



Georgia Department of Public Health

Road to NHSN Reporting: Antibiotic Use and Resistance Modules

Presentation to: Antimicrobial Stewardship Pharmacists

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Learning Objectives

- Describe the purpose and benefits of reporting to the National Healthcare Safety Network's (NHSN) Antimicrobial Use and Resistance (AUR) module
- Discuss information technology requirements for NHSN AUR module reporting
- Recall the general steps involved in the NHSN AUR module reporting process
- Identify best practices associated with the NHSN AUR module reporting process

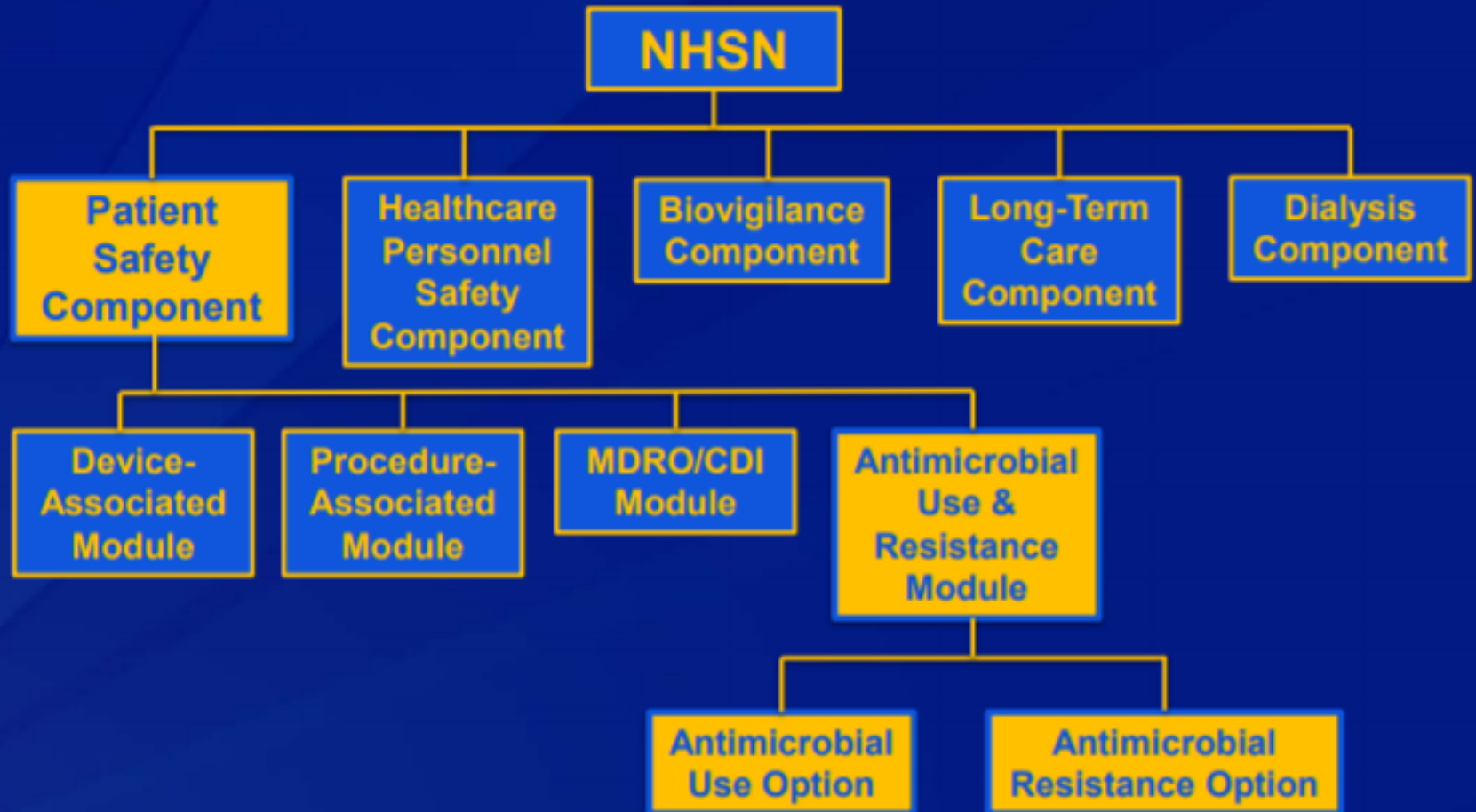
Background

- **National Healthcare Safety Network (NHSN)**
 - Centers for Disease Control and Prevention's (CDC) internet-based surveillance system
 - Collects mandated and voluntarily reported data on:
 - Healthcare-associated infections (HAIs)
 - Antimicrobial use and resistance
 - Healthcare personnel influenza vaccination
 - Blood safety

