The Short and Long of Measurement in Antibiotic Stewardship

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Disclosures

- No relevant disclosures
- Planning committee member for the Society of Healthcare Epidemiology of America's Antimicrobial Stewardship Research Workshop with honoraria from Merck

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Objectives

By the end of this presentation, the learner should be able to:

- Categorize quality measures into structure, process, and outcome metrics
- Design a plan to measure your antimicrobial stewardship intervention by following the main steps in collecting, analyzing, and utilizing data
- Propose two different approaches to viewing antibiotic use data to assess your antibiotic stewardship program

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What is Measurement?

Merriam-Webster insight

[2]measure

:to find out the size, length, or amount of (something)

:to judge the importance, value, or extent of (something)

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Why Measure?

Intrinsic

- Am I making a difference?
- Has my intervention "worked"?
- Are there additional areas for improvement?

Extrinsic

- Justification for current or additional resources
- Documentation for The Joint Commission

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"Measures are not definitive but act as a focus for the commencement of review and should act as a stimulus for change."

Curtis C et al. *J Antimicrob Chemother* 2004;54(2):529-33.

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Types of Quality Measures

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Types of Quality Measures

- Structure measures
  - Definition: assess the characteristics, components and activities of the stewardship program
  - Examples:
    - Designation of an antibiotic stewardship program leader
    - Implementation of policies and procedures
    - Tracking of antibiotic use
    - Provision of antibiotic education

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In-Depth Example

The Joint Commission Medication Management Standard

Joint Commission

Requirement

Official Publication of Joint Commission Requirements

New Antimicrobial Stewardship Standard

APPLICABLE TO HOSPITALS AND CRITICAL ACCESS HOSPITALS

Effective January 1, 2017

Medication Management (MM)

Standard MM.09.01.01

The [critical access] hospital has an antimicrobial stewardship program based on current scientific literature.

Elements of Performance for MM.09.01.01

1. Leaders establish antimicrobial stewardship as an organizational priority. (*See also* LD.01.03.01, EP 5)

   Note: *Examples of leadership commitment to an antimicrobial stewardship program are as follows:*

   - *Accountability documents*
   - *Budget plans*
   - *Infection prevention plans*
   - *Performance improvement plans*
   - *Strategic plans*
   - *Using the electronic health record to collect antimicrobial stewardship data*

2. The [critical access] hospital educates staff and licensed independent practitioners involved in antimicrobial ordering, dispensing, administration, and monitoring about antimicrobial resistance and antimicrobial stewardship practices. Education occurs upon hire or granting of initial privileges and periodically thereafter, based on organizational need.

3. The [critical access] hospital educates patients, and their families as needed, regarding the appropriate use of antimicrobial medications, including antibiotics. (For more information on patient education, refer to Stan-

Continued on page 4

https://www.jointcommission.org/assets/1/6/New_Antimicrobial_Stewardship_Standard.pdf

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Types of Quality Measures

- Process measures
  - Definition: surrogate endpoints in the treatment of infectious diseases, or data describing the activities of a stewardship program
  - Examples:
    - Adherence to institution-specific guidelines or bundle
    - Duration of antimicrobial therapy
    - Number of blood cultures reviewed by the ASP
    - Approval rate of requests for restricted antibiotics
    - Days of therapy per 1,000 patient days present

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In-Depth Example

Prospective Audit and Feedback Documentation

Antimicrobial Stewardship - Hospitalist Pilot 2017
March 1, 2017 - March 31, 2017

Total # of adult pts reviewed	228
Total # of prescriber contacts	33
Total # of patients discussed	107
Total # of recommendations	41
Total # of accepted recommendations	80%

Percent with ID issues	63%
Percent with ID issues d	50%

Date	Team Category	Attending 1	Attending 2	Attending 3	Attending 4	Number of team contacts	Patients on Teams (total)	Patients with ID issues (i.e. reviewed)	% ID issues	Patients discussed	% discussed with team	Specific Inte
3/1/2017	Team 2	Apollo	NA	NA	NA	1	14	7	50%	4	57%	Oral therapy
												Asymptoma
												Odd patient
3/2/2017	Team 4	Lee	NA	NA	NA	1	16	9	56%	4	44%	Too late alre
												Toe amputa

- Auto-calculated percentages in summary section
- For feasibility and ongoing sustainability, decided to only list specific interventions
- Accepted interventions: need to decide if this is a verbal acceptance, or if follow up is done to confirm intervention carry through

Design credit: John Veillette, PharmD

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Types of Quality Measures

- Outcome measures
  - Definition: patient outcomes, unintended consequences/adverse effects, and the emergence of antibiotic resistance
  - Examples:
    - Infection-related mortality
    - *Clostridium difficile* rates
    - Antibiotic resistance rates
    - Length of hospital stay
    - Drug and hospitalization costs

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In-Depth Example

Evaluation of a new protocol for acute ruptured appendicitis one-year after implementation

	Prior Protocol N=154	New Protocol N=152	p value
Length of stay, hours, mean (SD)	134 (66) hours	95 (62) hours	<0.001
Cost of care, US dollars, mean (SD)	13,610 (6859)	9,879 (5,670)	<0.001
Inpatient readmission, n (%)	13 (8%)	9 (6%)	NS
Observation readmission, n (%)	3 (2%)	15 (10%)	0.003
Reoperation, n (%)	3 (2%)	4 (3%)	NS
Abdominal abscess, n (%)	8 (5%)	2 (1%)	NS

Skarda et al. J Pediatr Surg 2014;49:1726-9.

