

# Inpatient Antimicrobial Stewardship Program Implementation

Kendall Van Tyle, PharmD, BCPS, ASP Chair  
Northern Navajo Medical Center

# Objectives

- ❑ Define antimicrobial stewardship
- ❑ **Cite reasons why inpatient antibiotic stewardship programs (ASP) are important**
- ❑ **Recall time-line and key milestones for implementation of I.H.S. ASP for inpatient**
- ❑ **Compare & contrast examples of ASP elements**
- ❑ **List potential starting points for ASP implementation for your site**
- ❑ **List some resources available**

# Stewardship

**“The management or care for something, particularly the kind that is successful”**

# The Goal

**Prospective optimization of antibiotic therapy – period.**

# Antimicrobial Stewardship

- **Strategic efforts to optimize antimicrobial prescribing**
  - *Drug*
  - *Dose*
  - *Duration*
  - *De-escalation*
  - *Indication - recognize when not needed*

# Something To Ponder

- Antibiotic stewardship asks us to think about the community, not only the patient being treated**
- The adverse effects of antibiotic overuse and misuse have implications beyond the patient and outside of your facility**

# Why Implement ASP?

**“If best infection control practices and antibiotic stewardship were nationally adopted, more than 600,000 infections and 37,000 deaths could be prevented over 5 years.”**

# CDC Emerging Infections Program (EIP) Assessment of Prescribing in 36 Hospitals

- **Antibiotic prescribing could potentially be improved in over one third (37%) of common prescription scenarios**
  
- **Examples:**
  - **“UTI”** – Asymptomatic bacteria accounted for 21% of patients receiving treatment with antibiotics
  
  - **Vancomycin use**
    - No Gram (+) bacterial growth, but still treated >3 days: 22%
    - Culture grew only oxacillin-susceptible *Staphylococcus aureus*, but patient still treated >3 days : 5%

# Rationale For Antibiotic Stewardship

- Improve Patient Care and Safety
  - **Prevent *C. Difficile* infections**
  - **Minimize Adverse Events**
  
- Reduce Resistance
  - **Preserve antimicrobial effectiveness**
  - **Decrease excess deaths**



REPORT TO THE PRESIDENT ON  
COMBATING ANTIBIOTIC RESISTANCE

Executive Office of the President  
President's Council of Advisors on  
Science and Technology

September 2014



Recommends that a  
regulatory  
requirement for  
antibiotic  
stewardship be in  
place by 2017

# As California Goes....

**“Starting July 1 (2015), acute care hospitals in California must put into effect antimicrobial stewardship programs.....”**

## Section 1.C. Systems to Prevent Transmission of MDROs and Promote Antimicrobial Stewardship

Elements to be assessed		Surveyor Notes
1.C.1 The hospital has policies and procedures to minimize the risk of development and transmission of multidrug-resistant organisms (MDROs) within the hospital (applicable to all persons in the hospital).	<input type="radio"/> Yes <input type="radio"/> No	
1.C.2 Systems are in place to designate patients known to be colonized or infected with a targeted MDRO and to notify receiving units and personnel prior to movement of such patients within the hospital.	<input type="radio"/> Yes <input type="radio"/> No	
1.C.3 Systems are in place to designate patients known to be colonized or infected with a targeted MDRO and to notify receiving healthcare facilities and personnel prior to transfer of such patient between facilities.	<input type="radio"/> Yes <input type="radio"/> No	
If no to any part of 1.C.1 through 1.C.3, cite at 42 CFR 482.42(a) (Tag A-0749)		
1.C.4 The hospital can provide a list of target MDROs.  Note: Hospitals should provide a list of MDROs that are targeted for infection control because they are epidemiologically important (e.g., MRSA, VRE). Please refer to CDC's Guideline for Isolation Precautions for criteria that may be used to define epidemiology important organisms: <a href="http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf">http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf</a>	<input type="radio"/> Yes <input type="radio"/> No	
1.C.5 The hospital can demonstrate the criteria used to determine epidemiologically important MDROs on their list.	<input type="radio"/> Yes <input type="radio"/> No	
1.C.6 The hospital can provide justification for any epidemiologically important organisms not on their list and otherwise not targeted in their hospital.	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> N/A	
No citation risk for questions 1.C.4 through 1.C.6; for information only.		