Antimicrobial Use and Resistance (AUR) Module

- Facilitate risk-adjusted inter- and intra-facility benchmarking of antimicrobial usage and resistance
- Reporting into module **not** required by Centers of Medicare and Medicaid (CMS)
- Reporting has been identified as one option for eligible hospitals to meet the Public Health Registry reporting under stage 3 of CMS Meaningful Use (MU3) Program

NHSN Structure



<https://www.cdc.gov/nhsn/acute-care-hospital/aur/index.html>

Antimicrobial Use (AU) Option

- Released in 2011
- Purpose:
 - Provide a mechanism for facilities to report and analyze antimicrobial usage as part of antimicrobial stewardship efforts at their facility
 - Allow for risk-adjusted comparison of antimicrobial use to a national aggregate

AU Option

- **Requirements for participation:**
 - Enrollment in NHSN Patient Safety Component
 - Must be an acute care hospital, critical access hospital, oncology hospital, long-term acute care hospital or inpatient rehabilitation facility
 - Must be able to collect numerator and denominator data electronically
 - Antimicrobial days for numerator
 - Days present for denominator
 - Must be able to upload electronically collected data using the required clinical document architecture (CDA)
 - Health Level 7 (HL7)

Technical Requirements for AU

- Electronic Medication Administration Record (eMAR) or Bar Coding Medication Administration (BCMA) to collect numerator data
- Admission, discharge, transfer (ADT) system to collect denominator data
- Methods to create a CDA file
 - Vendor approach
 - Electronic Health Record (eHR)
 - Third-party data mining software
 - Participating vendors: <http://www.sidp.org/aurvendors>
 - Homegrown approach
 - Information technology (IT) department

AU Data Elements

- Monthly, summary-level data
- Numerator – antimicrobial days (days of therapy)
 - Includes 89 antimicrobials (antibacterials, antifungals and anti-influenza agents)
 - Sub-stratified by route of administration
 - Intravenous (IV)
 - Intramuscular (IM)
 - Digestive (PO or PR)
 - Respiratory (inhaled)
- Denominators:
 - Days present = number of days spent in a specific unit or facility
 - Not the same as patient days
 - Admissions = number of patients admitted to the facility

AU Data Extraction

- **Steps involved:**
 - eMAR/BCMA captures drug administration
 - Vendor or “homegrown” system extracts and aggregates data elements
 - Aggregated data must be packaged into CDA files
 - One CDA file is created per location
 - Each single CDA file contains numerator and denominator for that given location
 - All CDA files are uploaded within a single zip file

AU Option Output

- Basic analysis reports:
 - Line lists – generates a list of each antimicrobial separated by location
 - Also shows total antimicrobial days and days present
 - Rate tables – generates a rate of utilization per 1,000 days present for each antimicrobial selected
 - Can also be created for individual locations
 - Bar and Pie Charts – shows proportion of antimicrobial days per antimicrobial class
 - Can also be created for individual locations

AU Option Output

- **Standardized Antimicrobial Administration Ratio (SAAR)**
 - Observed-to-expected/predicted (O-to-E) ratio
 - Numerator = observed days of therapy reported for a specific category of antimicrobial agent
 - Denominator = days of therapy predicted for a healthcare facility's use of a specific category of antimicrobial agent
 - Predicted value calculated by applying negative binomial regression modeling to nationally aggregated AU data
 - SAAR values can serve as a starting point for medication use evaluations or other antimicrobial stewardship interventions

Antimicrobial Resistance (AR) Option

- Released in 2014
- Purpose:
 - Facilitate evaluation of antimicrobial resistance data using a standardized approach
 - Provide facilities with improved awareness of a variety of AR issues to aid in clinical decision making and prioritizing transmission prevention efforts

