ANTIBIOTIC STEWARDSHIP PROGRAM

Infection Prevention & Control
Boot Camp For Long-Term Care Facility
Infection Preventionists

LEARNING OBJECTIVES

At the conclusion of this presentation, participants will be able to:

- Describe the evolution of multi-drug resistant micro-organisms (MDRO)
- Understand of the significance of appropriate use of laboratory testing
- Discuss over-utilization of antibiotics in the post-acute care setting
- Explain the rationale for optimization of antibiotic usage
- List the 7 Core Elements of Antibiotic Stewardship Program (ASP) for long-term care facilities
- Discuss the role of the Infection Preventionist in an Antibiotic Stewardship Program

BACKGROUND

- 47%-79% of nursing home (NH) residents receive systemic antibiotics each year[1]
- Studies have consistently shown that a high proportion of this antibiotic (ATB) use is inappropriate[2]
  - 25-75% of systemic ATB use and 60% of topical ATB use in long-term care (LTC) is considered inappropriate[3]
  - Studies reported globally, identify a high and increasing prevalence of antibiotic resistance (AR) in NHs[1]
  - ATB cost estimates in LTC, range from $38-$137 million per year[4]

1. Van Buul LW, Van der Steen JT, et al. Antibiotic Use and Resistance in Long Term Care Facilities. Journal of the American Medical Directors Association. 2012;3:568
2. Smith P, Bennett G, Bradley S, et al. SHEA/APIC Guideline: Infection Prevention and Control in Long Term Care Facility. American Journal of Infection Control. 2008;36:504-535.
3. Trivedi, K. Approaches to Antimicrobial Stewardship in Long-term Care presented at CAHF/DL IP Training September, 2014.
4. CDC. Get smart for healthcare: Antibiotic use in nursing homes. Get smart about antibiotics week: November 18-24, 2013. http://www.cdc.gov/getsmart/healthcare/learn-from-others/factsheets/nursing-homes.html .

EVOLUTION OF MDROS

- ESKAPE pathogens (*Enterobacter*, *Staphylococcus aureus* (SA), *Klebsiella pneumoniae* (KP), *Acinetobacter baumanii*, *Pseudomonas aeruginosa*, *Enterococcus faecium*)[5]
- According to the Centers for Disease Control and Prevention (CDC), ESKAPE bacteria are responsible for 2/3 of all healthcare-associated infections (HAI)[5]
- Resistance has developed in *E. Coli*, KP, SA, *Acinetobacter*, *Pseudomonas*, and *Enterococcus*
- With resistance comes less treatment options for serious infections
- Higher morbidity & mortality
- Increased healthcare costs

5. Science Daily. No ESKAPE! New drugs against MRSA, Other Superbugs Still Lacking. December 9, 2008. http://www.sciencedaily.com/releases/2008/12/081209101700.htm

PREVENTION & MANAGEMENT OF MDROS

- Robust hand hygiene program (education & monitoring)
- Use of Transmission-based isolation, when necessary
- Proper use of personal protective equipment (PPE)
- Involvement of environmental services in trainings and communication
- Education program for all disciplines, residents, families and ancillary services
- Antimicrobial stewardship program

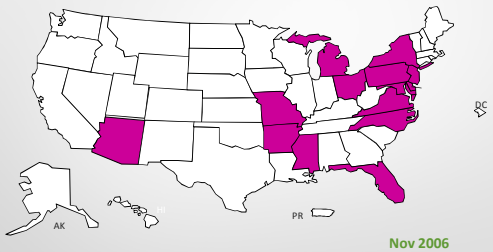
6. Schweon S, Burdsall D, Greene D, et al. APIC. Infection Preventionist's Guide to Long-term Care. 2013

RATIONALE FOR ANTIMICROBIAL USE OPTIMIZATION

- Antimicrobial resistance
  - Inherent
  - Antimicrobial exposure
- Patient safety
  - Arrhythmias, nephrotoxicity, drug-drug interactions *Clostridium difficile* infections, death[7]
- Cost
  - Unnecessary use, switching from IV to PO, broad-spectrum to pathogen-directed therapy[7]