# “No Citation Risk – Information Only”

- ❑ **1.C.9 -The hospital has written policies...**
- ❑ **1.C.10 – The hospital has designated a leader...**
- ❑ **1.C.11 – Requires an indication for all antibiotic orders**
- ❑ **1.C.12 – Formal requirement of antibiotic “time out’ at 48h**
- ❑ **1.C.13 – Monitors consumption of antibiotics...**

# 2012 Pilot by CMS

- ❑ **1.C.2.a Facility has a multidisciplinary process in place to review antimicrobial utilization, local susceptibility patterns, and antimicrobial agents in the formulary...**
- ❑ **1.C.2.b Systems are in place to prompt clinicians to use appropriate antimicrobial agents....**
- ❑ **1.C.2.e. The facility has a system in place to identify.....(Patients eligible for IV to PO)**

# Current Regulatory Need

- ❑ CMS lack of payment for hospital acquired infections – these are deemed preventable
- ❑ The Joint Commission
  - Reduce risk of HAI's
  - Implement strategies to reduce transmission of MDROs
- ❑ NHSN event reporting for *C. difficile*

# Proposed Timeline

“Rome was not built in a day”

# Implementation Timeline

- Goal is full implementation within 3 years
- Follow the Core Elements of Hospital Antibiotic Stewardship Programs outlined by the CDC as a guide

Available at:

<http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html>

- Goals for each year are flexible

# Year 1 Goals

- Leadership Support
- Physician & Pharmacist Champions
- Policies & Procedures
- Antibiogram Development
- Antimicrobial Stewardship Education Program

# Year 1 – Leadership Support

- Critical for success of ASP
- Formal statements of support
- Addition of stewardship activities on PMAPs and COERs
- Supporting training and education
- Ensuring participation from the various different departments involved in ASP
  - Form an ASP workgroup/committee
- Obtaining financial support

# Year 1 – Physician/Pharmacy Champions

- Identify physician champion
  - Training in infectious diseases/ASP beneficial
  - Can leverage telemedicine
  - Hospitalists may be ideal secondary to increasing presence in inpatient care
- Identify pharmacist champion
  - Training in infectious diseases/ASP beneficial
- The Pharmacy and Therapeutics committee should **NOT** be considered the stewardship team

# Year 1 (cont.)

- **Policies & Procedures (Examples)**
  - Define the ASP Committee as a required committee for the hospital
    - Identify required members
    - Outline committee charges
    - Identify frequency of meetings
  - Document dose, duration, and indication
  - Facility specific treatment recommendations
  - Identify reporting requirements
    - Ex. Reports to P&T and/or medical staff
  - Avoid implementing too many policies and interventions simultaneously

# Year 1 (cont.)

- **Antibiogram Development**
  - Done at least yearly for facility
  - Can be done more often if need identified
  - Can be done for individual hospital units if need identified
    - Ex. ICU, Burn Ward
- Follow best practices
  - Discussed later

# Year 1 cont.

- **Antimicrobial Stewardship Education Program**
  - Include reasons for starting ASP
  - Describe increasing resistance
  - Describe best practices in treatment of infectious diseases
- View as a process, not an event
  - Continuous
  - Multiple approaches

# Year 2 Goals

- Guideline development
- Implementation of Interventions
- Development of Tracking Measures
- Continue ASP Education

# Year 2 cont.

- Guideline development
  - For specific indications/disease states
  - EHR indication specific order sets
    - CAP/HCAP
      - MDROs
    - UTI
    - Cellulitis/Diabetic Foot
      - MDROs
    - C. Diff
    - Treatment of culture proven invasive infections

# Year 2 cont.

- Implementation of Interventions
  - Broad Interventions
    - Antibiotic “time outs”
    - Prior authorization
    - Prospective audit and feedback
  - Pharmacy-driven Interventions
    - Auto IV to PO conversions
    - Dose adjustments (ex. Renal adjustment)
    - Dose optimization
    - Automatic alerts where therapy might be unnecessarily duplicative
    - Auto-stop orders
    - Detection and prevention of ABX-related DDI

# Year 2 cont.

- Development of Tracking Measures
  - Monitoring Antibiotic Prescribing
    - Monitor adherence to documentation policy (dose, duration, and indication)
    - Monitor adherence to facility-specific treatment recommendations
    - Monitor compliance with one or more of the specific interventions
  - Antibiotic Use and Outcome Measures
    - Track *C. difficile* infections
    - Produce an antibiogram report
    - Monitor use by Days of Therapy, Defined Daily Dose, and/or direct expenditure

# Implementation Timeline

## Year 3

- Year 3 Goals
  - Reporting of Intervention Results
  - Reporting Information to Staff on Improving Antibiotic Use and Resistance
  - Continue ASP Education

# Year 1 – Foundational Project

- Create an antibiogram if none exists
- Update existing antibiogram
- Review “best practices” checklist