AR Option

- Requirements for participation:
 - Enrollment in NHSN Patient Safety Component
 - Must be an acute care hospitals, critical access hospital, oncology hospital, long-term acute care hospital or inpatient rehabilitation facility
 - Must be able to collect numerator and denominator data electronically
 - Must be able to upload electronically collected data using the required clinical document architecture (CDA)
 - Health Level 7 (HL7)

Technical Requirements for AR

- Electronic Laboratory Information System (LIS)
- Admission Discharge Transfer (ADT) System
- If neither of the above in place, must have electronic access to required data elements

AR Data Elements

- Numerator – patient-level susceptibility results for specific organisms
 - Date of birth, gender, date admitted to facility, and location
 - Specimen collection date, specimen source
 - Blood, cerebral spinal fluid (CSF), urine, lower respiratory
 - Organism and antimicrobial susceptibility data for each antimicrobial required for the isolated organism/specimen type
 - Minimum inhibitory concentration (MICs)
 - Final laboratory interpretation (susceptible, resistant etc.)
- Denominator – patient days and admission
 - Facility wide only

Organism – Agent Combinations

Organism	Specimen Type	Antimicrobial Agents
<i>Staphylococcus aureus</i>	Blood, Urine, Lower Respiratory, CSF	Azithromycin Cefoxitin Chloramphenicol Ciprofloxacin Clarithromycin Clindamycin Daptomycin Doxycycline Erythromycin Gentamicin Levofloxacin Linezolid Minocycline Moxifloxacin Ofloxacin Oxacillin or Nafcillin ^b Penicillin ^a Quinupristin-dalfoprisin Rifampin Telithromycin Tetracycline Trimethoprim-sulfamethoxazole Vancomycin
	Additional Agents for Urine	Lomefloxacin Nitrofurantoin Norfloxacin Sulfisoxazole Trimethoprim

- Selected antimicrobial agents must be reported for each of the organisms per specimen type
- Full list of combinations can be found in NHSN AUR Module Protocol:
<https://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf>

AR Option Event Reporting

- Each eligible organism isolated from an invasive source, per patient, per 14 day period
 - Blood or CSF
- First eligible organism isolated from a non-invasive culture source, per patient, per month
 - Lower respiratory or urine

Monthly AR Data Submission

- Upload data within 30 days following completion of the month
- One CDA file per organism and one CDA file for denominator
 - Example: for 50 organisms in a month, would have 50 separate CDA files for numerator and 1 CDA file for the denominator
- All CDA files are combined in a single zip file to upload

Importing CDA Files

- Manual upload
- Automatic upload
 - Third-party vendor
 - Homegrown solution
 - Done through Direct CDA Automation

Logged into DHQP Memorial Hospital (ID 10000) as ASCHNEIDER.
Facility DHQP Memorial Hospital (ID 10000) is following the PS component.

Direct CDA Automation Sign-up

CDA Automation will allow your facility to send CDA's to NHSN via your Health Information Service Provider. Please work with your CDA IT staff or vendor to obtain the information to complete the enrollment fields and enrollment process.

Facility ID: Object Identifier:

Direct address from which your facility will be sending data.*:

(HISP) Health Information Service Provider name*:

HISP-Technical Point of Contact email*:

Facility-Technical Point of Contact email*:

Status:

Remove Direct CDA Automation:

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AR Option Output

- **Line listing**
 - Can create a list of AR events by pathogen
 - Can be modified to show additional variables
- **Facility-wide antibiogram**



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Road to NHSN Reporting: Antimicrobial Use and Resistance Modules

Zina Gugkaeva, PharmD

Maury Regional Medical Center (MRMC)

- 255 bed facility
- 200+ physicians
- 18,000+ admissions per year
- Flagship for a group of facilities including Marshall Medical Center in Lewisburg, Wayne Medical Center in Waynesboro, Lewis Health Center in Hohenwald, Maury Regional Spring Hill and Spring Hill Health Center in Spring Hill



Maury Regional Medical Center (MRMC)