7. Trivedi, K. Advanced IP Training Class. CAHF October 2015. Slide Courtesy of Dr. Kavita Trivedi. Original slide reference: Roberts RR, et al. CID 2009;49:1175-1184

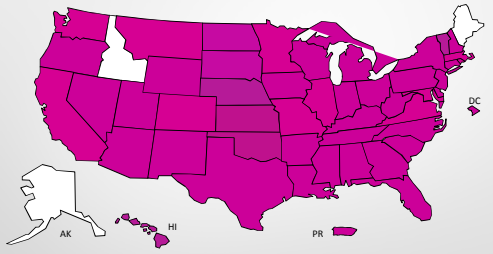
CARBAPENEMASE-PRODUCING CRE IN THE UNITED STATES



Nov 2006

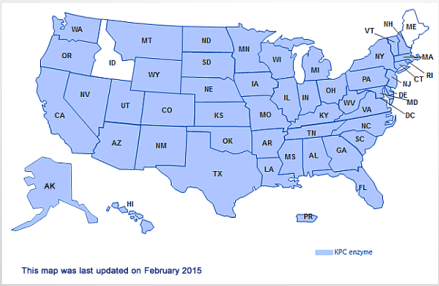
8. Kallen A. Epidemiology and Prevention of Carbapenem-Resistant Enterobacteriaceae. http://cdhealth.gov/disease/hai/Docs/Webfix/CRE_ND4-17-2013.pdf

CRE IN THE U.S. 2014[8]



Feb 2014

STATES WITH KPC-PRODUCING CARBAPENEM-RESISTANT *ENTEROBACTERIACEAE* (CRE)



Reported to the Centers for Disease Control and Prevention (CDC) as of February 2015

9. Centers for Disease Control and Prevention. Healthcare-Associated Infections (HAI). Tracking CRE. http://www.cdc.gov/hai/organisms/cre/TrackingCRE.html.

RATIONALE FOR ANTIMICROBIAL USE OPTIMIZATION

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  - Antimicrobial exposure
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  - Arrhythmias, nephrotoxicity, *Clostridium difficile* infections, drug-drug interactions, death
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EMERGENCY DEPARTMENT (ED) VISITS FOR ATB-ASSOCIATED ADVERSE EVENTS[9,10]

- On basis of 6614 cases of ED visits studied, an estimated 142,505 visits were drug-related adverse events associated with systemic ATBs[9,10]
  - ATB were implicated in 19.3% of all ED visits for drug-related adverse events[9,19]
- Most ED visits for adverse drug events were for allergic reactions[9,10]
  - Half of the estimated ED visits were due to penicillins (36.9%), and cephalosporins (12.2%)[9,10]

10.Budnitz DS, Lovegrove MC, Shehab N, Richards CL. Emergency Department visits for Antibiotic-Associated Adverse Events. New England Journal of Medicine. 365;21. November 24, 2011

EMERGENCY DEPARTMENT (ED) VISITS FOR ATB-ASSOCIATED ADVERSE EVENTS[9] (CONTINUED)

- Sulfonamides (18.9%) and clindamycin (18.5%) were associated with the highest rate of ED visits with moderate-to-severe allergic reactions[9]
- Sulfonamides (1.4%) and fluoroquinolones (0.5%)were associated with a significantly higher rate of neurologic or psychiatric disturbances[9]

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COST OF HEALTHCARE-ASSOCIATED INFECTIONS (HAI)

TYPE OF INFECTION	MINIMUM COST	MAXIMUM COST
Central Line-Associated Blood Stream Infection (CLABSI)	$7,288	$29,156
Ventilator-Associated Pneumonia (VAP)	$19,633	$28,508
Catheter-Associated Urinary Tract Infection (CAUTI)	$862	$1,007
Skin and Soft Tissue Infection (SSI)	$11,874	$34,670
Clostridium difficile Infection (CDI)	$6408	$9,124

Data are from 2007 from North Carolina Department of Health

11. Anderson DJ, Pyatt DG. North Carolina Department of Public Health HAI Advisory Group. American Journal of Infection Control; 2013 Sep;41(9):764-768.