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Quiz Question

Which of the following pairs is correct?

A. Antibiotic use trends :: Outcome measure
B. Treatment guideline :: Process measure
C. Clostridium difficile rates :: Structure measure
D. Duration of therapy :: Process measure

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Quiz Question

Which of the following pairs is correct?

A. Antibiotic use trends :: ~~Outcome~~ Process measure
B. Treatment guideline :: ~~Process~~ Structure measure
C. *Clostridium difficile* rates :: ~~Structure~~ Outcome measure
D. Duration of therapy :: Process measure

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Process for Measuring Your Stewardship Program

General approach (not disease-specific)

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Process Overview

- Collecting Data
- Analyzing Data
- Utilizing Data

For every minute spent organizing, an hour is earned.
~ Benjamin Franklin

You will never be completely ready. Start from wherever you are.
~ C.J. Hayden, MCC

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Collecting Data

1. Define your needs

Ask yourself:
- Who is your audience?
- Which quality measures?

Check Out: The Improvement Guide by Gerald Langley, Ronald Moen, Kevin Nolan, Thomas Nolan, Clifford Norman and Lloyd Provost

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Review of Consensus Statements

Intent	Criteria	Metrics	Ref
External accountability and internal quality improvement efforts	(1) Scientific merit (2) Burden and impact (3) Accountability	Accountability: 2 Quality improvement: 5	1
Structure and process indicators to assess and compare stewardship programs across hospitals	(1) Feasibility (2) Clinical importance (3) Relevance to minimizing antimicrobial resistance	Infrastructure: 7 Policy and practice: 4 Monitoring and feedback: 6	2
Metrics most pertinent for internal ASP decisions	(1) Improved prescribing (2) Improved patient care (3) Targeting efforts (4) Feasibility	Clinical outcomes: 0 (1) Unintended consequences: 3 (4) Utilization: 2 (5) Process measures: 1 (10)	3

1. Morris AM et al. *Infect Control Hosp Epidemiol* 2012;33(5):500-6.
2. Pollack LA, et al. *Infect Control Hosp Epidemiol* 2016;37(10)1201-11.
3. Moehring RW, et al. *Clin Infect Dis* 2016;64(3):377-83.

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Review of Consensus Statements

Intent	Criteria	Metrics	Ref
Internal quality management and external quality assessment	(1) Relevance • Clinical • Ecologic • Economical (2) Presumed practicality • 6 subcategories	Structure: 21 Process: 21	1
Develop generic indicators for appropriate antibiotic use for all hospitalized patients with bacterial infections	(1) Health gain, care efficiency or less resistance (2) Generalizable to all adults with infections (3) Sufficient scientific evidence or expert consensus	Structure: 2 Process: 9	2

1. Thern J et al. *Infection* 2014;42;351-62.
2. Van den Bosch et al. *Clin Infect Dis* 2015;60:281-91.

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Review of Consensus Statements

Process and Outcome Measures

Included in four consensus statements:

1) Days of therapy (DOT) per 1,000 patient days
   - Or Defined Daily Doses (DDD)

Included in more than one consensus statements:

1) Rate of drug-resistant infections
2) *Clostridium difficile* infection incidence
3) Appropriate blood culturing prior to systemic antibiotics
4) Frequency of prompt dose adaptation for renal dysfunction
5) Percent initial therapy in accordance with local guidelines
6) 30-day readmission rates
7) Days of excess or avoidable antibiotic use

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Consensus Statements

My Take Home

Antimicrobial Stewardship Program Strategy

Program Age	Goals	Metrics (S: structure; P: process; O: outcome)
< 3 years	• Small wins • Demonstrate value	• S: Infrastructure • P: Antibiotic use • O: *C. difficile* incidence
3 – 6 years	• Sustainability • New areas of impact	• S: Guideline development • P: Guideline adherence • O: 30-day readmission
7+ years	• Advanced interventions • Validate new metrics	• S: Annual report • P: Appropriateness • O: Adverse events

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Collecting Data

1. Define your needs
2. Clearly define the project

Ask yourself:

- Which units/locations do you want to include?
- Which patient populations are your focus?
- What are your current baseline rates?
- How much time do you have to spend on this?
- What is your data hypothesis?

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Collecting Data

2. Clearly define the project
3. Identify the data sources

Ask yourself:

- How is this information coded?
- How can you retrieve this data?
- Is it a manual or automated process?

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Collecting Data

3. Identify the data sources
4. Plan how to store the data

- Create a data dictionary
- Choose a storage method
  - e.g. Excel, Access, REDCap, Tableau, paper
- Ensure HIPAA compliance
- Invest in a way to backup your data
- Create quality control and edit checks

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Collecting Data

4. Plan how to store the data
5. Choose your project design

Ask yourself:

- Descriptive or predictive?
- Retrospective or prospective?
- What is the timeline of your project?
- If it's pre-intervention, plan staged roll out?
- Any pre-intervention education required?