- MRMC Antibiotic Stewardship Program (ASP) established 9/2014
- Antibiotic Stewardship Team
 - Leader - Infectious Diseases PharmD
 - MD champions –Infectious Diseases physician, neonatology MD, General Surgeon
 - Infection Control
- ASP is based on CDC/ Joint Commission recommendations
- Clinical surveillance software

NHSN Reporting

- Antibiotic Use reporting since
- Antibiotic Resistance reporting since
- Why report?
 1. Powerful Antibiotic Stewardship tool
 2. Antibiotic Stewardship progress monitoring and reporting is required by Joint Commission
 3. Will eventually become mandatory anyway

Stakeholders

- Hospital leadership
- Clinical surveillance software vendor (optional)
- IT Pharmacist/ Hospital IT team
- ID pharmacist (or person who will be responsible to AUR submission)
- Infection control

Welcome to NHSN!

- Add new users (ask Infection Control)
- Register with the Centers for Disease Control and Prevention's (CDC) Secure Access Management System (SAMS) and submit documentation for identity proofing
- Receive SAMS card



NHSN Reporting

- Hospital IT to ensure administration (eMAR) data is transmitted to the vendor
- The vendor
 - Utilizes eMAR data to automatically prepare an extract of AU data that aligns with NHSN's current criteria
 - Provides NHSN Direct AU import services enabling hospital to submit that data to NHSN
- AUR data is submitted monthly
- The pharmacist in charge of AU submissions has the option to review the data before submitting into NHSN

Timeline



Benefits of Reporting

- Monitoring/ reporting Antibiotic Stewardship progress

Antimicrobials used in adult ICUs and wards

location	summaryYr	locCDC	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR
1CCU	2015	IN:ACUTE:CC:MS	3554	1680.243	1870	2.115
1CCU	2016	IN:ACUTE:CC:MS	9323	7201.684	8015	1.295
3MED	2015	IN:ACUTE:WARD:M	5916	4413.833	8205	1.340
3MED	2016	IN:ACUTE:WARD:M	14591	11009.033	20465	1.325
6SURG	2015	IN:ACUTE:WARD:S	1839	1299.863	2480	1.415
6SURG	2016	IN:ACUTE:WARD:S	4763	3820.968	7290	1.247


Benefits of Reporting

- Monitoring/ reporting Antibiotic Stewardship progress

Antimicrobial Utilization Rates NICU. Rate per 1,000 Day Present

summaryYQ	antimicrobialDays	numDaysPresent	RateDaysPresent
2015Q3	84	237	354.43
2015Q4	132	682	193.55
2016Q1	144	518	277.99
2016Q2	206	442	486.06
2016Q3	164	423	387.71
2016Q4	71	472	150.42
2017Q1	68	494	137.65
2017Q2	89	537	165.74

Neonatal Sepsis Protocol Implemented



Benefits of Reporting

- Identify areas for improvement

Antibiotics used for Community onset infections in ICU

location	summaryYr	locCDC	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR
1CCU	2015	IN:ACUTE:CC:MS	482	363.832	1870	1.325
1CCU	2016	IN:ACUTE:CC:MS	1096	1559.421	8015	0.703

Antibiotics used for multi-drug resistant infections in ICU

location	summaryYr	locCDC	antimicrobialDays	numAUDaysPredicted	numDaysPresent	SAAR
1CCU	2015	IN:ACUTE:CC:MS	1337	533.626	1870	2.506
1CCU	2016	IN:ACUTE:CC:MS	3681	2287.170	8015	1.801