COST OF ANTIMICROBIAL-RESISTANT INFECTIONS (ARI)[7,11]

	ALL PATIENTS	PATIENTS WITH ARI	PATIENTS WITHOUT ARI
n (%)	1391	188 (13.5)	1203 (86.5)
APACHE II score	42.1	54.8*	40.1*
LOS (days)	10.2	24.2*	8.0*
HAI (n)	260	135*	125*
Cost per day ($)	1651	2098*	1581*
Total cost ($)	19,267	58,029*	13,210*
Death [n (%)]	70	34 (18.1)*	36 (3.0)*

*p<0.001

HIGH RATES OF MDROS IN LTC

- Frequent transfer from acute care hospitals
- Horizontal transmission of resistant organisms
- Widespread (often inappropriate) use of antimicrobials

Microsoft clipart Office 2010

12.Schwartz, DN et al., *Journal of American Geriatric Society*. 2007;55:1236-1242.

HORIZONTAL TRANSMISSION

- Horizontal transmission can occur in LTC due to high-risk patients
  - Invasive devices and procedures have increased[13]
    - Central lines, feeding tubes, dialysis, IV antibiotics, trachs[13]
  - Population includes more acute and sub-acute patients treated previously in hospitals[13]
    - Staff not given appropriate education
  - Changing infection control provider without expertise[13]

13.Nicolle, LE et al. Antimicrobial Use in Long Term Care Facilities, Infection Control and Hospital Epidemiology. 2000; 21: 537-545

PIPELINE FOR ANTIBIOTICS

2009[7]

- Only 15-16 antibiotics are in development
- Only 8 of these have activity against key Gram negative bacteria
- None have activity against bacteria resistant to all current drugs

2015[14]

- 39 antibiotics currently in clinical development
- 11 of these antibiotics have expected activity against resistant gram negative ESKAPE pathogens (*Enterobacter*, SA, *Klebsiella*, *Acinetobacter*, pseudomonas, enterococcus)
- 17 of these antibiotics have expected activity against 3 CDC urgent threat pathogen (CRE, CDI, AR gonorrhea)

14.Antibiotics currently in clinical development. December 17, 2015. www.pewtrusts.org/en/multimedia/data-visualizations/2014/antibiotics-currently-in-clinical-development

ANTIBIOTIC MAJOR RISK FACTOR FOR *CLOSTRIDIUM DIFFICILE* INFECTION (CDI)[15]

Increases in CDI risk are observed with increased cumulative dose, number of antibiotics, and days of ATB therapy[15]

Risk of CDI compared to resident on 1 antibiotic

	NUMBER OF ATBS	
2 ATBs	3-4 ATBs	5+ ATBs
2.5 times higher	3.3 times higher	9.6 times higher

Risk of CDI compared to resident on ATBs for <4 days

	DAYS OF ANTIBIOTIC	
4-7 days	8-18 days	>18 days
1.4 times higher	3 times higher	7.8 times higher

15.Epson,E. Orange County CDI Prevention Collaborative: Antimicrobial Stewardship. CDPH. November 5, 2015. Permission granted for use of this slide by Dr. Erin Epson. Original slide reference: Stevens et al. Clin Infect Dis. 2011;53(1):42-48

"Over- prescribing is a serious problem. Using antibiotics when they aren't needed is one of the main causes of antibiotic resistance. So we need to give doctors the information and guidance they need to make the right call in hard situations."

