Biovigilance	
Administrator	☐	☐	☐	
All Rights	☐	☐	☐	
Analyze Data	☐	☐	☐	
Add, Edit, Delete	☐	☐	☐	
View Data	☐	☐	☐	
Customize Rights	☑	☐	☐	Advanced

Minimum Rights for NHSN AUR

Patient		View	Add,Edit,Delete	All Rights
Patient	○With Identifiers ○Without Identifiers	☐	☐	☐
Event		**View**	**Add,Edit,Delete**	**All Rights**
BJ - Bone and Joint Infection		☐	☐	☐
BSI - Bloodstream Infection		☐	☐	☐
CNS - Central Nervous System		☐	☐	☐
CVS - Cardiovascular		☐	☐	☐
EENT - Eye, Ear, Nose and Throat		☐	☐	☐
GI - Gastrointestinal		☐	☐	☐
LRI - Lower Respiratory Infection		☐	☐	☐
PNEU - Pneumonia		☐	☐	☐
REPR - Reproductive Tract		☐	☐	☐
SSI - Surgical Site Infection		☐	☐	☐
SST - Skin and Soft Tissue		☐	☐	☐
SYS - Systemic		☐	☐	☐
UTI - Urinary Tract Infection		☐	☐	☐
CUSPS - Custom PS Event		☐	☐	☐
CLIP - Central Line Insertion Practices		☐	☐	☐
LABID - Laboratory-identified MDRO or CDI Event		☐	☐	☐
VAE - Ventilator-Associated Event		☐	☐	☐
Denominator Data: Procedure/Summary		**View**	**Add,Edit,Delete**	**All Rights**
AUR - Antimicrobial Use and Resistance		☑	☑	☑
PROC - Procedures		☐	☐	☐
PROC - Custom Procedures		☐	☐	☐
ICU - Device Associated - Intensive Care Unit / Other Locations		☐	☐	☐
NICU - Device Associated - Neonatal Intensive Care Unit		☐	☐	☐
SCA - Device Associated - SCA/ONC		☐	☐	☐
MDRO - MDRO and CDI Prevention Process and Outcome Measures Monthly Monitoring		☐	☐	☐
Plan		**View**	**Add,Edit**	**All Rights**
Patient Safety Monthly Reporting Plan		☑	☑	☐
Annual Survey		**View**	**Add,Edit**	**All Rights**
Patient Safety Annual Facility Survey		☐	☐	☐
Analysis				
Patient Safety Data Analysis		☑		
Antimicrobial Use and Resistance Analysis		☑		

Obtaining a SAMS Card

- Secure Access Management Services (SAMS) is a federal information technology (IT) system
- Provides authorized personnel secure access to non-public CDC applications
- SAMS provides healthcare facilities with secure access to NHSN