# Obtain Raw Data

- Work with microbiology lab supervisor
- Obtain report of susceptibility results for a given time frame, usually 1 calendar year
- Use “best practices” check list at this stage to eliminate duplicate isolates and validate data

# Present Data

- Will usually need to transcribe data into a more user friendly format
  - PDF – posted in E.H.R.
  - Pocket Card
- Review “best practices” check list at this stage to validate/present data appropriately

## ANTIMICROBIAL SUSCEPTIBILITY CHART (% Sensitive)

Northern Navajo Medical Center

July 1, 2014 – June 30, 2015

Prepared by: Kendall Van Tyle, PharmD, BCPS, NCPS, M(ASCP); Joyanna Wendt, MD MPH; Olivia Hodgins, MSA, MSN; Pierrette Montanez, MT(ASCP)

Bacterium (total isolates)	<i>Citrobacter freundii</i> (15)	<i>Enterobacter aerogenes</i> (63)	<i>Escherichia coli</i> (1345)	<i>Klebsiella oxytoca</i> (26)	<i>Klebsiella pneumoniae</i> (215)	<i>Proteus mirabilis</i> (70)	<i>Pseudomonas aeruginosa</i> (57)	<i>Enterococcus faecalis</i> (81)	<i>Enterococcus faecium</i> (24)	<i>Staph aureus</i> (477)	<i>Staph epidermitis</i> (73)	<i>Strep pneumoniae</i> (47)
Amikacin	100	100	100	100	100	100	98					100
Amoxicillin												
Ampicillin												
Ampicillin/S												
Benzylpenic												
Beta-Lactam												
Cefazolin												
Cefepime												
Cefotaxime												
Cefotaxime												
Cefoxitin	<i>Klebsiella</i>	<i>Klebsiella</i>	<i>Proteus</i>	<i>Klebsiella</i>	<i>Pseudomonas</i>	<i>Proteus</i>	<i>Pseudomonas</i>	<i>Enterococcus</i>	<i>Enterococcus</i>	<i>Staph</i>	<i>Staph</i>	<i>Strep</i>
Ceftazidime	<i>oxytoca</i>	<i>pneumoniae</i>	<i>mirabilis</i>	<i>oxytoca</i>	<i>aeruginosa</i>	<i>mirabilis</i>	<i>aeruginosa</i>	<i>faecalis</i>	<i>faecium</i>	<i>aureus</i>	<i>aureus</i>	<i>pneumoniae</i>
Ceftriaxone	(26)	(215)	(70)	(26)	(57)	(70)	(57)	(81)	(24)	(477)	(73)	(47)
Ceftriaxone												
Ciprofloxacin												
Clindamycin												
ESBL (negati												
Erythromycin												
Gentamicin												
Imipenem	100	100	100				98					
Levofloxacin												
Nitrofurants												
Oxacillin												
Piperacillin/												
Rifampin												
Tetracycline	0	0	87					96		21		
Tobramycin												
TMP/SMX												
Vancomycin	73	92	93									
								96		17		0
								99		100		0

- Gram (+) organisms no longer tested against first-generation cephalosporin – use Oxacillin as guide (if sensitive to Oxacillin, cefazolin/cephalexin are first-line agents)
- All species with 10 or less isolates for date range have been removed - *Morganella morganii* (7) & *Serratia marcescens* (8).

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	<i>Citro freu</i> (1)		<i>Citrobacter freundii</i> (15)	<i>Enterobacter aerogenes</i> (63)	<i>Escherichi coli</i> (1345)
<b>Bacterium (total isolates)</b>		<b>Bacterium (total isolates)</b>			
Amikacin	10	Amikacin	100	100	100
Amoxicillin		Amoxicillin			
Ampicillin		Ampicillin			56
Ampicillin/Sulbactam		Ampicillin/Sulbactam			63 <sup>AA</sup>
Benzylpenicillin (Penicillin)		Benzylpenicillin (Penicillin)			
Beta-Lactamase (negative)		Beta-Lactamase (negative)			
Cefazolin	6	Cefazolin	0	0	96
Cefepime	11	Cefepime	100	100	99
Cefotaxime (meningitis)*		Cefotaxime (meningitis)*			
Cefotaxime (non-meningitis)		Cefotaxime (non-meningitis)			
Cefoxitin		Cefoxitin			
Ceftazidime	7	Ceftazidime	73	95	99
Ceftriaxone (meningitis)*		Ceftriaxone (meningitis)*			
Ceftriaxone (non-meningitis)	8	Ceftriaxone (non-meningitis)	87	95	99
Ciprofloxacin	11				
Clindamycin**					
ESBL (negative)					
Erythromycin					
Gentamicin	11				
Imipenem	11				
Levofloxacin	11				
Nitrofurantoin	9				
Oxacillin					
Piperacillin/tazobactam	8				
Rifampin					
Tetracycline					
Tobramycin	11				
TMP/SMX	8				
Vancomycin					