President Barak Obama

Microsoft clipart Office 2013

16.Washington Times. Obama pushes $1.2 billion plan to fight drug-resistant bacteria. March 27, 2015. http://www.washingtontimes.com/news/2015/mar/27/obama-pushes-12-billion-plan-fight-drug-resistant-/

CMS PROPOSED REQUIREMENTS

- President Obama's PCAST (President's Council of Advisors on Science and Technology) released a report on Combating Antibiotic Resistance, September 2014
- June 2015 the White House convened a Summit on Antibiotic Resistance and Stewardship
- On July 16, 2015 CMS proposed a revision of the requirements that LTCFs must meet to participate in Medicare and Medicaid Programs (Federal Register Volume 80, No 136)
  - ✓ CMS proposes a reform requiring facilities to designate an Infection Preventionist (IP) for whom the infection prevention and control program is their MAJOR responsibility and who would serve as a member of the facility's quality assessment and assurance committee.
  - ✓ In addition, the proposal states that the IP should receive training in infection control.
  - ✓ Proposal also states that each infection prevention control program (IPCP) include an antibiotic stewardship program.

CHALLENGES FOR ASP IMPLEMENTATION

- Aging associated changes
- Institutional Exposure
- Underlying co-morbidities which has greater risk for infection
- Increased use of invasive devices
- Pressure from resident families to order ATBs
- High prevalence of colonization of skin, urine and oropharynx (cultures often positive in absence of infection)
- Limited resources

17.Nicole LE, Antimicrobial Stewardship in Long Term Care Facilities: What is Effective? Antimicrobial Resistance and Infection Control 2014, 3:6. www.aricjournal.com/content/3/1/6.

CHALLENGES FOR ASP IMPLEMENTATION[17] (CONTINUED)

- Physicians not always on premises and may not see the resident before ATBs are prescribed
- Physicians may have reservations that their resident may be forgotten (if ATB not ordered), and early signs of sepsis may be missed if the ATB is not ordered
- Diagnostic services are off site
- Resident's lack of ability to communicate symptoms
- Atypical presentation of infection in the elderly and frail

CHALLENGES FOR ASP IMPLEMENTATION[17] (CONTINUED)

- On-call physician is often the one who receives the original "change-of-condition" report from nursing staff
- Physician's lack of confidence in LTC nurse's competence
- Pressure from resident and family members to order diagnostic tests and antibiotics
- Litigation concerns

Antibiotic Stewardship Program

Nursing Challenges

- The IP in LTC usually wears many hats
- Turnover of staff within facility is high
- High turnover of the designated IP
  - Lack of formal training of IP for infection control duties
- Lack of adequate time to perform all duties

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Where Do You Begin

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Core Elements

CORE ELEMENTS OF ANTIBIOTIC STEWARDSHIP FOR NURSING HOMES 5

Summary of Core Elements for Antibiotic Stewardship in Nursing Homes

Leadership commitment
Demonstrate support and commitment to safe and appropriate antibiotic use in your facility

Accountability
Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility

Drug expertise
Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility

Action
Implement **at least one** policy or practice to improve antibiotic use

Tracking
Monitor **at least one process** measure of antibiotic use and **at least one outcome** from antibiotic use in your facility

Reporting
Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff

Education
Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

- ✓ Design your antimicrobial stewardship program and policy in accordance with the CDC's 7 Core Elements
- ✓ Identify champions to lead your stewardship efforts (medical director, pharmacy consultant)
- ✓ Assign responsibility for overseeing activities in your facility
- ✓ Choose a focus for your activities
- ✓ Monitor one process and correlate to outcomes observed through tracking
- ✓ Provide feedback to all providers in your facility as well as to your staff
- ✓ Educate families, clinicians, and nursing staff on your practices to improve antibiotic use

18.Centers for Disease Control and Prevention. The Core Elements of Antibiotic Stewardship for Nursing Homes. http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html

