NHSN Antimicrobial Use and Resistance (AUR) Module

September 2014
OVERVIEW OF NHSN
Purposes of NHSN

- NHSN is a secure, Internet-based surveillance system managed by the CDC’s Division of Healthcare Quality Promotion (DHQP) that is used to:
  - Collect mandated and voluntarily reported data on:
    - Healthcare-associated infections (HAIs)
    - Antimicrobial use and resistance
    - Healthcare personnel influenza vaccination
    - Blood safety
  - Analyze and report collected data to permit recognition of trends
  - Provide facilities with data that can be used for inter-facility comparisons and local quality improvement activities
Purposes of NHSN

- Enable healthcare facilities to report healthcare-associated infections (HAI) and prevention practice adherence data via NHSN to fulfill CMS’s quality reporting program requirements, state mandate reporting requirements, or collaborative/initiative requirements
  - Over 13,000 healthcare facilities enrolled in NHSN
    - Acute care hospitals (Gen, ONC, CAH)
    - Long term acute care hospitals
    - Inpatient rehabilitation facilities
    - Dialysis facilities
    - Ambulatory surgical centers
    - Long term care facilities (NHs/SNFs)
ANTIMICROBIAL USE OPTION
Antimicrobial Use 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
Antimicrobial Use Option

**Who can participate:**

- General acute care hospitals (ACH), long-term acute care hospitals (LTAC/LTCH), inpatient rehabilitation facilities (IRF), oncology hospitals, critical access hospitals (CAH) enrolled in NHSN with:
  - Electronic Medication Administration Record (eMAR) or Bar Coding Medication Administration (BCMA) systems
    - No manual entry allowed
  - Ability to collect and package data using HL7 standardized format: [Clinical Document Architecture](#)
    - Participating 3rd party vendors: [http://www.sidp.org/aurvendors](http://www.sidp.org/aurvendors)
    - “Homegrown” vendors
Antimicrobial Use Option

What data are collected:

- Monthly summary-level data gathered by location-specific and facility-wide inpatient usage
  - All inpatient locations & 3 outpatient locations (ED, pediatric ED, 24 hour observation)
- Numerator: Antimicrobial days (days of therapy)
  - 82 antimicrobials collected – includes antibacterial, antifungal, and anti-influenza agents
    - Agents are sub-stratified by route of administration: intravenous (IV), intramuscular (IM), digestive (oral), and respiratory (inhaled)
- Denominators:
  - Days Present - number of days spent in specific unit or facility
  - Admissions - number of patients admitted to the facility (Facility-wide calculation only)
### AU Option – NHSN Analysis Output Options

#### Antimicrobial Use and Resistance Module
- Antimicrobial Use Data
  - CDC Defined Output
    - Line Listing - Most Recent Month of AU Data for ...more
    - Line Listing - Most Recent Month of AU Data by L...more
    - Line Listing - All Submitted AU Data for FACWIDEIN
    - Line Listing - All Submitted AU Data by Location
    - Rate Table - Most Recent Month of AU Data - Anti...more
    - Rate Table - All Submitted AU Data - Antimicrobi...more
    - Rate Table - Most Recent Month of AU Data - Anti...more
    - Rate Table - All Submitted AU Data - Antimicrobi...more
    - Pie Chart - Most Recent Month of AU Data by Anti...more
    - Pie Chart - All AU Data by Antibacterial Class a...more
    - Pie Chart - Most Recent Month of AU Data by Anti...more
    - Pie Chart - All AU Data by Antifungal Class and ...more
    - Pie Chart - Most Recent Month of AU Data by Anti...more
    - Pie Chart - All AU Data by Anti-influenza Class ...more
    - Bar Chart - Most Recent Month of AU Data by Anti...more
    - Bar Chart - All AU Data by Antibacterial Class a...more
    - Bar Chart - Most Recent Month of AU Data by Anti...more
    - Bar Chart - All AU Data by Antifungal Class and ...more
    - Bar Chart - Most Recent Month of AU Data by Anti...more
    - Bar Chart - All AU Data by Anti-influenza Class ...more

- **Basic analysis output options available**
  - Line lists
  - Rate tables
  - Pie charts
  - Bar charts
Sample line list of the most recent month of AU data by location

- Generates a list of each antimicrobial separated by location
- Shows total antimicrobial days, days present and sub-stratification of routes of administration for each antimicrobial

*Data for example only*
Sample rate table for all submitted AU data by location

- Generates a rate of utilization per 1,000 days present for each antimicrobial class separated by location
- Report includes separate rates for each antimicrobial class for each month of data submitted

*Data for example only*
AU Option – Pie Chart by Location

National Healthcare Safety Network
Pie Chart - All Data - Proportion of Antimicrobial Days per Antibacterial Class by Location

- Date Range: All SUMMARY
- AU
- Stratified by Location

- Aminoglycosides
- Carbapenems
- Glycopeptides
- Lincosamides
- Macro cyclic
- Macrolides
- Penicillins
- Phenicols
- Polymyxins
- Tetracyclines
- OTHER

Sample pie chart by location
- Shows proportion of antimicrobial days per antibacterial class