Obtaining a SAMS Card

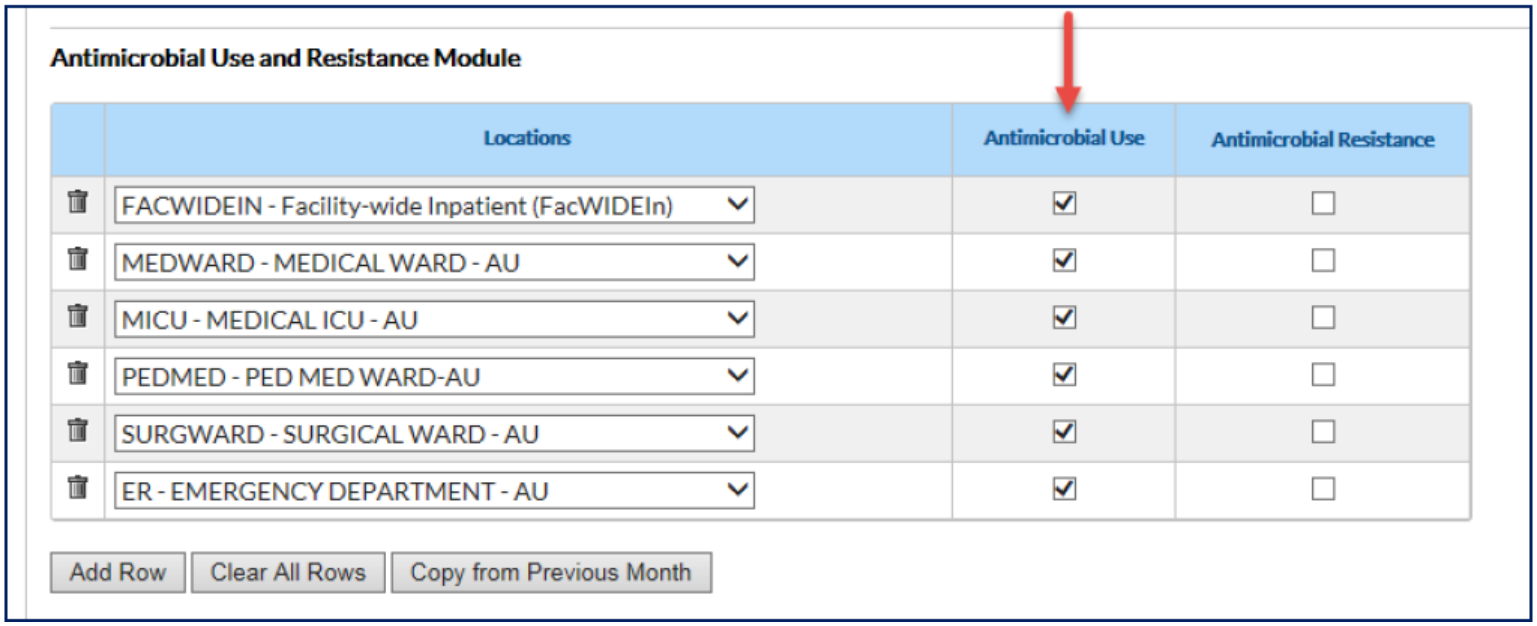
	Step	Task	Time
STEP 1 Receive an Invitation to register for SAMS	1a	Log in to the SAMS application using assigned username (i.e., your current email address)	2 min
	1b	Accept the SAMS Rules of Behavior	5 min
	1c	Complete the SAMS Registration Form	5 min
STEP 2 **Complete and submit identity verification documents**	2a	Receive SAMS registration confirmation email, print the attached verification form	5 min
	2b	Take the Identity Verification Form to a notary public for endorsement	varies
	2c	Mail or fax the endorsement verification forms and supporting documents back to CDC	varies

Obtaining a SAMS Card

	Step	Task	Time
STEP 3 Access NHSN using SAMS credentials	3a	Receive confirmation from CDC that forms were received (correspondence via email and US Postal Service)	varies
	3b	Receive welcome emails from SAMS and the NHSN Program	varies
	3c	Receive SAMS grid card delivered to your home address	varies
	3d	• Access NHSN: If you are a newly enrolling facility, the facility admin will require access to NHSN Enrollment • If you are any other NHSN user, you will access NHSN Reporting	2 min

Setting Up A Monthly Reporting Plan

- Locations for monthly recording plan must be specified prior to upload
- Same monthly reporting plan used for HAI reporting