WHERE DO WE BEGIN

Metrics That MATTER

- Obtain support and buy-in from Medical Director, Administrator and DON
- Create an ASP committee (meet monthly)
  - Members: Medical Director, DON, IP, Infectious Disease (ID) Pharmacist , Laboratory, ID doctor
- Narrow area of focus (low hanging fruit i.e., urinary tract infection (UTI) vs asymptomatic bacteriuria (ASB) may be a good starting point
- Decide on metrics to be used
- Create a policy for your stewardship program
- Begin educating nursing staff on goals & practices
- Consider developing working relationship with acute care IP and Pharmacist

19 Centers for Disease Control and Prevention. The Core Elements of Antibiotic Stewardship for Nursing Homes. http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html

STRATEGIES TO CONSIDER

- Develop communication protocols for reporting information to clinicians when infection may be suspected
- Establish best-practices for use of diagnostic testing
- Establish facility-specific management & treatment decision-algorithm (to be established by MD and Pharmacist)
- Implement policies on antimicrobial prescribing
- Utilize an "antibiotic time-out"
- Assessing resident 48-72 hours after ATB start to determine ongoing need and appropriateness of ATB chosen[1]
  - Changes to ATB selection may be based on resident's clinical condition or new diagnostic data[20,21]

20.Stone N. Applying the Core Elements of Antibiotic Stewardship in Nursing Homes. Presented at Infection Prevention & Control Conference. March 31, 2015. Permission granted for use of this slide by Dr. Nimalie Stone.

SAMPLE OF METRICS FOR URINARY TRACT EVENTS[21]

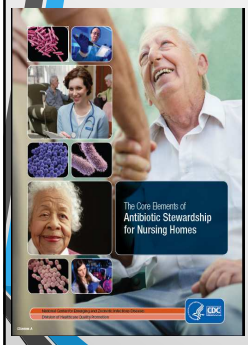
- # Urine Culture & Sensitivity (C&S) orders (started in NH)
- # of positive C&S
- # of ATB orders (started in NH)
- # of ATB orders for low colony count (less than 100,000 colonies)
- # of events that meet McGeer's Criteria
- # of days of ATB therapy
- # of ATBs ordered empirically
- # of *Clostridium difficile* tests ordered (in NH)
- # of *Clostridium difficile* positive tests (in NH)

21.Consultative collaboration between Dr. Rekha Murthy, Dr. Jake Scott, from Cedars Sinai (Cedars Sinai ASP Project) Dr. Amanda Kamali (CDC) and Dolly Greene (Diagnostic Laboratories). November 9, 2015. Written permission to use this slide from Dr. Murthy

HOW ARE LABORATORY TESTS USED?

- Assess the rationale for Urinalysis and C&S orders[20,21]
  - Are non-specific changes driving urine testing? (i.e., mental confusion, cloudy urine)[20]
- Assess specimen collection practices before ATB started[1]
  - Poor collection practices can lead to false positive results[1]
  - Are follow-up or "test-for-cure" cultures ordered?
  - Diagnostic tests can be positive without being clinically significant[20]
  - Diagnostic tests which are positive may indicate colonization rather than infection but still drive ATB treatment[20]

CONSULTANT LABORATORY[18]



Examples of laboratory support for antibiotic stewardship include:

- Developing a process for alerting the facility if certain antibiotic-resistant organisms are identified,
- Offering education for nursing home staff on the differences in diagnostic tests available for detecting various infectious pathogens (e.g., EIA toxin test vs. nucleic amplification tests for *C. difficile*), and
- Creating a summary report of antibiotic susceptibility patterns from organisms isolated in cultures

WHAT IS AN ANTIBIOGRAM?

An antibiogram is an "overall profile of antimicrobial susceptibility results" of bacteria to a battery of antimicrobial agents.

22.http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1151919/pdf/1893-04.pdf

WHAT IS AN ANTIBIOGRAM USED FOR?