Benefits of Reporting

National Healthcare Safety Network

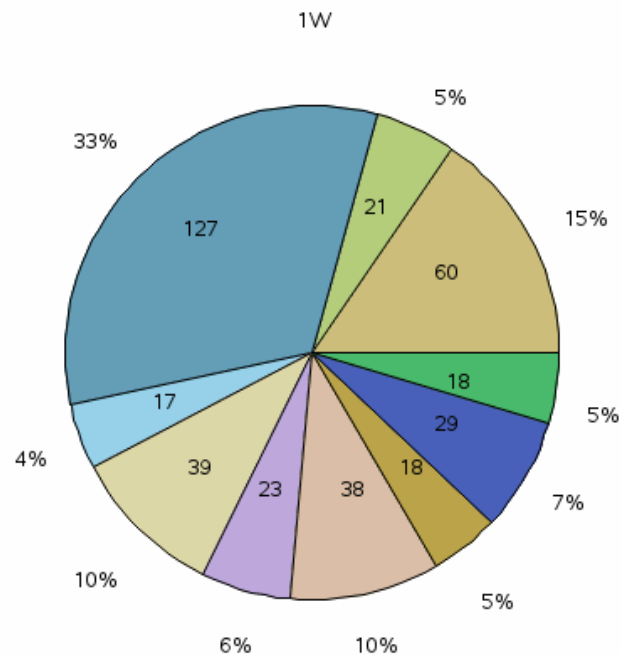
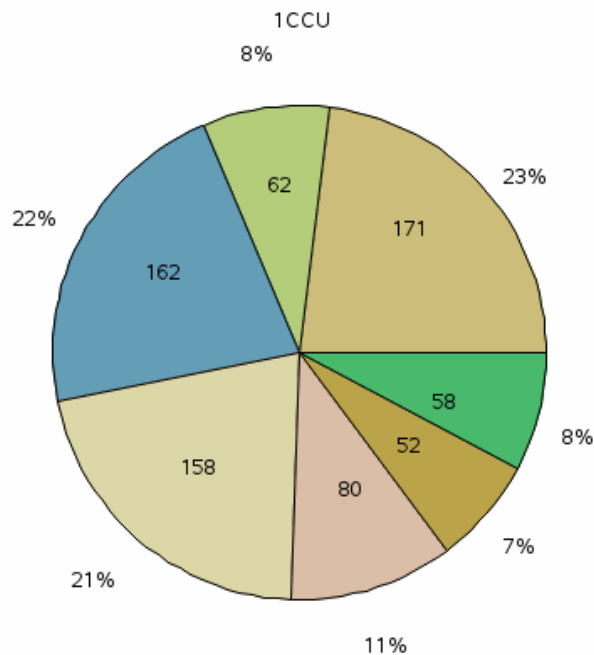
Pie Chart - Current Month - Proportion of Antimicrobial Days per Antibacterial Class by Location

As of: August 21, 2017 at 7:34 PM

Date Range: All SUMMARYAU1MONTH

Stratified by Location

summaryYM=2017M06



Lessons Learned

- What we learned:
 - Patience! Takes longer that you may expect
 - Multiple re-submissions until all errors are fixed
 - If planning moving units/ reassigning areas of the hospital best to do all changes before starting this project
 - The website is not user-friendly
 - E-mail help/ assistance with NHSN nhsn@cdc.gov

Questions? Comments?



Road to NHSN Reporting: Antimicrobial Use and Resistance Modules

Brooke Stayer, PharmD BCPS

Holston Valley Medical Center

- Located in Kingsport, TN
- Part of Wellmont Health System
- 505-bed facility (usual census 320)
- Community teaching hospital
- Level I Trauma Center
- 450



Antimicrobial Stewardship at HVMC

- Developed pharmacy-driven antimicrobial stewardship (AS) program in 2011
- Formed multidisciplinary AS committee in 2013
- Adopted EPIC EHR in 2014
- Began reporting AU to the state of TN in 2014
- Began looking into NHSN reporting in late 2014/early 2015