**Footnotes:**

- \*Streptococci
- \*\*\*\*Erythron
- ^^Does not p
- Trending c

**Additional notes:**

- MRSA: ;
- Gram (+
- All speci

## ANTIMICROBIAL SUSCEPTIBILITY CHART (% Sensitive)

### Footnotes:

- \**Streptococcus pneumoniae* only; \*\*D-test for inducible clindamycin resistance performed on all isolates; \*\*\*Not to be used for monotherapy - synergy only
  - \*\*\*\*Erythromycin only tested on PEN Resistant Strains (9 isolates); ^Uses meningitis breakpoints, likely overestimates resistance in non-meningitis infections;
  - ^^Does not predict susceptibility to amox/clav (typically higher); it is unclear if in vivo response to amp/sulb is better than predicted by in vitro susceptibility testing.
- Trending over past 3 yrs has not substantially changed – 65%>64%>63%.

### Additional notes:

- MRSA: 27% (non-duplicated, new cases – n=457); of MRSA Isolates (n=124) – 100% TMP/SMX, 98%Tetracycline, 85%Clindamycin (% Sensitive)
- Gram (+) organisms no longer tested against first-generation cephalosporin – use Oxacillin as guide (If sensitive to Oxacillin, cefazolin/cephalexin are first-line agents)
- All species with 10 or less isolates for date range have been removed - *Morganella morganii* (7) & *Serratia marcescens* (8).

Levofloxacin	100	98	88	100	95	90	79	94	17	71	70	96
Nitrofurantoin	93	11	96	85	30	0		99	29	100	100	
Oxacillin										68	41	
Piperacillin/tazobactam	86	95	97	100	97	100	96					
Rifampin										100***	97***	
Tetracycline								33	50	96	89	94
Tobramycin	100	100	96	100	97	97	96					
TMP/SMX	87	96	82	92	94	91				100	62	87
Vancomycin								99	46	100	100	100

### Footnotes:

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## Indian Health Service Antibiotic Stewardship Antibiogram Preparation Check-List

Facility Name: \_\_\_\_\_ Dates Data Collected<sup>1</sup>: \_\_\_\_\_

Best Practice/Item for review	Y	N	N/A <sup>2</sup>	Comments
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## Indian Health Service Antibiotic Stewardship Antibiogram Preparation Check-List

Facility Name: \_\_\_\_\_ Dates Data Collected<sup>1</sup>: \_\_\_\_\_

Best Practice/Item for review	Y	N	N/A <sup>2</sup>	Comments
Only organisms with at least 30 isolates reported <sup>3</sup>				
Only diagnostic (not surveillance) isolates reported				
Duplicates excluded; describe how first isolate define				
Only final, verified results reported				
Percentage Susceptible reported (intermediate not reported)				

1. Nitrofurantoin reported for urine isolates only; not reported for *Proteus sp.*, *Pseudomonas sp.* Or *Serratia sp.*

#### Footnotes and Guidance

1	Data for one calendar year; updated at least annually. Larger facilities may update every 6 mo
2	% Susceptibility not reported/Organism not reported
3	Smaller sites may report isolates with 10 or more; or may collect data for a longer period of time and properly note
4	Rifampin for <i>Staphylococcus sp.</i> ; aminoglycosides for enterococcus sp., etc.
5	Trimethoprim/ <u>sulfamethoxazole</u>
6	<i>Serratia</i> , <i>Pseudomonas</i> , Indole-Positive protease ( <i>P. vulgaris</i> , <i>Providencia sp.</i> , <i>Morganella sa.</i> ), <i>Citrobacter</i> , <i>Enterobacter</i> , <i>Acinetobacter</i> – production of inducible amp-c beta-lactamase.