- An antibiogram is an essential tool for any clinician when treating an infection empirically
  - Empiric treatment occurs prior to determination of a causative bacterial agent or its susceptibility results are known.
- An antibiogram can serve as an alternative to a C&S report until the results of a C&S are available
- An antibiogram can serve as an alternative to a C&S report if no organism is grown out of a C&S despite high clinical suspicion of an infection

PARTS OF AN ANTIBIOGRAM

Number of Isolates

Antibiotic	Aerococcus hydrophilus/viridans	Citrobacter freundii	Citrobacter koseri	Coagulase negative Staphylococcus	Enterococcus cloacae	Enterococcus	Escherichia coli	Escherichia coli ESBL CARBAPE	Klebsiella oxytoca	Klebsiella pneumoniae	Klebsiella pneumoniae ESBL CARBAPE	Morganella morganii	Proteus mirabilis	Providencia stuartii	Pseudomonas aeruginosa	Staph aureus coagulase	Staph aureus coagulase MRSA	Streptococcus mitis/oralis
	1	1	1	4	1	12	45	20	1	16	1	15	35	7	12	10	6	1
AMIKACIN	100	100	100		100		100	100	100	100	100	100	100	100	100			
AMPICILLIN	0					92	47	0	0	0	0	0	0	0				
AMPICILLIN/SULBACTAM	0						53	25	100	88	0	0	74	0				
BENZYLPENICILLIN				0		92										0	0	
CEFAZOLIN	0	0	100		0		96		100	100		0	97	0				
CEFEPIME	100	100	100		100		100		100	100		100	97	100	86			
CEFTAZIDIME	100	100	100		100		100		100	100		83	97	100	93			
CEFTRIAXONE	100	100	100		100		100		100	100		79	97	100				
CIPROFLOXACIN	100	100	100	25	100	33	57	0	100	100	100	83	51	43	43	10	0	
CLINDAMYCIN				25												10	33	
ERTAPENEM		100	100				100	100	100	100	100	100	100	100				
ERYTHROMYCIN				0		0										20	17	
GENTAMICIN	100	100	100		100		96	80	100	94	100	40	74	0	100			
GENTAMICIN HIGH LEVEL						100												
IMIPENEM	100	100	100				100	100	100	100	100	20	29	43	79			
LEVOFLOXACIN	100	100	100	25	100	42	50	0	100	100	100	60	51	43	43	10	0	100
LINEZOLID				100		100										100	100	
NITROFURANTOIN		100	100	75	0	92	96	80	100	42	100	0	0	0		100	100	
OXACILLIN MIC				25												100	0	
PIPERACILLIN/TAZOBAC		100	100		100		96	96	100	88		80	100	100	100			
QUINUPRISTIN/DALFOPR						0												
RIFAMPICIN					100											100	100	
STREPTOMYCIN HIGH LE						100												
TETRACYCLINE					100	0										100	100	
TIGECYCLINE						100												
TOBRAMYCIN	100	100	100		100		96	80	100	94	100	80	74	0	100			
TRIMETHOPRIM/SULFAME	100	100	100	75	100		53	60	100	81	0	20	69	57		100	100	100
VANCOMYCIN					100	83										100	100	

The greater the number of isolates, the more accurate the sensitivity results for the given organism

Minimum should be 10-30

23.Comprehensive Antibiogram Toolkit: Phase 2 Antibiogram Specific . Agency for Healthcare Research and Quality. https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/patient-safety-resources/resources/ic-antibiotic/module2/toolkit2/phase2/phase2-ph2.pdf