Tying it all together

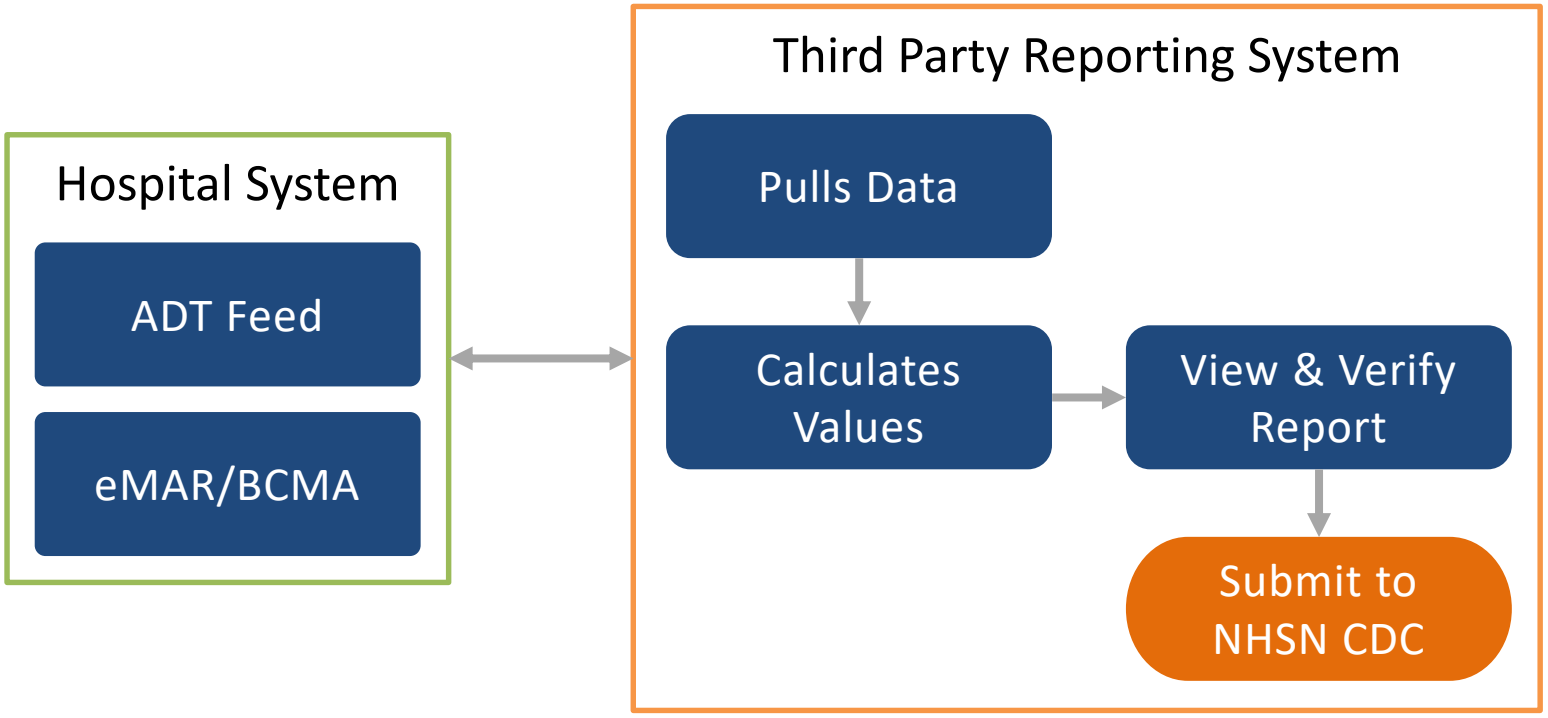
SOLUTIONS, WORKFLOWS, AND WALKTHROUGH

Software Solutions

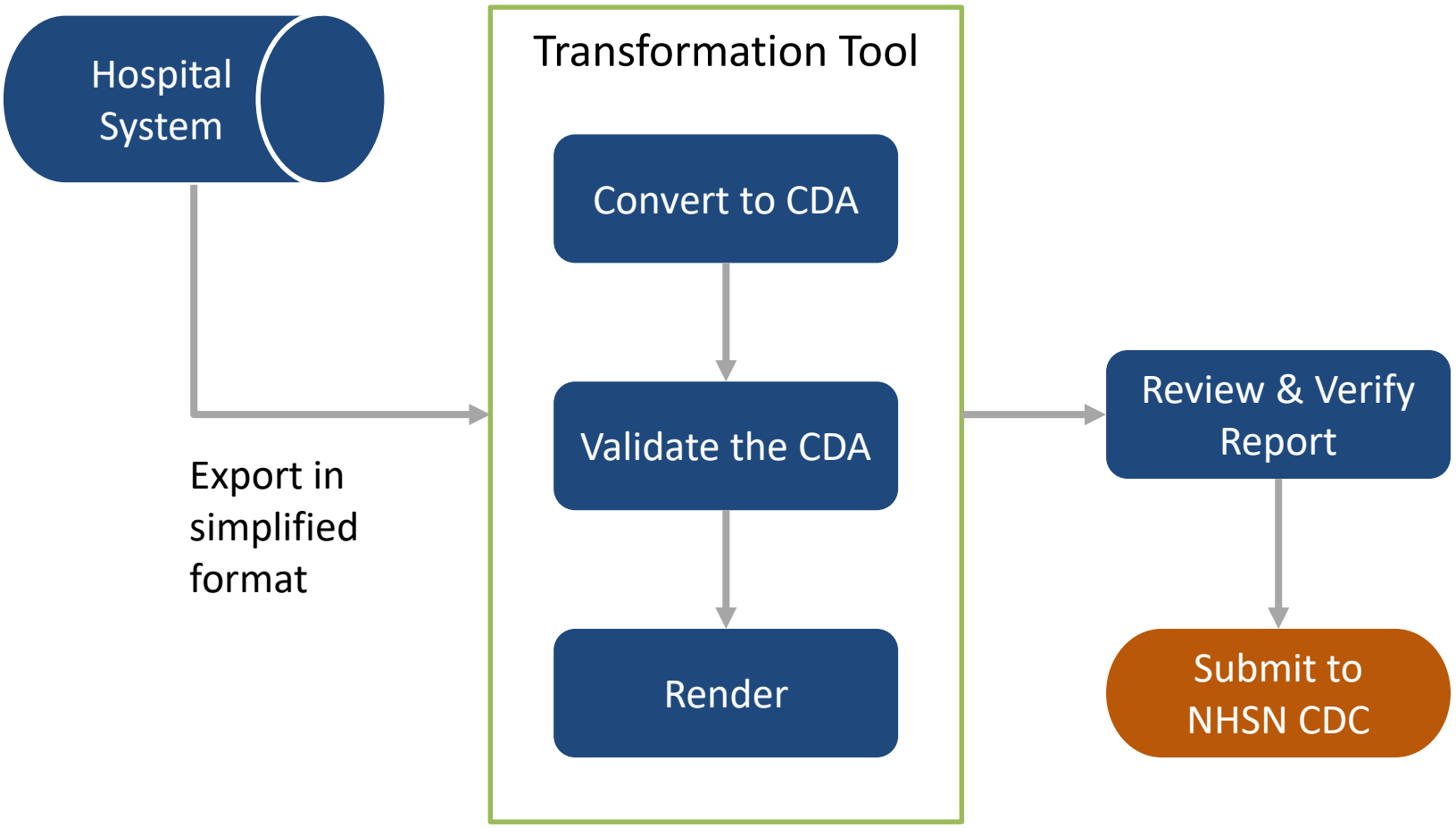
	Actively Reporting Antimicrobial Use	Actively Reporting Antimicrobial Resistance
Asolva, Inc.	Yes	
Atlas Development Corporation		
MedMinded™ services from BD	Yes	
Cerner	Yes	Yes
Epic Systems Corporation	Yes	Yes
Baxter Healthcare/ICNet	Yes	
Ilum Health Solutions	Yes	
Bluebird IMS Incoporated	Yes	Yes
Midas Healthy Analytics Solutions—Conduent		
RL Solutions	Yes	
Sentri7 by Wolters Kluwer	Yes	
TheraDoc—Premier	Yes	Yes
Truven Health Analytics		
QC Pathfinder—Vecna Technologies		
VigiLanz Corporation	Yes	Yes