*Data for example only*
Sample bar chart by location
- Shows proportion of antimicrobial days per antifungal class

*Data for example only*
ANTIMICROBIAL RESISTANCE (AR) OPTION
Antimicrobial Resistance Option

- Released in July 2014
- **Purpose:**
  - Facilitate evaluation of antimicrobial resistance data using standardized approach
  - Provide facilities with improved awareness of a variety of AR issues to aid in clinical decision making and prioritize transmission preventions efforts
Antimicrobial Resistance Option

Who can participate:

- General acute care hospitals (ACH), long-term acute care hospitals (LTAC/LTCH), inpatient rehabilitation facilities (IRF), oncology hospitals, critical access hospitals (CAH) enrolled in NHSN with:
  - Electronic Laboratory Information System (LIS) and Admission Discharge Transfer (ADT) System
    - No manual entry allowed
  - Ability to collect and package data using HL7 standardized format: Clinical Document Architecture
Antimicrobial Resistance Option

- **What data are collected:**
  - Numerator: Patient-level susceptibility results for 19 specific organisms
    - DOB, gender, date admitted to facility, location
    - Specimen collection date, specimen source
      - Blood, cerebral spinal fluid (CSF), urine, lower respiratory
    - Organism & antimicrobial susceptibility data for each antimicrobial required for the isolated organism/specimen type
      - Values for E-test, MIC, or Zone
      - Final lab interpretation
        - S, S-DD, I, R, NS, N
  - Denominator: patient days & admissions (facility-wide only)
AR Option – Eligible Organisms

- Acinetobacter
- Candida albicans
- Candida glabrata
- Citrobacter freundii
- Enterobacter
- Enterococcus faecalis
- Enterococcus faecium
- Enterococcus spp. (when not specified to the species level)
- Escherichia coli
- Group B Streptococcus
- Klebsiella oxytoca
- Klebsiella pneumoniae
- Morganella morganii
- Proteus mirabilis
- Pseudomonas aeruginosa
- Serratia marcescens
- Staphylococcus aureus
- Stenotrophomonas maltophilia
- Streptococcus pneumoniae
## AR Option – Organism/Agent Combinations

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<tr>
<th>Organism</th>
<th>Specimen Type</th>
<th>Antimicrobial Agents</th>
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</thead>
<tbody>
<tr>
<td><em>Acinetobacter</em></td>
<td>Blood, Urine, Lower Respiratory, CSF</td>
<td>Amikacin, Ampicillin-sulbactam, Cefepime, Cefotaxime, Ceftriaxone, Ciprofloxacin, Doxycycline, Gentamicin, Imipenem with Cilastatin, Levofloxacin, Meropenem, Minocycline, Piperacillin, Piperacillin-tazobactam, Tetracycline, Ticarcillin-clavulanate, Tobramycin, Trimethoprim-sulfamethoxazole</td>
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- Selected antimicrobial agents are required to be reported for each of the 19 organisms per specimen type
  - Full list can be found in the NHSN AUR Module Protocol: [http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf](http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf)
AR Option Reporting Rules

- Same organism from invasive specimen source (blood & CSF) reported once per patient per 14 day period

- Same organism from non-invasive source (urine & lower respiratory) reported once per patient per month

Please see NHSN AUR Module Protocol for further details: http://www.cdc.gov/nhsn/PDFs/pscManual/11pscAURcurrent.pdf
Basic analysis output options available

- Line listing
- Facility-wide antibiogram
### Sample line list of AR events by pathogen
- Lists each patient, specimen collection date, specimen source, and pathogen.

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<th>dob</th>
<th>gender</th>
<th>eventID</th>
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*Data for example only*
**AR Option – Line List**

- **Reading the line list**
  - Patient ID ‘Candida_Urine’ had a urine specimen taken on Jan 21, 2013 while he was in the location ‘1029-8.’ Candida albicans was identified in the specimen.

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### National Healthcare Safety Network
Line Listing - Antimicrobial Resistance Events by Pathogen

*As of: August 15, 2014 at 13:05 AM
Date Range: All AUR_DETAIL*

Pathogen=CA

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*Data for example only*
Modifications can be made to the output option to show the antimicrobial tested, susceptibility test values, and final susceptibility interpretation.

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Sample facility-wide antibiogram

- Shows the pathogens from the specimens reported into the AR Option for a given month
- Lists all antimicrobials and the percent of isolates that were non-susceptible to the pathogen
- Percent non-susceptible only calculated when ≥ 30 isolates have been tested for a particular drug. Cells with "." represent pathogen-drug combinations for which there were less than 30 isolates tested.
- Cells shaded in grey represent non-valid pathogen/drug combinations

*Data for example only*
AR Option – Facility-wide Antibiogram

Reading the antibiogram:

- In January 2014, 33.0% of *Acinetobacter* spp. isolates tested were non-susceptible to Ciprofloxacin.
- In January 2014, 0% of *Staphylococcus aureus* isolates were non-susceptible to Ciprofloxacin.

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*Data for example only*
AUR Resources


- NHSN Helpdesk: 
  - NHSN@cdc.gov
Thank you!

For more information please contact Centers for Disease Control and Prevention

1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.