PARTS OF AN ANTIBIOGRAM

% Susceptible

Antibiotic	Aerococcus hydrophilus/viridans	Citrobacter freundii	Citrobacter koseri	Coagulase negative Staphylococcus	Enterococcus cloacae	Enterococcus	Escherichia coli	Escherichia coli ESBL CARBAPE	Klebsiella oxytoca	Klebsiella pneumoniae	Klebsiella pneumoniae ESBL CARBAPE	Morganella morganii	Proteus mirabilis	Providencia stuartii	Pseudomonas aeruginosa	Staph aureus coagulase	Staph aureus coagulase MRSA	Streptococcus mitis/oralis
	1	1	1	4	1	12	45	20	1	16	1	15	35	7	14	10	6	1
AMIKACIN	100	100	100		100		100	100	100	100	100	100	100	100	100			
AMPICILLIN	0					92	47	0	0	0	0	0	0	0				
AMPICILLIN/SULBACTAM	0						53	25	100	88	0	0	74	0				
BENZYLPENICILLIN				0		92										0	0	
CEFAZOLIN	0	0	100		0		96		100	100		0	97	0				
CEFEPIME	100	100	100		100		100		100	100		100	97	100	86			
CEFTAZIDIME	100	100	100		100		100		100	100		83	97	100	93			
CEFTRIAXONE	100	100	100		100		100		100	100		79	97	100				
CIPROFLOXACIN	100	100	100	25	100	33	57	0	100	100	100	83	51	43	43	10	0	
CLINDAMYCIN				25												10	33	
ERTAPENEM		100	100				100	100	100	100	100	100	100	100				
ERYTHROMYCIN				0		0										20	17	
GENTAMICIN	100	100	100		100		96	80	100	94	100	40	74	0	100			
GENTAMICIN HIGH LEVE						100												
IMIPENEM	100	100	100				100	100	100	100	100	20	29	43	79			
LEVOFLOXACIN	100	100	100	25	100	42	50	0	100	100	100	60	51	43	43	10	0	100
LINEZOLID				100		100										100	100	
NITROFURANTOIN		100	100	75	0	92	96	80	100	42	100	0	0	0		100	100	
OXACILLIN MIC				25												100	0	
PIPERACILLIN/TAZOBAC		100	100		100		96	96	100	88		80	100	100	100			
QUINUPRISTIN/DALFOPR						0												
RIFAMPICIN					100											100	100	
STREPTOMYCIN HIGH LE						100												
TETRACYCLINE					100	0										100	100	
TIGECYCLINE						100												
TOBRAMYCIN	100	100	100		100		96	80	100	94	100	80	74	0	100			
TRIMETHOPRIM/SULFAME	100	100	100	75	100		53	60	100	81	0	20	69	57		100	100	100
VANCOMYCIN					100	83										100	100	

An antibiotic with a greater % susceptibility will be more likely to eradicate the organism than an antibiotic with a lower % susceptibility.

LIMITATIONS OF AN ANTIBIOGRAM

- Concentration differences of antibiotics between site of infection in the body and in vitro (in the lab).
  - Penetration to the site of infection
  - Inactivation of drug at site of infection
  - Declining levels in vivo vs. continuous level in vitro
- Resistance may develop more rapidly in vivo (in the body) vs. in vitro (in the lab).
- Inaccurate information due to small isolate number.
- Repeat data from the same patient may skew susceptibility percentages.

ANTIBIOGRAM IMPLEMENTATION

- Only a patient's treating physician or non-physician practitioner can determine if and when empiric antibiotic treatment should be implemented.
- Once this decision is made, an antibiogram provides information on the expected efficacy of specific antibiotics based upon the facility's current and historic susceptibility data.
- Proper use of an antibiogram may lead to higher levels of empiric efficacy, thus faster treatment, and better patient clinical outcomes leading to potential financial savings as well.
- Implementation of an antibiogram as a core element of an Antibiotic Stewardship Program concurs with current CDC and CMS recommendations.

SAMPLE EMPIRIC THERAPY DEVELOPED FROM FACILITY ANTIBIOGRAM FOR UTI[24]