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Collecting Data

5. Choose your project design
6. How to collect the data

- Who will collect the data? How often?
- Develop your data collection tool
- Balance completeness with essentialism
- If this is a manual process, less is more

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Collecting Data

6. How to collect the data
7. Consult experts & test data collection tool

- Consult with colleagues and experts
- Pilot your tool or run a test data query
- If multiple data collectors, educate on, assess for, and ensure similar processes

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Collecting Data

1. Define your needs
2. Clearly define the project
3. Identify the data sources
4. Plan how to store the data
5. Choose your project design
6. How to collect the data
7. Consult experts & test data collection tool

8. Start collecting your data!

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Analyzing Data

1. Assess your data

- Check for consistency
- Check for completeness
- Check for duplications
- Request data dictionary
- Save original file in a safe place

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Analyzing Data

1. Assess your data
2. Validate the data

- Ask yourself, does this make sense?
- Check min, max, mean, median for continuous variables
- Check for non-acceptable or missing answers for categorical variables

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Analyzing Data

1. Assess your data
2. Validate the data
3. Clean the data

- Discover the scope of the problem
- Fix errors
- Prevent future errors, if possible

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Analyzing Data

1. Assess your data
2. Validate the data
3. Clean the data
4. Plan your analysis

- Pre/post analysis
- Trend lines, interrupted time series analysis
- Aggregate data monthly vs quarterly
- Are there important subgroups to analyze?

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Analyzing Data

1. Assess your data
2. Validate the data
3. Clean the data
4. Plan your analysis
5. Do your analysis

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Analyzing Data

1. Assess your data
2. Validate the data
3. Clean the data
4. Plan your analysis
5. Do your analysis
6. Create the initial report

- Did you find what you expected?
- Anything jump out?
- Initial interpretation?

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Analyzing Data

1. Assess your data
2. Validate the data
3. Clean the data
4. Plan your analysis
5. Do your analysis
6. Create the initial report

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Utilizing Data

1. Define your goal for communicating

Ask yourself:
- What did I learn?
- What is my primary message?
- What would I like to see happen?

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Utilizing Data

1. Define your goal for communicating
2. Determine your target audience

Likely multiple targets for stewardship:
- Those on your stewardship team
- Those impacted by your stewardship program, such as frontline clinicians
- Those who financially support you (grants and/or your local administration)

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Utilizing Data

2. Determine your target audience
3. Choose the communication method(s)

- Different audience needs different approach
  - How much detail would your audience want?
  - What's the easiest way to communicate?
  - What does your audience care most about?
- Options include: fact sheets, newsletter, reports, online summaries, presentations

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The Stewardship Audience

Perceived Most Important by Position

Outcome	Hospital Administrator	Pharmacy Director	P&T Committee	ID Physician
Antibiotic Use	1 (2)	9 (22)	13 (32)	1 (2)
Antibiotic Cost	17 (42)	23 (56)	6 (15)	0 (0)
Appropriateness	2 (5)	2 (5)	6 (15)	11 (27)
Infection-related mortality	1 (2)	2 (5)	1 (2)	15 (37)
Infection or antibiotic-related length of stay	2 (5)	0 (0)	1 (2)	3 (7)

Bumpass JB et al. *Clin Infect Dis* 2014;59(S3):S108-11

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Utilizing Data

3. Choose the communication method(s)
4. Adopt good communication principles

- Write for your audience
- Make it visually appealing (font, space, color)
- Make it readable (clear and concise)
- Make it credible (organization logo, contact information, references, honest, accurate)

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Utilizing Data

4. Adopt good communication principles
5. Communicate numbers effectively

Some tips (NOTE: these are challenging!):

- Include titles, legends, and labels for charts
- Simplify images as much as possible
- Convert numbers into words
- Don't overstate your results

Check Out: Show Me the Numbers by Stephen Few

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Utilizing Data

5. Communicate numbers effectively
6. Provide a take home message

- State the conclusion
- Provide possible recommendations based on your findings
- Suggest an action, if appropriate

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Utilizing Data

1. Define your goal for communicating
2. Determine your target audience
3. Choose the communication method(s)
4. Adopt good communication principles
5. Communicate numbers effectively
6. Provide a take home message

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Quiz Question

Which of the following should be considered when designing your antibiotic stewardship measurement plan?

A. Relevance to your target audience
B. Feasibility to collect and analyze
C. Impact on antibiotic resistance
D. All of the above!

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Quiz Question

Which of the following should be considered when designing your antibiotic stewardship measurement plan?

A. Relevance to your target audience
B. Feasibility to collect and analyze
C. Impact on antibiotic resistance
D. All of the above!

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Approaches to Antibiotic Use Data

Highlighting Specific Examples

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Aggregated Antibiotic Data (Pre/Post)

Comprehensive evaluation pre and post full ASP implementation in February 2010 at a 39-bed Veterans Affairs Health Care System in Fargo

Table 1. Usage of the top five antibiotics: 2008 vs 2010

	2008 (N=1,432)		2010 (N=1,935)	
Antibiotic	Total no. of patients on specific antibiotic (%)	DDD/ 1,000 patient bed days	Total no. of patients on specific antibiotic (%)	DDD/ 1,000 patient bed days
Moxifloxacin	149 (10.4)	75.9	153 (7.9*)	80.6
Piperacillin/tazobactam	118 (8.2)	92.1	130 (6.7)	63.7
Vancomycin	122 (8.5)	80.5	124 (6.4*)	77.5
Ciprofloxacin	95 (6.6)	38.6	81 (4.2*)	32.7
Ceftriaxone	36 (2.5)	22.3	65 (3.4)	33

Note: DDD = defined daily dose; N = number of patient admitted during interval.
*Statistically significant, $P < .05$, chi-square test.