Adapted from:

## Indian Health Service Antibiotic Stewardship

### Antibiogram Preparation Check-List

<ul style="list-style-type: none"> <li>Do not report susceptibility to 1<sup>st</sup>/2<sup>nd</sup>/3<sup>rd</sup> Gen <u>Cephalosporins</u> (except <u>ceftazidime</u> for pseudomonas)</li> </ul>				
<b>For <u>Staphylococcus aureus</u>/Coag-neg staph:</b>				
<ul style="list-style-type: none"> <li>100% Susceptibility to Vancomycin</li> </ul>				
<ul style="list-style-type: none"> <li>% Susceptible to <u>Oxacillin</u> = % Susceptible to other beta-lactams</li> </ul>				
<ul style="list-style-type: none"> <li>Provide subset of MRSA % Susceptible to appropriate drugs (<u>Clindamycin</u>, <u>Tetracyclines</u>, <u>TMP/SMX</u>)</li> </ul>				
<b>For <u>Streptococcus pneumoniae</u>:</b>				
<ul style="list-style-type: none"> <li><u>Cefotaxime</u> and Ceftriaxone reported separately for meningitis and non-meningitis breakpoints</li> </ul>				
<ul style="list-style-type: none"> <li>It is clear that only a subset of isolates thought to be non-susceptible to penicillin are tested against other drugs (e.g. erythromycin, ceftriaxone, levofloxacin)</li> </ul>				
<ul style="list-style-type: none"> <li>100% Susceptibility to Linezolid/Vancomycin</li> </ul>				
<b>Nitrofurantoin reported for urine isolates only; not reported for <u>Proteus sp</u>, <u>Pseudomonas sp</u>. Or <u>Serratia sp</u>.</b>				

susceptible to penicillin are tested against other drugs (e.g. erythromycin, ceftriaxone, levofloxacin)				
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<b>Nitrofurantoin reported for urine isolates only; not reported for <u>Proteus sp</u>, <u>Pseudomonas sp</u>. Or <u>Serratia sp</u>.</b>				
<b>Footnotes and Guidance</b>				
1	Data for one calendar year; updated at least annually. Larger facilities may update every 6 mo			
2	% Susceptibility not reported/Organism not reported			
3	Smaller sites may report isolates with 10 or more; or may collect data for a longer period of time and properly note			
4	Rifampin for <u>Staphylococcus sp.</u> ; aminoglycosides for <u>enterococcus sp.</u> , etc.			
5	<u>Trimethoprim/sulfamethoxazole</u>			
6	<u>Serratia</u> , <u>Pseudomonas</u> , Indole-Positive protease ( <u>P. vulgaris</u> , <u>Providencia sp.</u> , <u>Morganella sa.</u> ), <u>Citrobacter</u> , <u>Enterobacter</u> , <u>Acinetobacter</u> – production of inducible amp-c beta-lactamase.			

Adapted from:

# Antibiogram Checklist

## Adapted from:

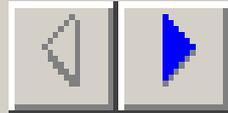
- Hindler JR, Stelling J. Analysis and presentation of cumulative antibiograms: a consensus guideline from the Clinical and Laboratory Standards Institute. CID. 2007;44:867-73.
- Boehme MS, Somsel PA, Downes FP. Systematic review of antibiograms: a national laboratory systems approach for improving antimicrobial susceptibility testing practices in Michigan. Pub H Rep. 2010;125(sup. 2):63-72.

# Year 1 - Suggestions

- Consider simply documenting what pharmacy already does/sees
  - Can be used for hypothesis generation
  - Might reveal some “low-hanging fruit”
  - Lead to ASP interventions/policies in year 2 and beyond
- Find those in your organization already involved in quality measures

# Year 2 – Foundational Project

- Creation of local antibiotic use guidelines
  - Focus on common indications for facility
  - Use antibiogram data and national guidelines
- Highly recommended to adapt these to Electronic Health Record, if possible



Pain Medications...

IVPB Antibiotics

[\[ \] Inpatient Guideline Based Menu](#)

PO/IM Antibiotics...

Pediatric Antibiotics (liquids etc)...

Cardiovascular Meds...

Dermatology Meds...

ALTERNATIVE OPTIONS FOR PIPERACILLIN/AZOBACTAM (ON SHORTAGE)

- Abdominal Infections
- Cellulitis (No Break in Skin or Ulcer)
- Diabetic Foot Wounds
- Pneumonia

## Diabetic Foot Wounds

### CLINICAL NOTES:

#### ~MILD

~Purulence

~One or more signs of inflammation

~Cellulitis (if present) 2cm or less around ulcer

~Limited to superficial

#### ~MODERATE

~Any of the above w at least one:

~2cm or more cellulitis

~Lymphangitic streaking

~Beneath superficial fascia

~Deep tissue abscess

~Gangrene

~Muscle bone tendon or joint involvement

#### ~SEVERE

~Any above with systemic toxicity or metabolic instability

### TREATMENT (MILD AND MODERATE)

[ ] Ampicillin/Sulbactam 3GM IV Q6H

~OR~

[ ] Ceftriaxone 2GM IV Q24H PLUS Metronidazole 500MG IV Q8H

~IF MRSA SUSPECT ADD~

[ ] Vancomycin (Pharmacy To Dose)