NHSN Experience

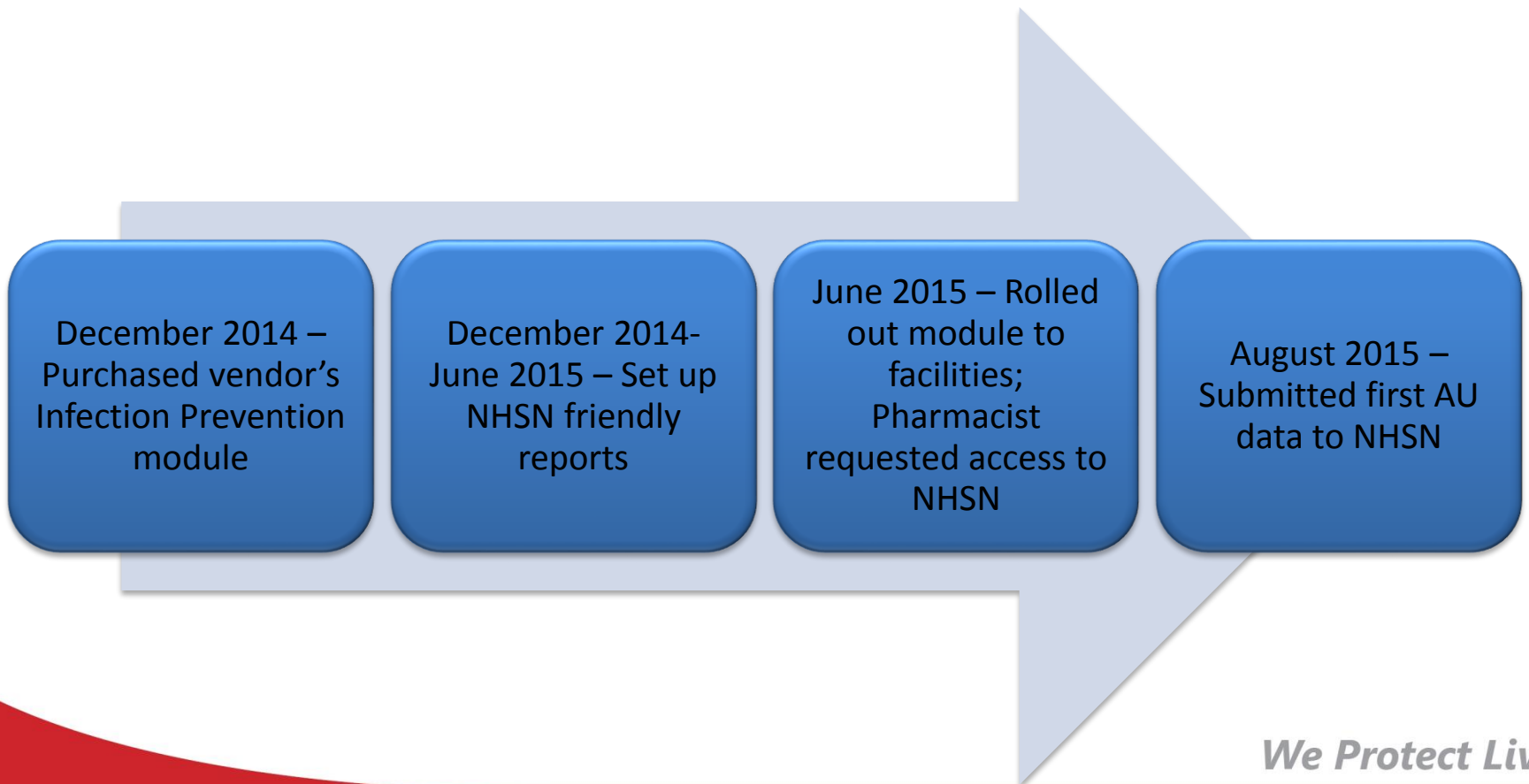
- Motivating factors:
 1. Letter to the President/National Action Plan for Combating Antibiotic-Resistant Bacteria released late 2014/early 2015
 2. TN Hospital Association/TN Pharmacist Coalition encouragement
- Process initiation: pharmacy leadership
- Process: vendor assisted

Stakeholders

- Pharmacy
- Microbiology Lab
- Infection prevention
- IT department
- Vendor

NHSN Experience

- Timeline:



NHSN Reporting

- Initial setup/validation
 - Vendor/clinical informatics pharmacist
- Monthly process
 - AS pharmacist
 1. Run reports in EPIC
 2. Export reports
 3. Log-in to NHSN via SAMS card
 4. Import and submit reports to NHSN
 5. Save successful submission report

Reciprocity

- Could use AU reports to compare usage by location and trend over time but currently use EHR reports
 - Used reports to optimize surgical prophylaxis
 - Used reports to add restrictions/criteria for use for certain antimicrobials
- Haven't identified value in SAAR report yet

Lessons Learned

- Reach out to vendor for options
 - May already have process in place that can be adopted
- Reach out to CDC with technical issues
 - Can work with IT to troubleshoot submission errors
- Unit reports are tricky
 - May need to work with Infection Control to ensure units in EHR exactly match units in NHSN

QUESTIONS?