Hagert BL, et al. *Hosp Pharm* 2012;47(12):939-45.

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Antibiotic Use Pre/Post: Things To Know

- Less information available to understand the impact of the intervention
  - E.g., if antibiotic use was increasing prior to ASP implementation, and decreased after ASP implementation, a pre/post assessment may falsely conclude the ASP had no intervention
- Other considerations:
  - Unable to tell if effect was immediate or gradual
  - Unable to tell if effect has been sustained
  - Was there an outbreak impacting antibiotic use?
  - What was the fidelity to the stewardship intervention?

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Antibiotic Use Trends Over Time

Time series analysis before and after ASP implementation in July 2008 at a 525-bed teaching hospital in Denver

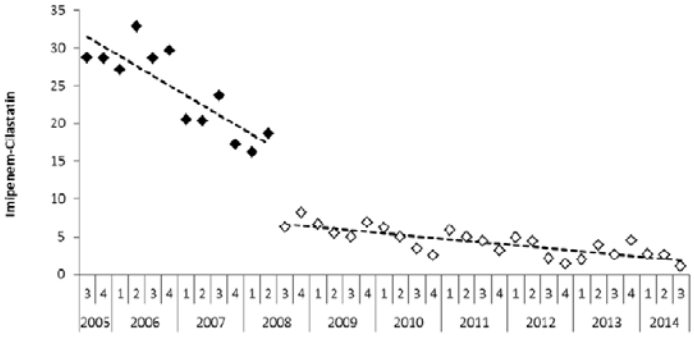

Figure 3: Use of agents with activity against *Pseudomonas aeruginosa* before (closed markers) and after (open markers) implementation

Jenkins TC et al. *Infect Control Hosp Epidemiol* 2015;36(6):664-72.

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Antibiotic Use Trends: Things To Know

- The trend cannot continue to go down
  - We know the goal *cannot* be zero
  - Therefore, the slope cannot indefinitely decline
- This has statistical and practical implications
- Other considerations:
  - Unit of time? (depends on the event frequency)
  - How far back to collect data? (time = power)
  - Is there a lagged effect?
  - Is the intervention constant?
  - Have methods changed over time?
  - Are there confounders? E.g., drug shortages?
  - Can you find a control group?

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Antibiotic Use Benchmarking

- 70 academic medical centers
- Broad range of antibiotic use (days of therapy = DOT)
  - Observed: 600 – 1100 DOT per 1,000 patient days
  - Example O:E ratio of 1.44
    - Observed 1101 DOTs/1,000 patient-days
    - Expected 763 DOTs/1,000 patient-days
- Clinical service line impacts antibiotic use
  - 14% of psychiatry patients received an antibiotic
  - 100% of liver transplant patients received an antibiotic

Polk RE et al. Clin Infect Dis 2011;53(11):1100-10.

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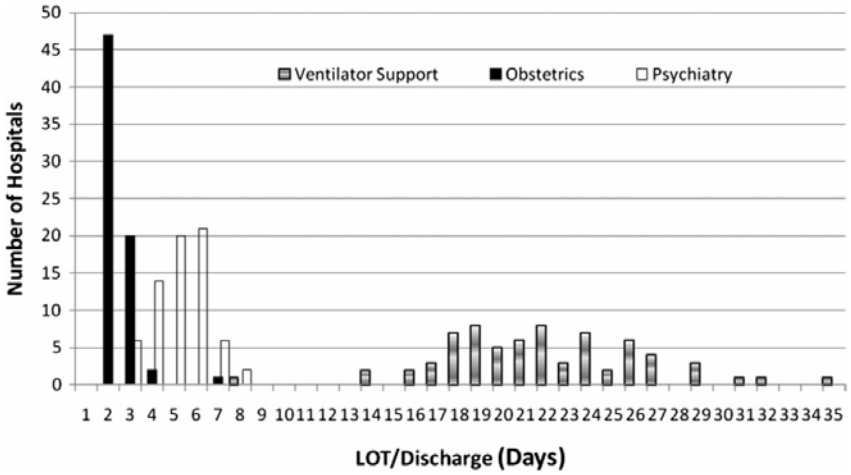
Antibiotic Use Benchmarking



Polk RE et al. Clin Infect Dis 2011;53(11):1100-10.

LOT = length of therapy

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Antibiotic Use Benchmarking: Things To Know

- No external goal for antibiotic use exists
  - However, we know the goal *cannot* be zero
- Metric benchmarking of antibiotic use can compare hospitals
  - Does not determine appropriateness of antibiotic use
  - Provides information on outliers
    - Outliers may represent inappropriate prescribing
    - High performers can be used to identify best practices
    - Need to adjust for confounding factors using statistical procedures to be most useful

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Advantages and Barriers to Benchmarking

Advantages

- Identify strengths and weaknesses
- Realize what level(s) of performance is possible
- Establish new standards and goals
- Stimulate continuous quality improvement
- Drive innovative ideas and practical solutions

Barriers

- Time and cost constraints
- Competitive barriers
- Lack of management commitment and professional human resources
- Resistance to change
- Short-term expectations

Ibrahim & Polk. *Expert Rev Anti Infect Ther*. 2012;10(4):445-57.