### TREATMENT (SEVERE)

[ ] Cefepime 2GM IV Q24H PLUS Metronidazole 500MG IV Q8H PLUS Vanco

# Year 2 Suggestions

- Consider your guidelines/E.H.R menus as an intervention
- Define and collect some baseline measures/data
  - Orders for XX drug for YY indication
  - Survey prescriber use of guidelines/menus
- Recollect data at some point post intervention
- Repeat this process for every intervention identified and implemented

# Year 3 - Suggestions

- Review what worked and what didn't
- Develop a process for continuous quality improvement
  - If an intervention succeeded, how to sustain it
  - If it didn't – why?
    - Evaluate variables defined and measured; methods
    - Evaluate process
- PDSA cycles
  - Plan, Do, Study, Act – repeat.

# Metrics

# Options

Type	Metric	Definition
Consumption	<ul style="list-style-type: none"><li>• Defined Daily Doses (DDD)</li></ul>	<ul style="list-style-type: none"><li>• Total Grams antibiotics used divided by WHO approved DDD values</li></ul>
	<ul style="list-style-type: none"><li>• Grams</li></ul>	<ul style="list-style-type: none"><li>• Total Grams used from administered, dispensed, or purchased data sources/reports</li></ul>
	<ul style="list-style-type: none"><li>• Days of Therapy (DOT)</li></ul>	<ul style="list-style-type: none"><li>• Number of days that the patient receives at least one dose of an antibiotic</li></ul>
	<ul style="list-style-type: none"><li>• Length of Therapy (LOT)</li></ul>	<ul style="list-style-type: none"><li>• Number of days that the patient receives therapy regardless of number of drugs or doses received</li></ul>
	<ul style="list-style-type: none"><li>• Expenditures</li></ul>	<ul style="list-style-type: none"><li>• Dollars spent</li></ul>

# Options

Type	Metric	Definition
Patient Outcomes	<ul style="list-style-type: none"><li>Health Care Associated Infections</li></ul>	<ul style="list-style-type: none"><li>Rate of disease-specific infections (e.g. <i>C. Diff</i>, MRSA, VAP)</li><li>ASP Intervention rates</li><li>ASP Intervention Acceptance rates</li></ul>
Resistance	<ul style="list-style-type: none"><li>Antibiotic Resistant Organisms</li></ul>	<ul style="list-style-type: none"><li>% of patients with resistant organism(s)</li><li>Antibiogram data</li><li>% of isolates of a pathogen with antibiotic resistance</li></ul>

# Advantages vs Disadvantages

Metric	Advantage(s)	Disadvantage(s)
Defined Daily Dose (DDD)	<ul style="list-style-type: none"><li>• Easy to calculate</li><li>• Can be utilized as a “benchmark” between hospitals, regions, and countries</li></ul>	<ul style="list-style-type: none"><li>• Never intended to be used as a metric to study ASP impact</li><li>• Biases against combination therapy, even when that therapy might be a narrower spectrum</li><li>• Assumes routine dosing – “penalized” if using clinically appropriate higher or lower dosing</li><li>• Not applicable to pediatrics</li></ul>
Grams	<ul style="list-style-type: none"><li>• Purchase data easy to obtain</li><li>• Not affected by price fluctuations</li><li>• Can be used to calculate DDD</li></ul>	<ul style="list-style-type: none"><li>• Purchase data is the least accurate</li></ul>

# Advantages vs Disadvantages

Metric	Advantage(s)	Disadvantage(s)
Days of Therapy (DOT)	<ul style="list-style-type: none"> <li>• Offers more clinical relevance than DDD</li> <li>• Applicable to pediatrics</li> <li>• Recommended by CDC, US National Healthcare Safety Network</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to obtain data</li> <li>• Not applicable to renal population</li> <li>• Incentivizes the use of broad spectrum monotherapy               <ul style="list-style-type: none"> <li>• A patient receiving 2 antibiotics for 7 days = 14 DOTs</li> </ul> </li> </ul>
Length of Therapy (LOT) “Treatment Period”	<ul style="list-style-type: none"> <li>• Most reflective of actual treatment duration</li> <li>• Accounts for dosing intervals beyond 1 day (i.e. Q48H Vancomycin)</li> <li>• Does not penalize programs for changing antibiotics based upon C&amp;S results</li> </ul>	<ul style="list-style-type: none"> <li>• Cannot be used to compare the use of specific drugs</li> </ul>
Expenditures (Cost of Therapy)	<ul style="list-style-type: none"> <li>• “Easiest” metric to calculate and obtain data for</li> <li>• Easily understood by all</li> </ul>	<ul style="list-style-type: none"> <li>• Affected by cost variations; natural or otherwise</li> <li>• Affected by changes in formulary</li> <li>• Should not be used for benchmarking purposes due to cost variability</li> </ul>