INFECTION/ DIAGNOSIS	LIKELY PATHOGEN	JHA INITIAL TREATMENT	IDSA EMPIRIC TREATMENT	ALTERNATIVE TREATMENT/ COMMENTS
Cystitis (UTI) uncomplicated	*E. coli*, *Klebsiella*, *Staph aureus*, coagulase negative *staph*	Cephalexin 250-500mg PO q6h x 3-7 days	Bactrim DS 1 tablet BID x 3days	Penicillin allergy: Bactrim DS 1 tab BID x3days
Cystitis (UTI) complicated	*E. coli*, *Klebsiella*, *Staph aureus*, coagulase negative *staph*	Cephalexin 250-500mg PO q6h x 7-14 days	Ciprofloxacin or Levofloxacin x 5-10 days	Penicillin allergy: Bactrim DS 1 tablet x 7days
Pyelonephritis Uncomplicated	MRSA, *Enterobacteriaceae* (*E. coli*, *Klebsiella*, *Proteus*, *Enterococcus*	Piperacillin/ Tazobactam 2.25mg IV q6h	Ciprofloxacin or Levofloxacin (use only if *E. coli* sensitivity is >80% OR ↓	Penicillin allergy: Aztreonam 500mg-1g IV q8-12h and Vancomycin IV (per pharmacy protocol)
Pyelonephritis Complicated (Foley, instrumentation, underlying disease)	Enterobacteriaceae (*E. coli*, *Klebsiella*, *Proteus*, *Pseudomonas*, *Enterococci*), *Staph* spp.	Piperacillin/ Tazobactam 2.25mg IV q6h	Bactrim DS 1 Tablet PO BID (use only if E. coli sensitivity >80%)	Remove change Foley/nephrostomy tube

24.This table was developed by the pharmacy department at Los Angeles Jewish Home for the Aging – Joyce Eisenberg Keefer facility. Permission to use this table granted by Jewish Home Organization July 29, 2016, Administrator Ilana Grossman. Acknowledgment given to Janice Hoffman Pharm.D., Elizabeth Kirby PN, Antoinette Bonaventure Pharm.D Candidate 2017 and Shakondhi Dhanjal Pharm.D Candidate 2017

TRACK OUTCOMES FROM ATB USE

- Monitor ATB prescribing patterns
  - Look at prescribing process measures
  - Thorough resident assessment and documentation
  - Appropriateness of ATB choices
- Antibiotic use measures
  - Point prevalence of ATB usage (snapshot of use)
  - New ATB starts and days of therapy (started in facility)
- Outcome measures
  - Correlate ATB use with Clostridium difficile and MDROs
  - Adverse events and/or costs related to ATB use
- Track improvement of susceptibilities on antibiogram

25.Stone N. Applying the core elements of antibiotic stewardship in nursing homes. Presented at Infection Prevention & Control Conference. March 31, 2015 Permission granted for use of this slide by Dr. Nimalie Stone from CDC.

SHARE THE DATA[25]

- Give regular feedback to providers and facility staff
  - Give provider-specific feedback
  - Feedback makes providers aware of their practices and how they compare to other providers
- Data is most powerful when shared
  - Enlighten everyone in your facility of important resident outcomes related to ATB use
- To sustain change, show clinicians and staff the impact of their stewardship efforts

WHAT'S IN IT FOR THE LTC FACILITY?

- Improved resident safety
- Stronger staff knowledge and skills regarding infection prevention and control
- Enhanced resident, family, and staff satisfaction
- Potential for improved compliance with survey requirements related to quality of care, infection control and more
- Improved relations with referring hospitals
- Decreased costs

IN SUMMARY

- Microorganisms are mutating and developing resistance These are common organisms found in and on the human body which contribute to higher morbidity & mortality
- Over utilization and inappropriate use of antibiotics contributes to the increasing problem of MDRO development
- Maintaining best practices in infection control protocols can prevent transmission of infections
- Using antibiotics judiciously can decrease antimicrobial resistance while avoiding adverse reactions, and decreasing costs.
- Utilize the 7 Core Elements of ASP for NH

QUESTIONS?

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21. Consultative collaboration between Dr. Rekha Murthy, Dr. Jake Scott, from Cedars Sinai (Cedars Sinai ASP Project) Dr. Amanda Kamali (CDC) and Dolly Greene (Diagnostic Laboratories). November 9, 2015. written permission to use this slide from Dr. Murthy.

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