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NHSN AUR Option Overview

The Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) Antibiotic Use and Resistance (AUR) Option

National Objectives

1) Monitor and improve antimicrobial prescribing
2) Identify, understand, and respond to antimicrobial resistance patterns or trends

- First real AU data uploaded into NHSN in July 2012
- As of June 2017, 314 facilities submitted at least 1 month of data

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NHSN AU Option Details

- Currently voluntary participation
- Data are based on:
  - Medication administration data (not billing data) and
  - Admission/Discharge/Transfer (ADT) systems
- All data must be submitted electronically
- Metric:
  - Numerator: Days of Therapy per
  - Denominator: 1,000 Patient Days Present

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Standardized Antibiotic Administration Ratio (SAAR)

- First attempt at antibiotic use benchmarking
  - Similar to the Standardized Infection Ratio
  - Observed antibiotic use compared to predicted use
- Risk adjusted by facility and location characteristics
  - Presence of ICUs, hospital size, teaching status, ward type
- Endorsed by the National Quality Forum
  - For public health surveillance and quality improvement

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CDC Spectrum Definitions

Broad spectrum agents predominantly used for		Anti-MRSA agents	Agents predominantly used for surgical site infection prophylaxis
hospital-onset/ multi-drug resistant bacteria	community-acquired infection		
aminoglycosides imi/meropenem cefepime/cefazidime β-lactam/βLIs (PsAr) aztreonam colistin/polymyxin tigecycline	ertapenem cefotaxime ceftriaxone ciprofloxacin levofloxacin moxifloxacin	ceftaroline dalba/oritavancin daptomycin line/tidezolid quinu/dalfopristin, telavancin vancomycin IV	cefazolin cefotetan cefoxitin cefuroxime IV

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The SAARs Currently Available

All antimicrobials	Medical and surgical ICUs and wards	
Antimicrobials for hospital-onset/ multi-drug resistant infections	M/S ICUs	M/S wards
Antimicrobials used for community-onset infections	M/S ICUs	M/S wards
Anti-MRSA antimicrobials used	M/S ICUs	M/S wards
Antimicrobials used for surgical site infection prophylaxis	Medical and surgical ICUs and wards	

SAAR: Standardized Antibiotic Administration Ratio

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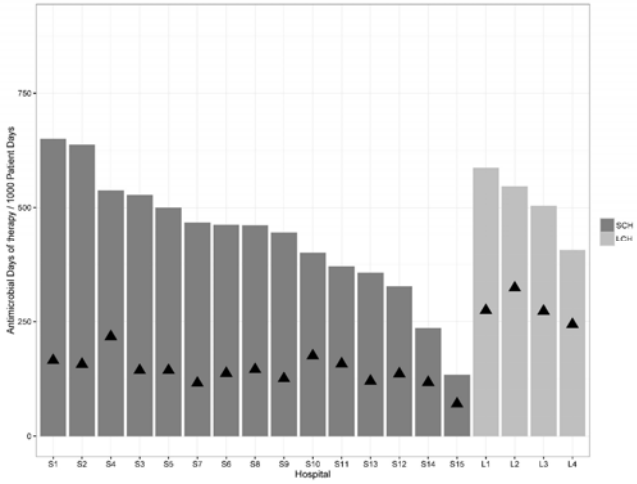
Three-Year Facility-wide Antibiotic Use within Intermountain



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Floor Types in Small Hospitals

Hospital	Licensed Beds	Total Patient Days	Medical/Surgical Days	Intensive Care Unit Days	Pediatric Days	Other Days*
Small, community hospitals						
S11	146	44,174	13,976 (32%)	3,351 (8%)	4,619 (10%)	22,228 (50%)
S14	97	33,319	8,082 (24%)	802 (2%)	3,000 (10%)	21,435 (64%)
S6	89	27,491	11,363 (41%)	1,895 (7%)	4,677 (17%)	9,556 (35%)
S10	71	23,448	8,913 (38%)	933 (4%)		13,602 (58%)
S1	48	11,642	7,765 (67%)	1,531 (13%)		2,346 (20%)
S15	24	10,118	6,091(60%)			4,027 (40%)

- A significant proportion of patient days present were in labor & delivery, maternity, nursery and psychiatry units (Other Days*)

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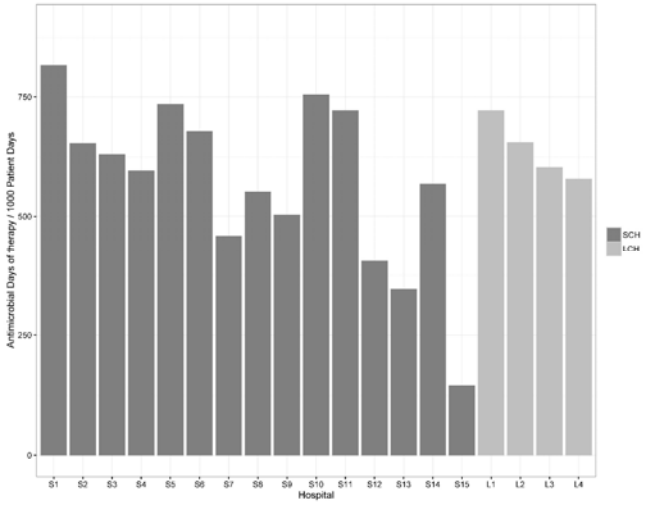
Facility Level – Excluding "Other"