# Advantages vs Disadvantages

Metric	Advantage(s)	Disadvantage(s)
Antimicrobial-free Days	<ul style="list-style-type: none"> <li>• Avoids issues related to Broad vs Narrow spectrum therapy</li> <li>• Avoids issues related to Mono- vs Duo-Therapy</li> <li>• Focuses on whether patients are receiving an antibiotic or not</li> </ul>	<ul style="list-style-type: none"> <li>• Mostly used as a disease-specific consumption measure (i.e. ventilator-associated pneumonia)</li> </ul>
Point Prevalence “Snapshot” Surveys	<ul style="list-style-type: none"> <li>• Resource-efficient</li> <li>• Typically done at a single site on a single day</li> <li>• Data collected may include % patients prescribed antibiotics, % “restricted” antibiotics prescribed, # antibiotics per patient, duration of therapy, dosing and dosage interval, time for IV to PO switch</li> <li>• Can be used to measure and compare antibiotic use at multiple sites</li> </ul>	<ul style="list-style-type: none"> <li>• Can only provide feedback on limited elements of prescribing</li> <li>• May not consistently reflect typical practice within a Unit or Hospital</li> </ul>

# Using Bar Coded Medication Administration Data (BCMA)

- Paper published by the VA in 2012
- Compares BCMA vs. Orders data
- Used to help calculate some of the metrics described
- NHSN AU Module

<http://www.cdc.gov/nhsn/PDFs/training/AUR-training.pdf>

# BCMA Log Output - RPMS

## ADMINISTRATION MEDICATION

### UNIT OF ADMINISTRATION

### ORDER DOSAGE

### DOSE GIVEN

ADMINISTRATION MEDICATION	UNIT OF ADMINISTRATION	ORDER DOSAGE	DOSE GIVEN
IBUPROFEN	12	240MG/12ML	
CETIRIZINE	5	5MG/5ML	
TOBRAMYCIN	1 drop	1 DROP	
FLUOCINONIDE	a small amount	A SMALL AMOUNT	
LACTULOSE RETENTION	200	300ML IN 700ML WATER	
CLONIDINE	TAB	0.2MG	
LISINOPRIL	TAB		
	TAB	30MG	
FUROSEMIDE	TAB	20MG	
AMLODIPINE	TAB	2.5MG	
BISACODYL	0100351079299018	1 SUPPOSITORY	
ELECTROLYTES/PEG-3350	8oz	8 OZ GLASS AND DRINK	
FENTANYL 50MCG/HR	PATCH	1 PATCH	
LISINOPRIL	TAB		
	TAB	30MG	
BISACODYL	10mg	1 SUPPOSITORY	
INSULIN REGULAR	4 units	MEDIUM DOSE SLIDING	
AMLODIPINE	TAB	2.5MG	
ALBUTEROL 90MCG MDI	2 puffs	2 PUFFS	
ELECTROLYTES/PEG-3350	4000ml	8 OZ GLASS AND DRINK	
CEFTAZIDIME 2GM			2 GM
FUROSEMIDE	TAB	20MG	

# “Crunched” Data – Days of Therapy

The screenshot displays a Microsoft Access window titled "Drugs from BCMA Log 10 - Database - V:\BE\_Data\BCMA Log - Shiprock\Drugs from BCMA Log 10.mdb (Access 2002 - 2003 File Format) - Access". The main window shows a table named "Days\_of\_Therapy\_3\_Total\_Patients\_Days qry" with the following data:

ADMINISTRATION_MEDICATION	CountOFCHART_NUMBER	CountOFACTION_DATE
AMOXICILLIN/CLAVULANATE 500MG/125MG	1	1
AMOXICILLIN/CLAVULANATE 875/125MG	10	10
AMPICILLIN (PIDS)	6	6
AMPICILLIN 2GM	2	2
AMPICILLIN/SULBACTAM 1.5GM	6	6
AMPICILLIN/SULBACTAM 3GM	45	45
AZITHROMYCIN	17	17
CEFDINIR	4	4
CEFEPIME	28	28
CEFOTAXIME 2GM	4	4
CEFTRIAOXONE (PIDS)	1	1
CEFTRIAOXONE 1GM	30	30
CEFTRIAOXONE 2GM	4	4
CIPROFLOXACIN	16	16
CIPROFLOXACIN 400MG/200ML D5W	17	17
CLINDAMYCIN	14	14
CLINDAMYCIN 600MG/50ML D5W	26	26
CLINDAMYCIN 900MG/50ML D5W	15	15
DOXYCYCLINE	7	7
ERYTHROMYCIN	1	1
LEVOFLOXACIN	13	13
LEVOFLOXACIN 250MG/50ML D5W	2	2
LEVOFLOXACIN 500MG/100ML D5W	1	1
LEVOFLOXACIN 750MG/150ML D5W	8	8
METRONIDAZOLE	6	6
METRONIDAZOLE 500MG/100ML 0.3%NACL	22	22
PENICILLIN	23	23
PIPERACILLIN/TAZOBACTAM 2.25GM	1	1
PIPERACILLIN/TAZOBACTAM 3.375GM	38	38
PIPERACILLIN/TAZOBACTAM 4.5GM	14	14
SULFA/TRIMETH 800MG/160MG DS	23	23
VANCOMYCIN 1GM	65	65

Below the table, a "Datasheet View" section shows two records for patient "DEMO,PATIENT HI 999911" in the "NURSERY" department, both on "MAY 17, 2014". The first record is for "LISINAPRIL" at 12:56 with a "TAB" status and "30MG" dosage. The second record is also for "LISINAPRIL" at 12:56 with a "TAB" status and "30MG" dosage.

The bottom of the screenshot shows a Windows taskbar with the Start button, application icons, and a system tray displaying the time as 4:11 PM on 10/22/2015.

# ASP Resources

- CDC
  - <http://www.cdc.gov/getsmart/healthcare/implementation.html>
- IDSA/SHEA
  - [http://www.idsociety.org/Stewardship\\_Policy/#sthash.gZe2Eucl.dpuf](http://www.idsociety.org/Stewardship_Policy/#sthash.gZe2Eucl.dpuf)
- ASHP
  - <http://www.ashp.org/menu/PracticePolicy/ResourceCenters/Inpatient-Care-Practitioners/Antimicrobial-Stewardship>

# Additional Resources

- I.H.S. ASP Workgroup members
- I.H.S. ASP Listserv
- Antibiogram Checklist
- Metric Databases (RPMS)
- PDSA forms
- Cited References

# IHS NPC ASP Workgroup Members

- Dr. Daniel Marino: [Daniel.Marino@ihs.gov](mailto:Daniel.Marino@ihs.gov) Phone: 520-295-2401
- Robin Bartlett: [Robin.Bartlett@ihs.gov](mailto:Robin.Bartlett@ihs.gov) Phone: 615-467-1577
- Shani Bjerke: [Shani.Bjerke@ihs.gov](mailto:Shani.Bjerke@ihs.gov) Phone: 218-679-3912
- Linda Crosby: [Linda.Crosby@ihs.gov](mailto:Linda.Crosby@ihs.gov) Phone: 541-553-2134
- Jeff Gildow: [Jeffrey.Gildow@ihs.gov](mailto:Jeffrey.Gildow@ihs.gov) Phone: 402-878-2231
- Tim Langford: [tglangford@klm.portland.ihs.gov](mailto:tglangford@klm.portland.ihs.gov)  
Phone: 541-882-1487 x354
- Chris McKnight: [Christopher.McKnight@cherokeehospital.org](mailto:Christopher.McKnight@cherokeehospital.org)  
Phone: 828-497-9163 x6379
- Jodi Tricinella: [Jodi.Tricinella@ihs.gov](mailto:Jodi.Tricinella@ihs.gov) Phone: 918-342-6298
- Kendall Van Tyle: [Kendall.VanTyle@ihs.gov](mailto:Kendall.VanTyle@ihs.gov) Phone: 505-368-7250
- Thaddus Wilkerson: [tdwilkerson@anthc.org](mailto:tdwilkerson@anthc.org) Phone: 907-729-2155
- Ron Won: [Roney.Won@ihs.gov](mailto:Roney.Won@ihs.gov) Phone: (503) 414-5579
- Jon Schuchardt: [Jon.schuchardt@ihs.gov](mailto:Jon.schuchardt@ihs.gov) Phone: (605) 355-2281

# Conclusions/Pep Talk

- Implementation is important
  - Think “patient safety”
  - Think “public health”
- Implementation is easy
  - Take it one step at a time
  - One step will lead to the next
- Implementation is rewarding
  - Impact and positive change
- Do something today.