Source: Society of Infectious Diseases Pharmacists

Workflow with 3rd Party Solution



Workflow with In-house Solution



EXAMPLE IN-HOUSE SOLUTION

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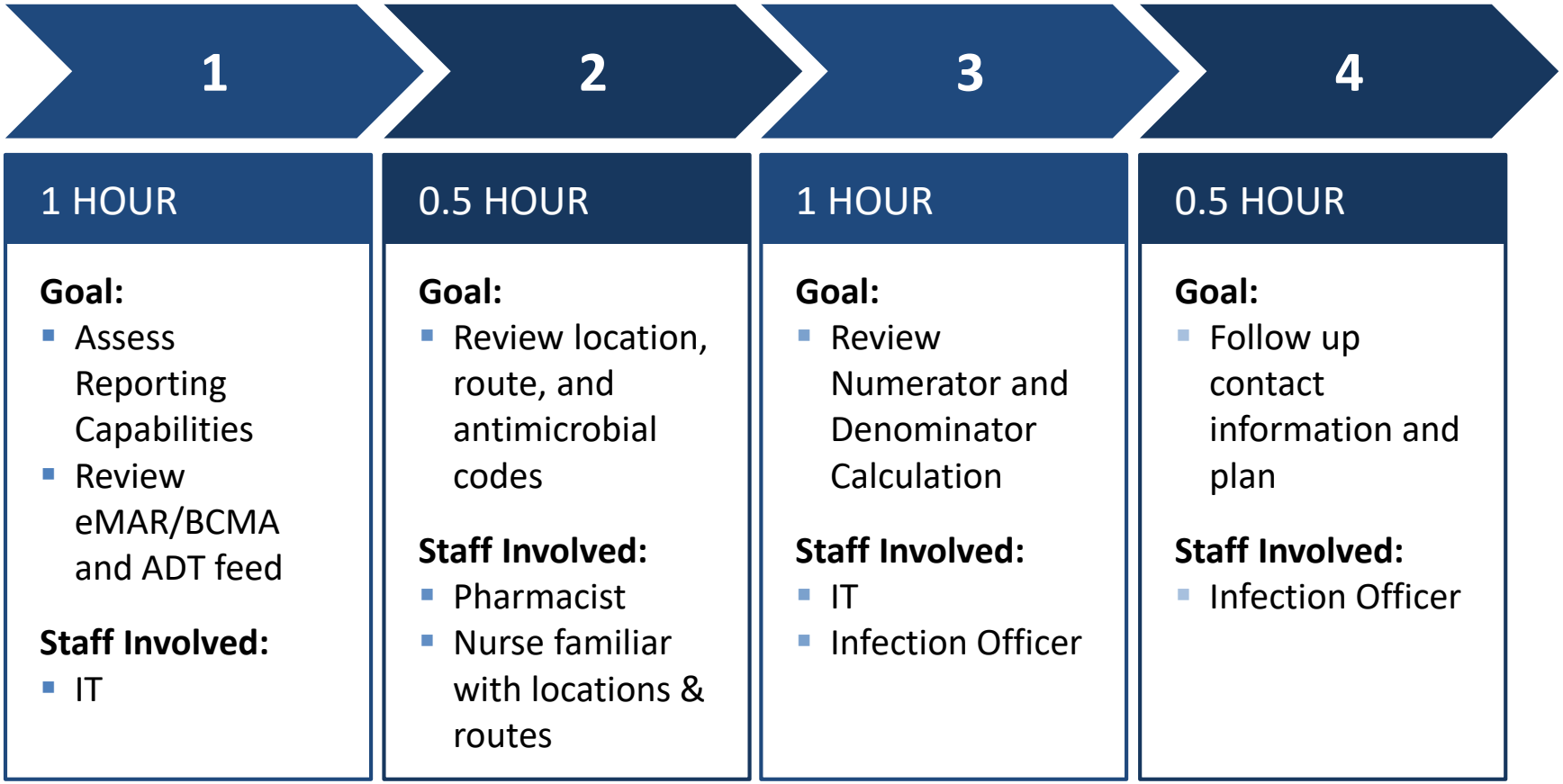
Our Support

- Curated AU Implementation Plan
- Transformation tool for exported AU reports
- Learning collaborative to connect with other organizations

Preview of Onsite Assessment Activities



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Additional AU Reporting Resources

AUR TOOLKIT

Centers for Disease Control and Prevention website

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Important Links

- National Healthcare Safety Network (NHSN):
  http://www.cdc.gov/nhsn/

- Surveillance for Antimicrobial Use (AU) and Antimicrobial Resistance (AR) Options:
  http://www.cdc.gov/nhsn/acute-care-hospital/aur/index.html
  Direct link to AUR Module protocol:
  https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf
  NHSN CDA Submission Support Portal (CSSP)
  https://www.cdc.gov/nhsn/cdaportal/index.html

- HL7 Implementation Guide for CDA® Release 2: Healthcare Associated Infection (HAI) Reports, Release 1 – US Realm , August 2013
  http://www.hl7.org/implement/standards/product_brief.cfm?product_id=20

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