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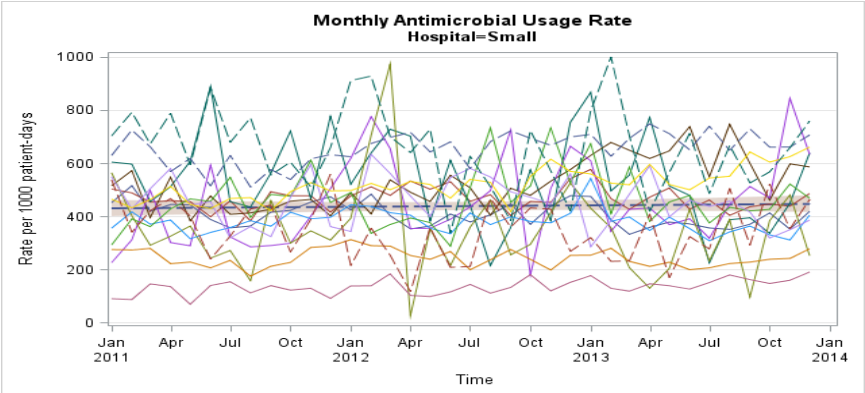
Baseline Trend in 15 Small Hospitals



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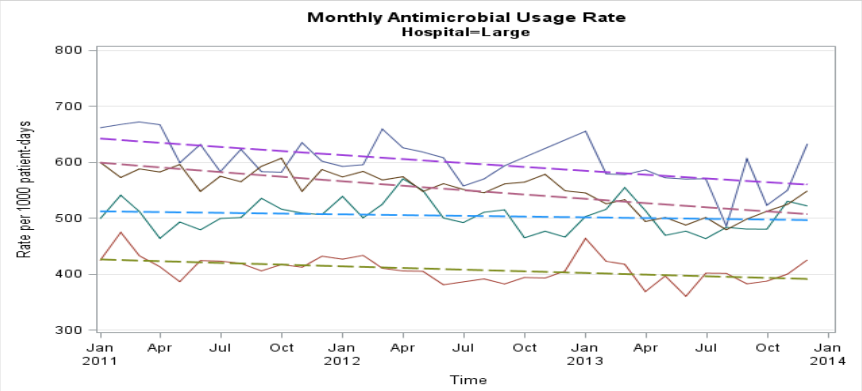
Baseline Trends in 4 Large Hospitals



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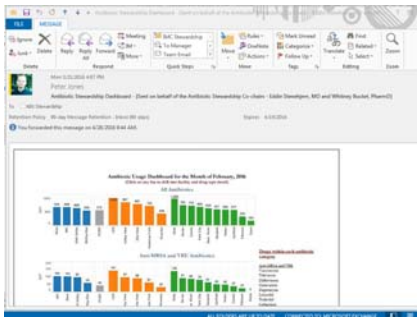
Intermountain AU Dashboard

- We send out NHSN AU data which allows comparisons between facilities
- Monthly email to physician, pharmacist and business administrators
- Goal: "To keep you better informed and provide data that you can use to identify areas within your hospitals that may need further assessment of antibiotic prescribing."



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Survey of Our Dashboard

- Randomly selected recipients of our antibiotic use dashboard invited for a 20-minute telephone or in-person interview
- Administrators, physicians, and pharmacists
- Examples of great feedback we received:
  - Add note that data do not include the emergency department
  - Change the color scheme to a value neutral set
  - Include raw numerator and denominator data
  - Create a training asset or guidance document on how to use
  - Add cost data to panel or dashboard (administrator request)
  - Is there a way to display what the target is (plan to add SAAR data)

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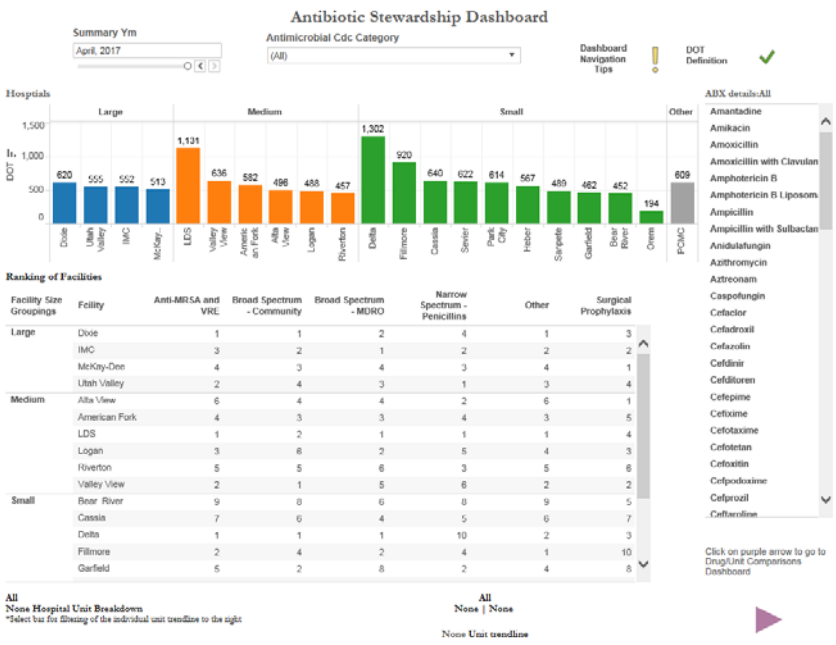

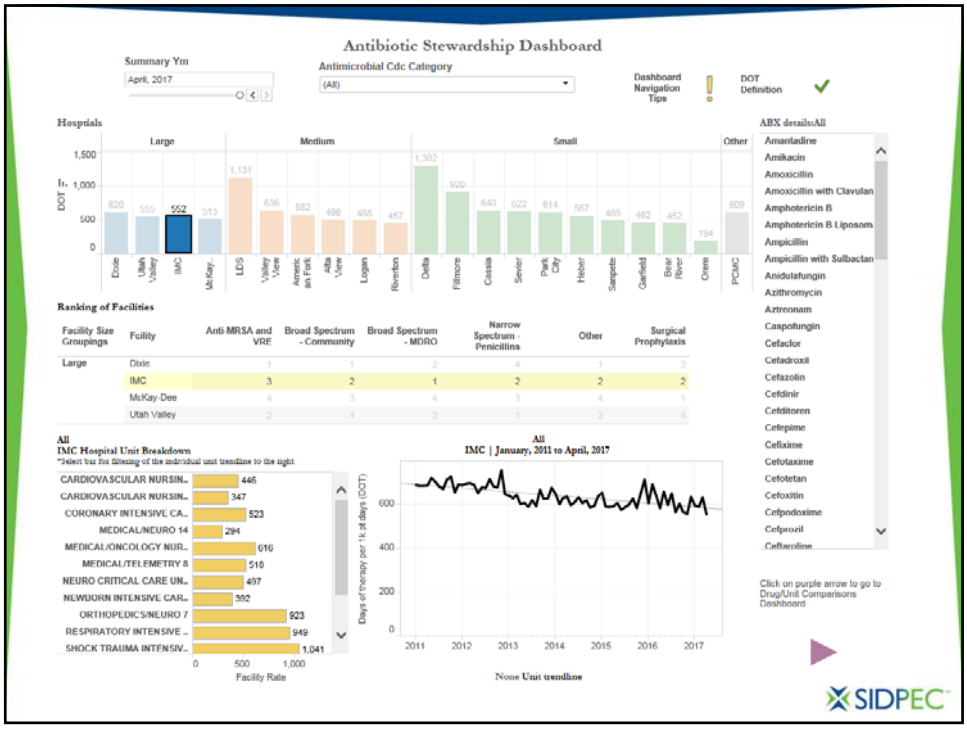
Antibiotic Stewardship Dashboard
Summary Ym
April, 2017
Antimicrobial Cdc Category
(All)
Dashboard Navigation Tips
DOT Definition
Hospitals
Large
Medium
Small
Other
DOT
1,500
1,000
500
0
820
555
552
513
1,131
636
582
496
488
457
1,302
920
640
622
614
567
489
462
452
194
609
Dixie
Utah Valley
IMC
McKay-...
LDS
Valley View
Americ an Fork
Alta View
Logan
Riverton
Delta
Fillmore
Cassia
Senior
Park City
Heber
Sanpete
Garfield
Bear River
Orem
PCMC
ABX details:All
Amantadine
Amikacin
Amoxicillin
Amoxicillin with Clavulan
Amphotericin B
Amphotericin B Liposom
Ampicillin
Ampicillin with Sulbactan
Anidulafungin
Azithromycin
Aztreonam
Caspofungin
Cefaclor
Cefadroxil
Cefazolin
Cefdinir
Cefditoren
Cefepime
Cefixime
Cefotaxime
Cefotetan
Cefoxitin
Cefpodoxime
Cefproxil
Ceftaroline
Ranking of Facilities
Facility Size Groupings
Facility
Anti-MRSA and VRE
Broad Spectrum - Community
Broad Spectrum - MDRO
Narrow Spectrum - Penicillins
Other
Surgical Prophylaxis
Large
Dixie 1 1 2 4 1 3
IMC 3 2 1 2 2 2
McKay-Dee 4 3 4 3 4 1
Utah Valley 2 4 3 1 3 4
All
IMC Hospital Unit Breakdown
*Select bar for filtering of the individual unit trendline to the right
CARDIOVASCULAR NURSIN... 446
CARDIOVASCULAR NURSIN... 347
CORONARY INTENSIVE CA... 523
MEDICAL/NEURO 14 294
MEDICAL/ONCOLOGY NUR... 616
MEDICAL/TELEMETRY 8 516
NEURO CRITICAL CARE UN... 497
NEWBORN INTENSIVE CAR... 392
ORTHOPEDICS/NEURO 7 923
RESPIRATORY INTENSIVE ... 949
SHOCK TRAUMA INTENSIV... 1,041
0
500
1,000
Facility Rate
All
IMC | January, 2011 to April, 2017
Days of therapy per 1k pt days (DOT)
600
400
200
0
2011
2012
2013
2014
2015
2016
2017
None Unit trendline
Click on purple arrow to go to Drug/Unit Comparisons Dashboard
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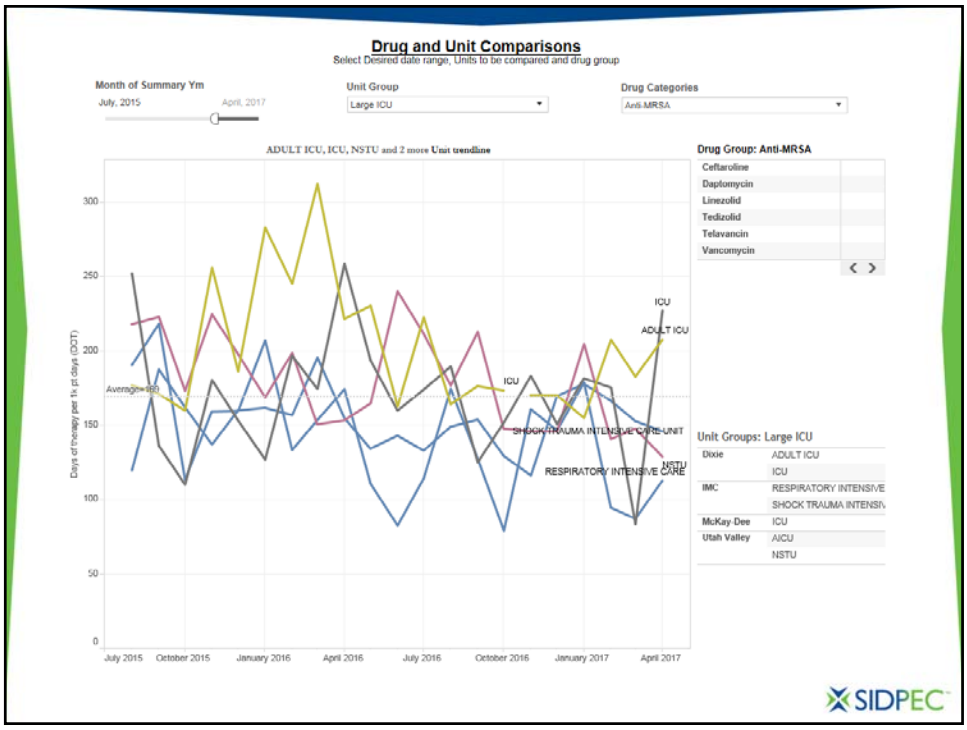
Drug and Unit Comparisons
Select Desired date range, Units to be compared and drug group
Month of Summary Ym
July, 2015
April, 2017
Unit Group
Large ICU
Drug Categories
Anti-MRSA
ADULT ICU, ICU, NSTU and 2 more Unit trendline
Days of therapy per 1k pt days (DOT)
300
250
200
150
100
50
0
Average=160
ICU
ADULT ICU
ICU
SHOCK TRAUMA INTENSIVE CARE UNIT
NSTU
RESPIRATORY INTENSIVE CARE
July 2015
October 2015
January 2016
April 2016
July 2016
October 2016
January 2017
April 2017
Drug Group: Anti-MRSA
Ceftaroline
Daptomycin
Linezolid
Tedizolid
Telavancin
Vancomycin
Unit Groups: Large ICU
Dixie ADULT ICU
ICU
IMC RESPIRATORY INTENSIVE
SHOCK TRAUMA INTENSIV
McKay-Dee ICU
Utah Valley AICU
NSTU
SIDPEC

Limitations of Antibiotic Use

- NOT outcome measure
- Does not address number or percent of patients treated
- Surrogate endpoint
  - Is it 'irrational' or 'inappropriate' antibiotic prescribing?
- Benchmarking antibiotic use data
  - Attempts to adjust for known variables that influence use
    - High level data – teaching status, presence of an ICU
    - More challenging to account for diagnostic or microbiologic differences between hospitals
  - Helps identify outlier areas for further investigation

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"Put simplistically, the DDDs [or DOTs] per 1000 bed days unit is unable to distinguish between a few patients getting a lot of antibiotic and a lot of patients getting a little antibiotic, nor between a small number of long-stay patients and a large number of short-stay patients."

Berrington A et al. *J Antimicrob Chemother* 2010;65(1):163-8.

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Antibiotic Appropriateness

- No standard exists
- Significant reviewer variability
- The need is there – the next frontier
- European Consensus Statements
- CDC resources available:
  - Inpatient assessment tools for UTI, CAP, resistant gram-positive infections and inpatient antibiotics
  - www.cdc.gov/getsmart/healthcare/implementation.html

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Conclusion

- Measure the impact of your stewardship program
- Choose structure, process and outcome measures
- Feasibility should be a main consideration
- Regularly assess and validate your data
- Communicate your findings, tailor your message
- Consider different approaches for displaying antibiotic use data

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Additional Reading

Show Me the Numbers by Stephen Few

The Improvement Guide by Gerald Langley, Ronald Moen, Kevin Nolan, Thomas Nolan, Clifford Norman and Lloyd Provost

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The Short and Long of Measurement in Antibiotic Stewardship

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